Environmental Education in Urban Green Space: Understanding Educator Practice

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ENVIRONMENTAL EDUCATION IN URBAN GREEN SPACE:
UNDERSTANDING EDUCATOR PRACTICE

A Dissertation Presented

by

Jennifer M. Klein

Submitted to the Graduate School of Education
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Environmental Education in Urban Green Space: Understanding educator practice

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Individually Designed Specialization

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ABSTRACT

Over the past 10 years, urban ecosystems have gained attention and interest among environmental education scholars and practitioners alike. This is thought to be due to increased awareness of the growing human population, the percentage of land across the world now classified as urban, and an overall understanding that urban systems are unique ecological systems worthy of their own approach to environmental education programming. To date, much urban environmental education in urban systems has focused on program participant outcomes—social, emotional, and academic.

This mixed-methods study introduces a middle-range framework through which to understand the instructional practice of environmental educators who teach in urban ecosystems. This study explored the ways in which urban environmental educators who teach in urban green spaces think about and approach their work from the perspective of teaching practice, teaching methods, and programmatic content. Participants consisted of a small (12) case-study group of environmental educators in one city, plus a large (96) nationwide sample.

Findings show no one central instructional practice or teaching method employed by urban environmental educators. Although urban environmental educators drew on a myriad of instructional approaches and methods, they primarily approached their work through the lens of ecological literacy, science education, and applied conservation. The results reveal a wide range of content areas addressed in urban environmental education programs. This study provides an overview of practice and brings to light some questions about instructional or programmatic intentions versus realities.

Keywords: urban environmental education, urban green space, teaching practice
CHAPTER 1

Introduction

In *The Culture of Cities*, the famed humanist and urban critic Lewis Mumford (1938) cautioned against separating the human world from the natural world in the development of cities. He noted that cities are a part of the earth and stressed the importance of treating them as both a part of nature and a work of art: Cities should be places that feed the human soul spiritually and naturally. At the time of Mumford's writing in 1938, only 65 million people (50% of the population) in the United States lived in urban areas compared to over 270 million (81% of the population) today (United States Census Bureau, 2015, 2016, 2017a). Although the problems of separating the human from the natural world in cities was recognized in the early 1900s, until recently, urban development and the environmental movement in U. S. cities have done little to answer Mumford's call.

For years, urban planning favored economic growth over sustainability (Breuste & Qureshi, 2011), conservation favored land preservation in areas with no human presence (Mace, 2014), and environmental education favored teaching in wilderness areas over urban areas (Dixon, 2002). Scientists headed to exotic places to conduct research, families took vacations to remote locations to deeply experience and connect with nature, and educators hopped on buses to visit rural wildlife preserves. Little attention was paid to how human activity and natural systems were connected (Kareiva & Marvier, 2012) and, therefore, some ecologists and educators continued to share a belief that cities and nature do not mix.
Many scientists believe our planet has entered the Anthropocene Era (Houston, 2013; Norström et al., 2014; Seidl et al., 2013; Steffen, Crutzen, & McNeill, 2007; van der Pluijm, 2014; Wiens & Hobbs, 2015), an era in which no ecosystem on earth will remain unaffected by the actions of urbanization. As such, more people will reside in cities, and more landscapes will become novel (Standish, Hobbs, & Miller, 2013). To mitigate any human disconnect from the natural world, there may be a greater need to focus on urban areas (Blaustein, 2013; Miller & Hobbs, 2002; Pereira et al., 2006). Humans are faced with global ecological issues concerning climate change, loss of biodiversity, collapsing fisheries, and water shortages, as well as psychological, sociological, and educational issues concerning human disconnect from the natural world. Along with these global challenges, cities have had an increasing prominence in our world's landscapes. Our global population is over 7.3 billion people (United States Census Bureau, 2016). Most of this population growth is occurring in cities.

These populations are projected to continue to grow; therefore, urban landscapes are becoming an important focal point in environmental education as well as other disciplines. Within the fields of urban ecology (Forman, 2014; Gaston, 2010; Niemela, 2012), sociology (Boone, Buckley, Grove, & Sister, 2009; Capek, 2010), psychology (Moskell & Allred, 2013), public health and medicine (Lindland, Fond, Haydon, & Kendall-Taylor, 2015; Shanahan et al., 2015; Tzoulas & Greening, 2012), and environmental education (J. Brown, Byron, Corrao, Hecht, & King, 2015; Cornell University, 2015; Kudryavtsev & Krasny, 2012), recent attention has been placed on urbanization and the natural environment. Much of this research focused on the role and importance of green space in urban areas for both people and the natural world. As such,
it may be surmised that engaging and educating urban audiences in urban green space may produce long-term benefits to both the human and nonhuman world. Indirect outcomes from teaching and learning in urban green space may include enhanced human health and wellness, and increases in native biodiversity and species richness.

Because most of our population resides in cities and green space has proven a growing topic of study, it is important to examine the many ways in which people understand, use, and engage in these spaces. One way to deepen our understanding of urban green space, particularly as it relates to environmental education, is to investigate the work educators do in these spaces. This dissertation addresses the question of how environmental educators working in urban green space(s) in one U.S. city articulated their approach to environmental education.

There are differing opinions about what urban environmental education is (Fialkowski, 2003; Kudryavtsev & Krasny, 2012), what constitutes urban environmental education (Barnett, Vaughn, Strauss, & Cotter, 2011; Kollmuss & Agyeman, 2002), and how it is approached or practiced by environmental educators (Russ & Krasny, 2015). Despite these varied viewpoints on urban environmental education, and aside from the work of Kudryavtsev, Stedman, and Krasny (2011), the majority of recent urban environmental education research studies have emphasized student-learner outcomes related to programming in urban areas with urban audiences. These outcome-related studies focused on concepts to enhance science education, such as citizens science (Matteson, Taron, & Minor, 2012; C. Wilson & Godinho, 2013), field-based science projects (Barnett, Lord et al., 2006; Barnett, Vaughn et al., 2011), inquiry-based teaching and learning (Endreny, 2010; Harnik & Ross, 2004), and STEAM education (Robelen,
pillars aimed at building ecological literacy, such as connection to place (Budruk, Thomas, & Tyrrell, 2009; Kudryavtsev, Stedman et al., 2011; Powers, 2004), enhanced systems thinking (Monroe, Plate, & Colley, 2015; Moskell & Allred, 2013), and outdoor experiences (Almeida, Bombaugh, & Mal, 2006; Ferreira, Grueber, & Yarema, 2012), and engagement in applied conservation of place through stewardship, restoration, and civic ecology (A. Bell, 2001; Dolan, Harris, & Adler, 2015; Krasny & Tidball, 2009).

Many positive outcomes are associated with urban environmental education programs, but the outcomes may not be fully understood without also looking at programming goals and the approach of the educator or leader who teaches the program. Although commonly discussed in formal education circles (Darling-Hammond, 2000; Wenglinsky, 2002), investigating education practice has been less common in environmental education. Kudryavtsev and Krasny's (2012) and Russ and Krasny's (2015) reviews and associated research of underlying urban environmental education goals concluded that urban environmental education programming follows five identifiable trends. These trends include using the city as a classroom, urban areas as platforms for problem solving, urban space for environmental stewardship, environmental education in cities to enhance youth development, and urban areas as a context to enhance participant understanding of the city as a social-ecological system. In addition to Russ and Krasny's work, Schusler and Krasny (2010) found that youth development was an important instructional approach for environmental educators in the context of urban environmental action. These studies provide a strong foundation on which to better understand the work urban environmental educators do. This research aims to build on the works of Kudryavtsev, Schusler, and Krasny and look more closely
at urban environmental educators from a myriad of organizations by specifically inquiring into the ways urban environmental educators think about the work they do.

Understanding urban environmental education practitioners—how they articulate their approach to their practice, what they do, how they think about their work, and why they do this work—will further illuminate the existing literature that supports both affective and effective outcomes for environmental education participants. Additionally, this study of urban environmental educators will identify future research opportunities and gaps for the field of environmental education, particularly as it pertains to understanding educator practice.

Urban environmental educators come to the field of environmental education from a multitude of paths and backgrounds (Russ, Peters, Krasny, & Stedman, 2015; Volk, 2003). Some educators may have solid foundations in effective pedagogy (Bainer, Cantrell, & Barron, 2000), some may have knowledge of different teaching practices or training in urban environmental education, whereas others may have little practice or pedagogy knowledge but be well versed in urban systems and related social or environmental content areas. Because environmental educators are a central component of any environmental education program (Volk, 2003), deeply exploring environmental educators' work provides a more complete picture of what happens in environmental education programming. Overall, the aim of this study is to understand how urban environmental educators who teach in urban green space(s) approach their work.

Although the literature differs on some definition, within this research, the terms are defined as follows:
Ecological (environmental) literacy: The ability to understand, and to act on those understandings, how people and societies relate to one another and to natural systems in a sustainable manner (Orr, 1990).

Environmental education practice: Carrying out or applying the act of teaching environmental education, a process by which individuals, communities, and organizations learn more about the environment and develop skills and understanding of how to address global challenges (North American Association for Environmental Education, 2015).

"Friends of" organizations: Groups whose work focuses solely on one local organization with the aim of beautification, preservation, or engagement of a particular site.

Nature-based organizations: Organizations whose work focuses on nature appreciation and stewardship of the nonhuman world.

Social justice-based organizations: Groups whose work focuses on environmental issues as a means of enhancing health, rights, and equality of community members.

STEAM: Science, technology, engineering, arts, and math.

UEETP: Urban environmental education teaching practices.

Urban agricultural site: Places for "the growing, processing, and distribution of food and other products such as flowers through intensive plant cultivation and animal husbandry in and around cities" (K. Brown & Carter, 2003, p. 3).

Urban area: An area physically dominated by human-constructed spaces (roads and other impervious surfaces, business buildings, housing, industry) with a population of over 175,000 and a population density greater than 1,600 people per square kilometer that relies on resources from surrounding areas.
Urban ecology: The study of the intersections and interactions between natural and social systems in urban communities with populations greater than 70,000 and population densities greater than 3,000 per square kilometers where humans are the keystone species.

Urban environmental education: Experiences that provide opportunities to learn about the ways in which people interact with, view, steward, and learn about ecology of and in cities—in urban ecosystems, as residents, teachers, and learners who live, work, play, and teach in the urban environment

Urban green space: An unbuilt area of a city, such as a wooded area, lawn, urban agriculture site, wetland, successional habitat (including brownfields and vacant lots), park, or combination green space area such as a cemetery.
CHAPTER 2

Literature Review

Urban Areas and Urban Ecology

Fundamental to the understanding of urban environmental education, and specifically urban environmental education that occurs in urban green spaces, is an understanding of urban places and spaces, as Figure 1 illustrates. The sections that follow provide an overview of how an urban area may be defined, as well as two distinct approaches to understanding urban ecosystems.

Figure 1. A review of urban environmental education (EE) in urban green space.

Urban Area

What constitutes an urban landscape in the United States and how is the term urban perceived? To understand urban environmental educational practices, there should first be an understanding of what urban means. To a rural forester, rancher, or farmer in
the mountains and plains of the Western United States, an urban area may be the closest city, which could be 2 hours away with a population of 500. However, a family born and raised in the populous east coast of the United States is unlikely to think of a small mountain town as urban. Instead, they might describe urban as the Interstate 95 corridor between Washington, District of Colombia and Boston, Massachusetts.

Merriam-Webster ("Urban," 2016) defined *urban* as "of, related to, characteristic of, or constituting a city." The United States Census Bureau (2010) defined *urban areas* as populated regions with a density of 1,600 people per square kilometer or greater and a minimum population of 2,500. Most major cities in the United States, including New York, Chicago, Boston, Detroit, and Denver carry population densities of greater than 2,500 people per square kilometer and populations over 100,000. Merriam-Webster's definition was vague ("Urban," 2016), whereas the census definition allowed many small cities and towns to fit the category of urban (United States Census Bureau, 2010). Berkowitz, Nilon, and Hollweg (2003) described *urban areas* as identifiable places with defined or fixed boundaries and a high human population density, whereas Gaston (2010) explained that the cutoff between what is and is not urban is often arbitrary. Without including a specific numeric framework, Francis and Chadwick (2014) broadly interpreted the term to include a high proportion of built environment and a high population density within a regional context. Thus, the definition of *urban* varies depending on the frame of reference—landscape, infrastructure, and people.

It is significant to note that the inclusion of landscape type and functionality is absent in most definitions (Berkowitz, Hollweg, & Nilon, 2003; Boone et al., 2009; "Urban," 2016). Pulling from the definitions of Francis and Chadwick (2014), Berkowitz,
Nilon et al. (2003), and the United States Census Bureau (2010), in this study, *urban* is defined as an area physically dominated by human-constructed spaces (roads and other impervious surfaces, business buildings, housing, industry) with a population of over 175,000 and a population density greater than 1,600 people per square kilometer that relies on resources from surrounding areas. This perspective integrates physical attributes, population size, population density, and resource-economic functionality and allows inclusion of most major cities in the United States. For example, Boston has a population of 650,000 with a population density of 5,000 people per square kilometer (United States Census Bureau, 2013). Although Boston has green space, like many U.S. cities, it does not grow enough food internally to support its residents and roads, and buildings dominate its landscape (Forman, 2014).

**Urban Ecology**

Urban ecology developed as a discipline in the 1970s. It has grown from an area of study reserved for ecologists to one that encompasses a variety of disciplines. Currently, the field of urban ecology includes the fields of landscape architecture, urban planning, sociology, education, conservation biology, and sustainability and studies a range of topics from species richness and conservation to human wellness and sustainable development (McDonnell, 2012).

Ecologists have approached and defined urban ecology in two ways: ecology *in* cities and ecology *of* cities. The former uses a traditional natural-science approach, whereas the latter blends sociological and natural-science approaches. Gaston (2010) and Francis and Chadwick (2014) took an ecology-in-cities approach by defining *urban ecology* as the study of urban habitats (buildings, walls, parks, gardens, etc.), interactions
between organisms and the environment, and flows of energy and materials through urban systems. Forman (2014) offered a broad definition of urban ecology, describing it as the study of interactions of organisms, built structures, and the physical environment where people are concentrated. McDonnell (2012) took an ecology-of-cities approach, defining urban ecology as the integration of both basic and applied natural and social science research to explore and elucidate the multiple dimensions of urban ecosystems. Blending the two approaches to urban ecology and pulling from the works of Gaston (2010), McDonnell (2012), Francis and Chadwick (2014), and Forman (2014), an ecology-of-cities approach can be defined as the study of the intersections and interactions between natural and social systems in urban communities with populations greater than 70,000 and population densities greater than 3,000 per square kilometers where humans are the keystone species.¹

Tomalty (2009) asserted that the ecology-of-cities approach requires extensive collaboration between ecologists as well as other professionals such as hydrologists, engineers, landscape architects, educators, and sociologists. He went on to explain that interdisciplinary approaches are difficult to pull together but have the potential to contribute to our understanding of complex systems in new ways. By understanding the interconnected relationships and systems in cities, urban ecologists aim to develop

¹ A keystone species has a disproportionately large effect on its ecosystem relative to its abundance, causing drastic changes in community diversity and abundance (Primack, 2014).
sustainable communities that are rich in biodiversity while providing opportunities for humans to learn about and connect with the natural world.

The United States has lagged behind many European and Asian cities when it comes to urban ecological initiatives (McDonnell, 2012; Newman & Jennings, 2008). Although successful, long-term citywide urban ecosystem studies have been conducted only in a few U.S. cities—Baltimore, Maryland, Washington, District of Columbia, and Phoenix, Arizona (Grove, Pickett, Whitmer, & Cadenasso, 2012; Pickett & Cadenasso, 2006; Pickett et al., 2008; Spiess, 2007). The lack of long-term studies in the area of urban ecology in U.S. cities presents an opportunity to research the many ways cities can be used as urban environmental educational platforms.

**Green Spaces**

Urban areas are filled with different types and layers of unique and complex ecosystems worthy of study. Within an urban ecosystem are remnants of natural habitats (fields, forest, and wetlands), novel habitats (city parks and greenways), and unique urban habitats such as rooftop gardens, urban farms, and impervious landscapes (Standish et al., 2013). Both built and natural areas may provide different opportunities for learning. Although much learning can occur by examining unique urban habitats such as areas with a high density of people, buildings, and roads, the most commonly cited platform for small-scale urban ecological studies and teaching environmental education is urban green space (Almeida et al., 2006; Bendt, Barthel, & Colding, 2013; Blair, 2009; J. Brown et al., 2015; Douglas & Ravetz, 2011; Forman, 2014; Glackin & Jones, 2012; Newman & Jennings, 2008; Platt, 2014). Forman (2008, 2014) asserted that urban green space consists of unbuilt areas such as wooded areas, lawns, yards, urban agriculture sites,
wetlands, successional habitats including brownfields and vacant lots, parks, and combination green space areas such as cemeteries. These areas provide platforms for both sociological and natural science approaches to understanding urban ecosystems.

The majority of green space areas in cities are located in or near high income residential areas (Francis & Chadwick, 2014). Green space planning and placement has faced much criticism in recent years because of accessibility, usability, and placement issues (Agyeman, 2005; Agyeman & Evans, 2003; Anguelovski, 2014; Chawla & Salvadori, 2003; Lindland et al., 2015; Platt, 2014; Seymour, 2012). Studies have found that although some traditionally underserved communities have easy access to parks, the quality of those parks and the amount of acreage is inferior to those in wealthy urban communities (Boone et al., 2009; Heynen, 2004; Lindland et al., 2015). Put another way, low-income communities often have access to small-scale playgrounds, pocket parks, or vacant lots, but little access to large-scale multiuse green spaces. Therefore, understanding the role urban green space plays in urban environmental education may need to take into account the socioeconomics of any given neighborhood, city, or community, along with the type and quality of green space being explored.

The literature on the various types, uses, and modes of accessing urban green space is quite prolific and cannot all be addressed within the scope of this paper. Instead, the following sections focus on opportunities for environmental education within public parks and urban agriculture sites and green spaces with a historically high degree of community engagement, education, and access. The long-standing use and functionality of these important spaces may be attributed to their close proximity to residential areas and schools, inviting opportunities for environmental education.
**Parks.** An urban park offers one area in which to engage in urban environmental education. Parks as green space include traditional parks with playgrounds and sports fields, nature preserves, pocket parks, and plazas (Ryan, 2006). Public parks are among the largest and most continuous vegetated areas in cities. Their benefits include recreation, aesthetics, local climate control, other ecosystem services, and economic prosperity (Forman, 2014; Francis & Chadwick, 2014). Parks can provide urban residents with beautiful spaces to recreate and learn, while serving as a tool to sequester carbon, mitigate floods, and increase property values. They range in size from a city square of less than 300 square feet to over-700-acre parks, such as Central Park in New York City (Forman, 2014). Although the exact acreage of urban parks in the United States is unknown, it is estimated to be over one million acres (Harnik, 2006).

These green spaces have been a key component of urban area design and planning since the 17th century. In the United States, the majority of urban parks were established in the late 1800s and early 1900s. This city park movement was led by visionary civic leaders who saw parks as a necessity for urban development and intended their use for enjoyment by all urban citizens (Platt, 2014). Throughout the late 1800s and early 1900s, the likes of Fredrick Law Olmsted, George Kessler, H. W. S. Cleveland, and Charles Eliot were actively building large-scale parks such as New York City's Central Park, Boston's Emerald Necklace, Detroit's Belle Isle, St. Louis's Longview Farm, and Providence's Roger Williams Park (Girling & Kellett, 2005). The vast majority of urban parks, especially those in older U.S. cities, were originally developed in the 1800s; however, they are still heavily used for conservation, recreation, and environmental education (Forman, 2008, 2014; Grant, Middendorf, Colgan, Ahmad, & Vogel, 2012;
Except in newer cities such as Phoenix, Los Angeles, Salt Lake City, and Seattle, since the early 1900s, few new large-scale urban parks have been developed in the United States (Harnik, 2006; Platt, 2014). Lack of space to build new parks, the rise of suburbia, the increasing use of automobiles and highway development, and urban decay and disinvestment are reasons given for the decline in urban park development throughout the mid- to late-20th century (Girling & Kellett, 2005; Harnik, 2006; Platt, 2006, 2014). This appears to be especially true for cities such as Boston, New York, Detroit, and Philadelphia. Urban park improvement and development did not become a central part of urban design again until the 21st century. The new millennium brought a new population (primarily young adults), grassroots reclamation, and investment into cities that, in turn, allowed reinvestment and redevelopment of parks throughout the United States (Harnik, 2006).

Parks are especially unique in the opportunities they offer urban residents and hold an interesting history. Most urban parks were developed originally as resources for low socioeconomic urban residents (J. Johnson & Hurley, 2002). In discussing Fredrick Law Olmsted's goal for park development, Platt (2014) explained that Olmsted wanted to provide opportunities for those who did not have the resources to travel to wilderness areas, such as national parks, to experience the natural world. However, today, many cities struggle with fair and equitable access to parks. According to urban planning and policy professor Julian Agyeman, aside from small-scale neighborhood parks, the poorest urban residents now tend to have the least access to large-scale quality parks (personal communication, November, 2014). Urban residents with the highest means now dominate the use of most large-scale parks such as New York's Central Park and Boston's Emerald
Necklace (Agyeman, 2005; Seymour, 2012), whereas residents in lower income neighborhoods are left with parks that are smaller, more developed, and contain less trails and trees (Fuller, Irvine, Devine-Wright, Warren, & Gaston, 2007; Ibes, 2014). Access to parks may be an environmental justice issue.

**Urban agriculture sites.** Although urban parks are a popular form of urban green space for human engagement, urban agriculture sites have become increasingly popular. These sites can be defined as places for "the growing, processing, and distribution of food and other products such as flowers through intensive plant cultivation and animal husbandry in and around cities" (K. Brown & Carter, 2003, p. 3). They include any urban green space that has public or community access and is managed according to community needs (Ferris, Norman, & Sempik, 2001). These spaces include community gardens, schoolyard gardens, and urban farms. It is worth noting that within the context of urban ecology, agriculture sites are defined differently than gardens. Although urban residents and educators refer to agriculture sites as "gardens" (i.e., community or schoolyard), within the field of urban ecology, the term *garden* typically refers to green spaces that are either publicly and privately held and function primarily for aesthetics and landscaping (Forman, 2008, 2014; Francis & Chadwick, 2014; Niemela, 2012). For example, residential yards and commercial lawns are classified as *gardens* within urban ecology literature, whereas community and schoolyard gardens and urban farms would be classified as *agriculture sites*.

Urban agriculture sites can vary in size from a single pollinator or vegetable bed to large-scale lots or urban farms comprising several acres of land. They can be found in both densely populated urban centers and semi-urban areas on the outskirts of the city.
These spaces are unique because they are capable of integrating urban restoration, activism, social interactions, education, cultural expression, and food security. As such, agriculture sites provide a context for learning while addressing societal goals (Krasny & Tidball, 2009). Their primary purpose can include any combination of food production, land reclamation, leisure, education, or therapy. The literature on urban agriculture is vast and all cannot be addressed within the scope of this paper. Some may not consider agriculture sites that are primarily used for social or aesthetic spaces as urban agriculture. However, this study's focus is on urban agriculture sites used for a variety of purposes that encompass community gardens, schoolyard gardens, and urban farms.

Like parks, urban agriculture has been a part of the urban landscape as long as cities have existed. Agriculture within cities has been the foundation of urban development since the times of the ancient Greeks and Romans. Without agriculture, cities would not exist (Kostof, 1991). Over time, large-scale urban agriculture development was pushed out of cities and into more rural communities—especially in the United States, where land outside of city centers was abundant and cheap, allowing large-scale industrial agriculture to develop (K. Brown & Carter, 2003).

Despite the decline of large-scale agriculture in U.S. cities, urban agriculture did not disappear; rather, it evolved into small grassroots and community-based initiatives. The community and schoolyard garden movements likely originated from European allotment gardens in the mid-1800s (Lautenschlager & Smith, 2007). Widespread interest in urban agriculture in U.S. cities did not emerge until the 1970s (Firth, Maye, & Pearson, 2011; Turner, Henryks, & Pearson, 2011). As more urban communities struggle to educate young people, rehabilitate degraded landscapes, create more green space, and
provide fresh food for community members, urban agriculture has seen resurgence in the United States (Firth et al., 2011; Lautenschlager & Smith, 2007; T. Smith & Parpia, 2014). Unlike large parks, urban agriculture sites are more commonly used by urban residents of lower socioeconomic status (Lautenschlager & Smith, 2007; Lawson, 2005; Standish et al., 2013; Turner et al., 2011). As such, they may be the primary spaces in which to engage urban residents of lower socioeconomic status in educational programs.

**Urban Environmental Education**

Environmental education has occurred in cities for decades. "Studying urban ecosystems is not a new frontier for science or for urban planning, but it may be for education" (Spirn, 2003, p. 202). Urban environmental education is an emergent subarea of environmental education that transcends many other fields within education and the sciences. In a review of urban environmental education literature, Kudryavtsev and Krasny (2012) found that urban landscapes were being identified as learning platforms as early as 1901, and urban environmental education, as it currently stands, emerged after educators realized that environmental education (as a profession) needed to focus more on urban areas and urban citizens.

The North American Association for Environmental Education (2015) described environmental education as a pedagogy that teaches children and adults how to learn about and investigate their environment and to make intelligent, informed decisions about how they can take care of it, but does not provide a separate definition for urban environmental education.

Kudryavtsev and Krasny (2012) noted that many environmental educators described their work as *urban environmental education*; however, the term was rarely
defined within the literature. Russ and Krasny (2015) considered urban environmental education as any environmental education that occurs in cities. However, this definition did not necessarily distinguish the complexity of cities (sociological issues, natural systems, natural areas, built environments, etc.) or delineate what actually constitutes environmental education. Environmental justice organizations whose work is heavily rooted in urban social and environmental policy may also do educational programming without identifying it as such. Looking back to the pioneering book, *Understanding Urban Ecosystems*, Berkowitz, Nilon et al. (2003) stated that urban environmental (ecosystem) education was influenced by nature study, science education, social-ecological systems, conservation education, sustainable urban planning, community and youth development, sense-of-place studies, citizen science, ecosystem services, and environmental justice. Kudryavtsev and Krasny's (2012) review identified five trends showing how urban environmental education has been approached within environmental education. These trends encompassed viewing the city as a classroom to facilitate learning about science and ecology, problem solving through the mitigation of environmental or socially related problems, using cities to foster environmental stewardship, utilizing cities as a platform to understand integrated social and ecological systems, and youth and community development to foster youth and community wellbeing. Within the trends, there were many ways in which to engage learners in urban green space and practice urban environmental education. These ranged from formal school-based approaches to adventure-based recreation and outdoor education (Berkowitz, Nilon, & Hollweg, 2003).
C. Thomashow and Kessel (2015) further emphasized that urban environmental education must address the social, educational, economic, and cultural issues of urban life with relevant and meaningful environmental approaches that may include youth and community development, environmental action and environmental justice. In this study, *urban environmental education* is defined as teaching about the ways in which people interact with, view, and learn about the ecology of and in cities' urban ecosystems as residents, teachers, and learners who live, work, play, and teach in the urban environment. This definition showcases the complex interdisciplinary nature of urban systems beyond the natural sciences and more traditional work of environmental education, whose focus historically has been more on natural history knowledge acquisition and experiences. Because urban environmental education transcends disciplines, approaches to it vary. Urban environmental education can range from outdoor-adventure programs to those focused on environmental action; whereas some programs teach ecological science through hands-on inquiry or research activities, others integrate art, green jobs, or social justice (Secretariat of the Convention on Biological Diversity, 2012).

The recent emergence of urban environmental education and programming growth may also be attributed to the (a) growing urban population (United States Census Bureau, 2015); (b) uniqueness of demographic, social, cultural, and environmental issues in cities (Niemela, 2012); (c) urban citizens' contributions towards global ecological awareness and action (Shutkin, 2001); and (d) recognition by the field of environmental education that few urban environmental organizations and environmental educators (especially people of color) have been included or invited to participate in environmental
education development and policy at a national level (Agyeman, 2005). Cornell University (2015) and the North American Association for Environmental Education (2015, webpage) recently prioritized addressing a broader vision of urban environmental education through the Expanding Capacity in Environmental Education Project, which brings diverse groups of educators together to "encourage innovation in environmental education by promoting the exchange of ideas among professionals with diverse perspectives." Research on approaches or practices related to urban environmental education addressed youth outcomes, programmatic goals, and community impacts with an environmental focus. With few exceptions (e.g., Russ, 2016), rarely have they explicitly examined the practices of frontline educators.

Although the work being done by urban environmental educators encompasses many subject areas and frameworks, the sections that follow highlight the urban environmental education research that emerged as the most commonly cited approaches within this research. Specifically explored here are some environmental education practices associated with science education, ecological literacy, youth development, and applied conservation (Figure 2). These practices emerged in this inductive study, focused on a specific region, and may shed light on the complexities within urban environmental education programs and educator practice. In addition, as noted here, there is a variety of urban green space types; however, this research focused on parks and agriculture sites due to the frequency with which urban environmental education programs use them, as well as the body of available research.
Figure 2. Preliminary framework for urban environmental education practice.
Environmental Education in Urban Green Spaces

Recognizing the value of urban green space presents an opportunity for environmental education. Little attention has been paid to environmental education in urban green space (Fialkowski, 2003; Kudryavtsev & Krasny, 2012; Pereira et al., 2006; Wals, 1994). Many environmental educators have focused their energy on bringing urban residents into the wilderness or rural areas to connect with nature (Hanna, 1995; Swayze, 2009). However, some limitations of this approach include urban populations lacking access to wilderness areas (Agyeman, 2005) and the limited ability to connect to a place far from where one lives (Budruk et al., 2009). Comprehensive programming in urban green space can be difficult; it often relies on collaborative approaches involving stakeholders, and the institutions that own the urban green space are not always the same as those using it for programming (A. J. Johnson & Glover, 2013).

Additionally, it can be surmised through the literature that engaging and educating urban audiences in urban green space may provide long-term benefits to both the human and nonhuman worlds. Indirect outcomes from teaching and learning in urban green space include enhanced human health and wellness, increased native biodiversity, and species richness.

Science Education

Green spaces are living science laboratories. These spaces provide a plethora of opportunities to engage with science outdoors in an informal setting. The importance of these experiences may be underscored by Friedman and Quinn (2006), who reported that 75% of Nobel Prize winners in science stated their interest in science came from informal learning experiences. In an educational era of decreased science teaching and
funding for "special" scientific equipment and field trips in public schooling, urban green space provides a rich informal learning environment that is free and easily accessible to explore science content and processes (Lakin, 2006; "Future of school science," 2006). Parks and urban agriculture sites in close proximity to schools help eliminate economic constraints, encourage repeat visits for varying curriculum and to note seasonal changes, provide opportunities for hands-on interaction with science specimens, highlight relationships between citizens and the natural world, and invite development of aesthetic and affective relationships with nature (J. Brown et al., 2015; Erbentraut, 2015; Pereira et al., 2006).

Science education in urban green space can come in the form of many different methods and approaches. On a basic level, educators use urban green space as the platform from which to teach basic science concepts and content such as food chains, photosynthesis, habitats, and water properties. More innovative approaches to science teaching in green space included the use of field studies, citizen science projects, inquiry-based approaches, and science, technology, engineering, arts, and mathematics (STEAM) practices. Additionally, a growing number of scholars highlighted the importance of using urban green space to teach about larger-scale ecological urban issues, including watersheds, air quality, climate change, urban resilience, sustainability, environmental justice, and biodiversity (Agyeman, 2003; Krasny & Tidball, 2015; Newman & Jennings, 2008; Russ & Krasny, 2015; Tidball & Krasny, 2010).

**Ecological Field Studies**

A growing movement supported by both educators and scientists stressed the importance and benefits of allowing young people the chance to conduct scientific
investigations as "real" scientists do or to "think like scientists" (Doris, 2010; Segelken, 2007). One approach to "real" scientific investigations as it relates to urban green space is the use of ecological field studies.

Urban ecologists work within the ecology-in-cities framework commonly uses ecological field studies. The goal is to take the focus of the study outside of a laboratory and into the natural environment where the organism or phenomenon can be observed in its natural state (Berkowitz, Nilon et al., 2003; Doris, 2010). Ecological field studies allow learners to gain contextual knowledge of scientific content (Braund & Reiss, 2008). Within urban green space, field studies can take the form of short-term taxonomic inventories, long-term biodiversity studies, or other forms of study that aim to understand the natural history features of an urban space better. Field studies are versatile enough to be used by both formal and informal educators.

In an interdisciplinary urban green space field study of plant biodiversity with high school students, Almeida, Bombaugh, and Mal (2006) reported that participating students demonstrated greater sensitivity to and knowledge of their local environment and were more engaged in their learning. Barnett, Lord et al.'s (2006) work looking at high school students and teachers found that youth engagement in science and community stewardship increased through participation in an outdoor field-based ecology program. Their study included pairing schools with a community-based environmental organization to conduct ecological field research. Through surveys and interviews, the researchers found gains in student stewardship of their local environment, teachers' perceptions of youth environmental engagement, and students' understanding of scientific process skills. These results showcased unique opportunities that may exist in developing
urban environmental education programs that pair teachers with informal educators and organizations. Neither the teachers nor the community-based organizations were isolated in their capacity to develop curriculum; therefore they could build robust and effective ecological curricula for youth in their community.

**Citizen Science**

Related to ecological field studies but an educational practice in its own right, citizen science projects allow more authentic application of field-based studies. Citizen science is a model of science education that engages a diverse network of volunteers, whose backgrounds may or may not include formal training in the sciences, to assist in professional research using methodologies developed by or in collaboration with professional researchers. The public plays a role in data collection that addresses questions raised by researchers (Cooper et al., 2009). This model creates an excellent platform to bring more real-world learning to urban communities.

Successful examples of large-scale citizen science projects conducted in urban communities included Cornell University's Celebrate Urban Birds and eBird, the National Ecological Observatory Networks' Project BudBurst, the University of Kansas's Monarch Watch, North Carolina State University and the Smithsonian Institution's E-Mammal program, and the American Association for Zoos and Aquarium's FrogWatch USA.

Research institutions and scientists typically develop citizen science projects. Through education and training, these projects allow the public to actively participate in data collection regardless of the participant's academic background (Rosner, 2013). Citizen science projects allow citizens to not only participate in conducting science investigations as scientists do, but also serve as advisors to the work (Wolford, 2003).
This approach benefits scientists directly because a community of scientists utilize the
data collected (Fleming, 2013), and benefits the community at large through fostering
social engagement and scientific understanding among residents (Dickinson et al., 2012).

The educational and scientific benefits of citizen science projects may be strong.
During a study on butterfly populations in Chicago and New York City, Matterson,
Taron, and Minor (2012) found that although citizen science monitoring practices varied
by physical location, local volunteers were generally effective in collecting data on
existing urban butterflies, demonstrating an enhanced understanding of scientific
practices. Toomey and Demroese's (2013) case study on attitude and behavior outcomes
of two citizen science projects (Great Pollinator project and Earthwatch's Coyote study)
found that the majority of participants indicated increases in their overall conservation
attitudes and behaviors after participating in citizen science projects. Specifically, 79% of
citizen science pollinator project participants reported increased scientific knowledge of
pollinators; and 70% of participants who engaged in the coyote study reported increased
positive attitudes towards coyotes, and 53% reported increased personal connection to the
natural world. In another citizen science project, Neighborhood Nestwatch, urban
participants were tasked with collecting data that helped researchers understand the
ecology and population dynamics of eight bird species along an urban-to-rural gradient in
the Washington, DC area and to teach people living in urban and suburban settings about
bird biology. After studying Nestwatch participant outcomes, Evans et al. (2005) found
that when examining science literacy, 87% of participants reported an increase in their
knowledge of bird biology and behavior as a result of participating in the citizen science
project. Although the studies outlined herein were conducted in conjunction with the
citizen science projects, it is clear the outcomes of such projects may reach well beyond the basics of science education and science literacy. This may speak to the many types of outcomes (intentional or not) that may come from participating in a program whose main focus is science learning.

**STEAM Education**

A growing avenue for creating accessible science education connections in urban parks and agriculture sites (especially for young people) is STEAM (science, technology, engineering, arts, and math) education. The STEAM avenue is an offshoot of the national STEM movement developed out of a recognition by business, industry, and school leaders that the United States is about to experience a shortage of one million workers in the science, engineering, and mathematics (STEM) fields (Moss-Racusin, Dovidio, Bescoll, Graham, & Handelsman, 2012).

The STEAM platform can enhance art and design education within the existing STEM framework (Rhode Island School of Design, 2015). It advocates pushing learners to solve community-based problems in a collaborative environment. Proponents described the STEAM approach as focusing on innovation through project-based and hands-on collaboration (Baker, 2011; O'Hanley, 2015; Robelen, 2011), which may be seen as a natural fit for teaching and learning in urban green space.

As such, STEAM education uses a cross-disciplinary framework that incorporates art and design into formal and informal learning environments (Shaffer, 2014). Urban green space supports STEAM by allowing learners to make meaningful and relevant connections to their communities (J. Brown et al., 2015). It has the power of a unifying framework by which to use ecological field studies, citizen science, and inquiry learning
in urban green space. Technology (such as probes or tablets) may be incorporated through instruments to collect data; engineering, through building and designing of structures (e.g., raised beds, outdoor classrooms, or green houses) within green space; art, through sketching (scientific illustration or artistic impression); and math, through data collection, measurements, and synthesis. With guidance, learners using the STEAM approach in urban green space might, for example, design and create a gazebo for community use, an outdoor classroom for a school, or a solar-powered garden shed or greenhouse.

Additionally, intertwining STEAM and green space can support development of a green economy while increasing science and ecological literacy. Using STEAM education in urban green space, young adults can be introduced to various career paths that center on caring for the environment, engaging in their community, and creating a more sustainable world.

Despite the applications of STEAM in urban green space teaching and learning, there appears to be a gap in the research—few studies explicitly looked at it as a cohesive unit in practice. In a database search (Proquest Central, Academic Search Premiere, ERIC, JSTOR, and GreenFILE) using the terms STEAM green space; STEAM urban agriculture; STEM education parks; and Science, technology, engineering, math urban parks, no results yielded studies that investigated the use of STEAM or STEM in urban green space. This may have been because the STEAM movement is relatively new within the education sphere, both in formal and informal learning environments, or because few programs approach STEAM as an integrated practice. Rather, for some STEAM programs, art may be an important element to consider in program design and delivery.
Developing Ecological Literacy

The on-going and ever-changing relationships between human and natural systems can be understood through the lens of ecological literacy theory. The roots of ecological literacy theory are grounded in ecological theory (Roughgarden, May, & Levin, 1989), general systems theory (von Bertalanffy, 1969), and ecological systems theory (Gnauck, 2000). Although varied in their own rights, each theory has a foundational understanding that all systems, humans, organisms, and environments are in constant interaction with and influence one another (Gnauck, 2000; Neal & Neal, 2013; Rennie, 2008).

The theory of ecological literacy is credited to environmental scientist David W. Orr (1990), whom many also see as the father of ecological literacy in practice (Cutter-Mackenzie & Smith, 2003; Fleischer, 2011; Jordan, Singer, Vaughan, & Berkowitz, 2009; Mitchell & Mueller, 2011). Orr (1990) developed ecological literacy's place within the field of environmental education. He viewed ecological literacy as a critical approach to addressing what he called the "crisis of sustainability" in the United States (p. 4). Orr summarized ecological literacy as the ability to understand how people and societies relate to one another and to natural systems in a sustainable manner (and to act on those understandings). This frame is especially useful when looking at urban environmental education because the context of the work is rooted in the nexus of human and natural systems.

Since Orr's first writings on ecological literacy in 1990, systems physicist Fritjof Capra (2007) further developed it as both a theory and a pedagogical practice. Capra described ecological literacy as a theory through the lens of systems theory—an
interdisciplinary theory about the complex systems in nature, society, and science wherein the world is understood as inherently nonlinear interwoven networks. Capra (1996) summarized ecological literacy as "the ability to understand the principles of organization of ecological communities and using those principles for creating sustainable human communities" (p. 297). Capra (2007) also emphasized the importance of understanding and developing ecological literacy because humanity's survival depends on our ability to understand how ecosystems (both in rural and urban systems) function. 

The development of ecological or environmental literacy is a key goal in the field of environmental education (North American Association for Environmental Education, 2015). As such, it is an important framework from which to approach environmental education in urban areas. In a search of five databases (Proquest Central, Academic Search Premiere, ERIC, JSTOR, and GreenFILE) with the phrases *urban ecological (environmental) literacy; ecological (environmental) literacy urban; and ecological (environmental) literacy city*, results yielded no studies that investigated ecological literacy in urban areas; only essays and articles describing, defining, and advocating for ecological literacy. In light of this lack of studies that explicitly examined ecological literacy in urban settings, the following section addresses some of Orr's (1990) central tenants or propositions of ecological literacy and how they are practiced in urban green space. These tenants or propositions, pulled from Orr's, as well as Capra's (2007), work, include teaching for and providing outdoor experiences, connecting residents to community through place-based education, and educating for an understanding of complex issues under a systems-thinking framework.
Outward Experiences

To achieve ecological literacy, it is important that urban populations get outside to connect and reconnect to the natural world. In urban systems, this may come from structured or unstructured time in urban green space. In a review of literature on the decline of human-nature experiences, Soga and Gaston (2016, p. 94) asserted that experiences in urban green spaces can be a viable option to minimize the on-going "extinction of experiences" some believe is prevalent among urban populations. Haupt (2013) suggested getting outside and doing something as simple as watching and identifying wildlife in a local park reminds people of their connection to the ever-present wild and they feel more attuned to place.

Humans have a desire to be around nature. E.O. Wilson's (1984) biophilia hypothesis put forth this idea, stating there is an instinctual bond between humans and other living systems. The scientific community now widely accepts this hypothesis. Humans need nature. This is especially recognized in cases of restoration, stewardship, and civic ecology, where communities come together to restore and renew urban green space (Krasny & Tidball, 2015).

Although not focused on environmental education programming, Breuste's (2003) study found that 44% of urban residents regularly use parks in their neighborhoods. Although this figure may not seem compelling, it is important to understand it in context. In most major U.S. cities, less than 25% of urban land is comprised of green space, and only a small percentage of green space is in the form of parks (Ryan, 2006). Thus, human-centered outcomes may be the "selling point" of any education program in urban environments. Successful urban park development and management comes through
highly adaptive policies and conservation management plans that put human needs first (Swamy & Devy, 2014). It may only be through connecting urban residents to urban nature that wide-sweeping environmental education and conservation goals can be met.

By spending time in urban parks and gardens and connecting with flora and fauna, people can enhance their physical and emotional health and wellness. Participating in agriculture-based learning, service learning, and stewardship can be described as green exercise and, as such, contributes to physical health, especially in terms of overall physical fitness (Tzoulas & Greening, 2012). Aside from the positive effect of movement-based activities, physical health also improves in the presence of provisioning and regulating ecosystem services that provide clean air to breath and clean water to drink (Dearborn & Kark, 2010). For example, in a review of literature on urban ecology and human health, Tzoulas and Greening (2012) concluded that spending time in urban green space simulates movement and may reduce blood pressure and diabetes rates.

Nature provides therapeutic value (Dearborn & Kark, 2010). Various studies found that urban residents who experienced increased biodiversity and species richness in green space self-reported positive wellbeing (Dallimer et al., 2012; Luck, Davidson, Boxall, & Smallbone, 2011; Standish et al., 2013). Indeed, a study conducted in England found measurable positive associations between the species richness of urban green space and self-reported psychological wellness in terms of reflective practice and sense of distinct identity, as well as continuity with the past (Fuller et al., 2007). Further, studies

\[\text{Species richness} \]

2. Species richness is defined as the number of different species found within an ecosystem.
showed that although causality was difficult to prove and users of urban green space may have different perceptions of species richness, many positive emotions were associated with encounters with nature (Dallimer et al., 2012; Fuller et al., 2007; Luck et al., 2011).

One of the best ways to enhance human quality of life is through social bonds (Halpern, 2005). Social bonds may be established as a result of outdoor experiences in urban green space and can emerge in many forms of educational engagement within green space. For example, stewardship efforts and civic ecology practices provide opportunities to engage directly in hands-on work while integrating people's value systems, cultural traditions, and socioeconomic activities (Standish et al., 2013).

In discussing conservation initiatives, Miller and Hobbs (2002) stated that community-based efforts establish a positive feedback loop because they draw on local support, which in turn fosters greater connection to place and builds a stronger interest in local conservation issues. Focusing on social connections and value opens the door to a variety of teaching and learning options. It provides new ways for people to engage with novel urban ecosystems, biodiversity (Standish et al., 2013), and fellow residents (Wals, 2007).

Urban green space restoration creates pathways to build community. Social and community relationships are central to overall wellness, and time spent in urban green space enhances such feelings (Tzoulas & Greening, 2012). The goal of engaging in urban green space is less about traditional learning and more about social learning and personal relationship building.

In his book, Ecological Identity, environmentalist and educator Mitchell Thomashow (1995) wrote about the role of experiences in the outdoors and a person's
ability to connect to his or her own ecological identity and develop ecological literacy. He defined ecological identity as the way people construct themselves in relation to the earth, as manifested in their personality, values, action, and sense of self. He further explained that a key aspect of developing ecological literacy and identity comes from childhood experiences in the outdoor natural world and noted that identity and literacy develop experiences in wild spaces and perceptions of disturbed places.

M. Thomashow's (1995) work was not specific to urban communities; however, it can apply to urban environments. Outdoor experiences in urban green space can bring a sense of wildness to the city. For example, in cities, reflections in wild places come in the form of time spent in large natural habitats found within the urban areas or in local rural wilderness areas juxtaposed with urban green space and identify how humans are connected to a larger bioregion. "Wild" can be an extension of wildness—wilderness as a physical place and wildness as a state of mind. Wild can be an internal feeling, a mindset, or a place. Through urban environmental education experiences in outdoor nature areas, people can develop the ability to see cities, especially urban green space, as wild—for both humans and nonhumans.

The Frameworks Institute recently published a report asserting that the public opinion of urban nature experiences is one in which urban residents think urban outdoor nature experiences are nice but not essential (Lindland et al., 2015). This belief presents a misguided understanding that environmental educators may need to address. With less time spent outdoors, it may become harder for people to identify with nature both in and out of cities. There is no substitute for time spent outdoors to develop ecological literacy.
How that time is used is important because we are becoming a society that suffers from nature deficit disorder or a disconnect from the natural world (Louv, 2008).

Studies that looked at providing outdoor learning experiences are common; however, few specifically explored outdoor nature experiences in cities. The following paragraphs summarize studies that documented outdoor learning in urban settings. These studies showed positive results about the ways in which outdoor experiences can benefit urban settings.

Wells and Lekies's (2006) study of childhood experiences with nature found a correlation between having both wilderness (camping, hiking, and natural-area play) and domestic (home-based gardening and tree planting) nature experiences as a child and adult environmental attitudes and pro-environmental behavior. Additional results from Budruk, Thomas, and Tyrrell's (2009) research on urban green space attachment and attitudes (in India) suggested emotional connections that were developed with urban green spaces from outdoor experiences contributed towards long-term pro-environmental attitudes.

While examining urban outdoor experiences located within schoolyards, Carrier (2009) found that when students (especially males) were exposed to learning experiences in local outdoor environments, they not only developed a connection to the local environment, but also improved their classroom behavior and attitudes towards learning. A study that looked specifically at formal urban teachers' use of the outdoor local environment found that professional development was key to understanding how schools could provide nature experiences to young people. Teachers who participated in environmental education-based professional development that was site-specific were
much more likely to not only use their local environment, but also develop lessons and activities that could be taught in nature at the sites (Simmons, 1999).

**Place-Based Education**

A deep connection to place is needed to move society towards a deeper connection to and appreciation of the environment (Orr, 2004). Place-based education roots learning in local environments and phenomena and gives students first-hand experiences (G. Smith, 2002). The goal of place-based education is to provide educational experiences in which participants can develop a sense of place for an environment (Sobel, 2005). *Sense of place* is defined as the ways in which people experience, use, and understand place, leading to place identity, place attachment, place meaning, and place dependency (Cowery, Corsane, & Davis, 2012; Raymond, Kyttä, & Stedman, 2017; Stedman, 2008). In developing a sense of place, people can create a bond with both the natural world and their communities (Sobel, 2005). In urban areas, as in other environments, sense of place comes from attachment or bonds to the physical spaces or people (place attachment) and the meanings given to a place (place meaning; Kudryavtsev, Krasny, & Stedman, 2012; Kudryavtsev, Stedman et al., 2011).

One way to encourage development of a sense of place is to use place-based education— instructional programming focused on local-level learning and engagement (Sobel, 2005). Place-based education shifts the focus of teaching and learning from global and national perspectives to local ones (Knapp, 2005). Central to the principles of place-based education is an in-depth observation of how landscape, community, and culture interact and shape each other at a local level (Sobel, 2005). Place-based education
addresses teaching and learning on a micro level where people live, work, and go to school.

Much has been written about the importance of citizens (especially young people) having experiences in their own communities, schools, and neighborhoods to support a place-based education model for learning and developing ecological literacy (Barnett, Lord et al., 2006; Fisman, 2005; Harwell & Reynolds, 2006; Kudryavtsev, Krasny et al., 2012; Louv, 2008; Meichtry & Smith, 2007; Powers, 2004; G. Smith & Williams, 1999; Sobel, 2005). Meichtry and Smith (2007) stated, "Place-based education, which grounds learning in the local environment, is aligned with the goals for improving education outcomes in schools and a sustainable society by developing in students a sense of connectedness to where they live" (p. 15). However, Clark (2012) stated that there is all too often a disconnect, especially in urban settings, between what environmental content is taught (especially in schools) and where people actually live. When experiences and learning are connected to students' local urban environment, there can be an increase in positive feelings about how the students perceive their place (Barnett, Lord et al., 2006; Kudryavtsev, Krasny et al., 2012).

Orr (1992) believed learning in place is highly relevant to developing ecological literacy because it infuses intellect with experience, is relevant to problems of overspecialization or linear thinking, and educates people in the art of living well. With this approach, urban citizens may no longer feel helpless about the enormity of ecological crises; it becomes easier and more relevant to their everyday lives to focus on ecological connections within their own neighborhoods (Gruenewald, 2003).
Endreny's (2010) work investigating urban fifth-grade students' conceptions of science found that student understanding of watershed concepts increased as a result of participating in place-based education lessons. All students developed a deeper understanding of the role watersheds play in urban communities. Powers's (2004) qualitative study evaluated four place-based programs and found that educators who used a place-based education approach to learning reported students were more motivated and engaged in their learning. In addition, special education students performed better on reading and math assignments than they had when the community was not involved in their learning. Fisman (2005) examined elementary students from four classes across two schools who participated in a 9-week informal environmental-based green space program. The study's aim was to explore how participation in an urban neighborhood-based environmental education program affected young peoples' awareness of nature in their home place. Results showed the program had a positive effect on students' awareness of the local environment and on their knowledge of environmental concepts.

Meichtry and Smith (2007) found that teachers' confidence, attitudes, and teaching practices improved through participation in place-based environmental education professional development. Moreover, Sobel (2005) believed that place-based approaches aided students in developing problem-solving skills, which has become equally important for academic test achievement in the 21st century. These findings supported use of place-based education not only to enhance teaching for ecological literacy, but also for overall literacy, skill building, and community engagement.

Additionally, Sobel (2005) stated that rather than exploring students' own town, often out-of-school or field-trip experiences take learning away from the community.
Instead, these experiences place learning in zoos, parks, and museums that may not be part of the students' immediate environment. Urban areas are filled with a complicated matrix of social and ecological systems. Young people struggle to develop an ecological sense of place, and by taking learning away from the community, educators (especially in underserved areas) may perpetuate the notion that cities are not worthy of connection and exploration. Instead, learning in place allows students to take ownership of their learning and find greater value in the communities in which they live (Keifer & Kemple, 1999).

**Systems Thinking Framework**

Systems thinking approaches to ecological literacy have become increasingly useful to urban environmental educators. Physicist Fritjof Capra (2007), founder of the Center for Eco Literacy and leader in systems theory, stated that the roots of systems thinking and systems theory came from the fields of biology, Gestalt psychology, and nonlinear dynamics. Within the context of ecological literacy, systems thinking focuses on the organization of nature or living systems. A systems-thinking approach aims to take experiences out of isolation and instead nest them within a bigger picture. It pushes those engaged to find connections between linear parts and systematic wholes. To teach for ecological literacy in cities with a systems approach is to teach towards a new way of thinking about and viewing both cities and the world. Following a systems-thinking approach to teaching in urban green space means that when studying nature, nothing can be studied separately from the natural and social system within which it exists (Capra, 2007; Stone, 2010). A systems approach includes teaching focused from parts to whole, from objects to relationships, from measuring to mapping procedures, from quantity to quality, and from structures to processes (Duailibi, 2006; Meadows, 2008). In urban
green space, this comes from understanding that these spaces are interconnected to a wider ecological bioregion, as well as an integral part of our sociological systems. To understand urban green space through systems thinking perspectives is to see urban areas as interconnected socioecological systems.

In practice, systems thinking synthesizes fragmented ecological and sociological content by orienting learners to connections (Meadows, 2008). This orientation ultimately allows a deeper understanding of how humans and the natural world are connected. For example, teaching for systems thinkers in urban agriculture sites may involve programming or lessons that address the growing needs for particular vegetables, as well as considering which vegetables can grow in a given region, where vegetables are native or indigenous, what happens to the various parts of the vegetables after harvest, advantages and disadvantages of urban locations, and how growing and harvesting benefits the community at large. In an urban park, a systems-based approach to education could include exploration of an edge habitat—which plant species live there, where they are from, what wildlife utilizes the plants, how humans have affected the space, and what ecosystem services the habitat provides.

Teaching for systems thinking requires urban environmental educators to teach against linear instruction. Because linear instruction is embedded in our culture (especially within the public education system), implementation of systems thinking may be difficult (Meadows, 2008). One way to incorporate systems thinking is to align it with place-based learning—learners can make connections and take action within their own environments (Hogan & Weathers, 2003). "When nature is our teacher, we see connections everywhere" (Stone, 2010, p. 36).
A gap appeared in the research investigating teaching for systems thinking in environmental education. In a search of three databases (ERIC, JSTOR, and Academic Search Premier), no studies were found that examined systems thinking or teaching within the context of urban environmental education. However, it may be that systems-thinking education has related outcomes, regardless of whether it occurs in urban or nonurban settings.

To understand systems teaching and related outcomes, the researcher reviewed studies conducted in classrooms and nonurban informal settings. In their meta-analysis exploring the assessment of systems thinking interventions in classrooms, Hopper and Stave (2008) suggested there was strong support for higher-order skills being built upon lower-order skills to effectively scaffold for systems thinking. Additionally, they noted that of the systems-thinking interventions reported, the studies primarily tested the intermediate level on the systems-thinking taxonomy. In addition, half of all interventions conducted assessments using the same tool, thereby limiting other ways to assess for systems thinking. Building on this work, Monroe, Plate, and Colley (2015) investigated learning outcomes associated with a brief systems-thinking intervention in three groups (control, lecture, and modeling-based) of undergraduate students. Their results suggested that short-term interventions could generate interest among some students in systems thinking. Finally, Jordan, Sorenson, and Hmelo-Silver (2014) and Hemelo-Silver, Liu, Gray, and Jordan (2015) published positive results about the use of modeling as a means to teach for systems thinking. Their research shows that, through the use of modeling, both educators and young people are able to better understand and provide examples of complex systems. Although these studies were not specifically applied to urban
environmental education but instead focused on interventions, they indicated that applying a system-thinking intervention could benefit learners' long-term development of systems-thinking skills.

**Pedagogy**

Merriam Webster defined *pedagogy* as the method and practice of teaching ("Pedagogy," 2017). Many pedagogical approaches may be used in teaching environmental education programs in urban green spaces. The sections that follow highlight the inquiry, critical exploration, and positive youth development approaches commonly cited by scholars and practitioners and investigated for this research.

**Inquiry**

Urban parks and agriculture sites may provide many opportunities for inquiry investigations. Inquiry-based learning is defined as the seeking of truth through asking questions and solving problems (Minstrell & Van Zee, 2000; Pearce, 1999). Inquiry-based learning is a science teaching method that is easily applied to investigations of urban green space. Bourne (2000) stated that inquiry-based learning involves questioning, exploring, investigating, manipulating, problem solving, communicating, and reinventing understanding—skills that are a part of everyday learning experiences in how humans make sense of the world. Without even knowing what inquiry-based learning is or the steps involved in it, people use it every day (Pearce, 1999). Inquiry-based learning is a natural way for people to explore their world and a natural fit for environmental education and engagement in urban parks and agriculture sites.

Inquiry-based approaches to science education have grown in popularity in both formal and informal learning environments. Curriculum writers and educators have
attempted to move from textbook-based, rote memorization-based, and lower-order learning towards more real-world and higher order learning (Bybee, 2000; Hume, 2009; Next Generation Science Standards, 2014; Pearce, 1999; Wahl, 2002). This movement becomes especially important when considering opportunities for urban environmental education in green space, not only due to the complexity of urban systems, but also because of the need to support the new Framework for 21st Century learning in which learners are expected to develop skills in critical thinking, problem solving, reasoning, analysis, interpretation, and synthesizing information (P21, 2015).

Exploring science through inquiry in urban green space can occur through stand-alone science investigations or large-scale projects that support and enhance field-based and citizen science projects (Bourne, 2000; Dyment, 2005; Eick, 2012; Lakin, 2006; Roth, 1992). Examples of smaller stand-alone lessons include soil testing to explore chemistry, measured runoff investigations exploring physical science, investigating simple machines through garden tools, and understanding life science through compost and decomposer sampling. Examples of large-scale inquiry projects that can occur over weeks, months, and years include controlled seasonal plant-growth experiments, monthly biodiversity inventories, and yearly chemical testing of water or soil.

Studies documenting outcomes of inquiry-based education in environmental education showed some positive results. A qualitative study of a garden-based science program with the Brooklyn Botanic Garden found that young people who engaged in inquiry-based learning increased their understanding of science concepts as a result of participating in the program (Morgan, Hamilton, Bentley, & Myrie, 2009). Harnik and Ross's (2004) mixed-methods study explored urban elementary student and teacher
attitudes towards science after participating in an inquiry-based geoscience program at a local urban park. Their results showed that students who participated in the program reported much greater interest and enjoyment in geosciences after being allowed to explore their own questions and to problem solve, whereas they voiced disinterest in simply talking about the subject matter.

**Critical Exploration**

Critical exploration can be explained as a pedagogical approach that invites learners to think and talk about what they think on a given situation or phenomena through exploration of a given subject. Additionally, critical exploration calls for educators to deeply explore the learners' thinking to best understand how knowledge is achieved (Duckworth, 2006). Unfortunately, few studies documented the use of critical exploration in the context of environmental education. Critical exploration is more about learners' knowledge construction.

Critical exploration as a teaching research method does not expect that learners should state some authoritative knowledge about content, instead it aims to give learners familiarity with science concepts and content which from there learners can explore more within their own capabilities.

(Duckworth, Easley, Hawkins, & Henriques, 1990, p. 23)

In a critical exploration approach, the instructor serves primarily as a facilitator of learning and as a researcher, while learners choose what elements of any academic content area they wish to explore. Like inquiry, critical exploration takes the focus of instruction off the teacher and allows learners more freedom to pursue self-generated ideas. Critical exploration allows instructors to investigate children's understanding by
having them take their own understanding seriously, pursue their own questions, and struggle through their own conflicts (Duckworth, 2001).

Critical explorations provide experiences in teaching and learning that a teacher conducts to engage learners in a subject matter that is real and may be physically present in the classroom. With its fullness of detail, the reality of such a subject accommodates plenty of leeway across which learners may exercise curiosity, actions, observations, conjectures, and thought (Cavicchi, Chiu, & McDonnell, 2009). However, critical exploration moves beyond the traditional focus on and assessment of academic content knowledge. Duckworth, Easley, Hawkins, and Henriques (1990) stressed that thoughtful instruction puts little emphasis on memorization of concepts.

**Positive Youth Development**

In recent years, urban environmental education has become interconnected with positive youth development (Withrow-Clark & Abrams, 2015). Different from a traditional pedagogical approach, positive youth development is defined as an intentional, pro-social approach that engages youth within their communities, schools, organizations, peer groups, and families in a productive and constructive manner; recognizes, utilizes, and enhances youths' strengths; and promotes positive outcomes for young people by providing opportunities, fostering positive relationships, and furnishing the support needed to build on leadership strengths (Interagency Working Group on Youth Programs, 2015).

According to Eccles and Gootman (2002), effective youth development programs provide youth with a positive environment that include caring and supportive relationships, developmentally appropriate structure, high expectations for behavior,
positive social norms, opportunities to belong and to build new skills, physical and emotional safety, support for efficacy, and integration of family, school, and community. Additionally, Catlano, Berglund, Ryan, Lonczak, and Hawkins (2004) stated that effective youth development programs should meet a number of additional criteria, including meeting for an extended time, maintaining an evaluation procedure, and having a structured curriculum.

Because urban environmental education in green space focuses learning on a local level and may include programming over an extended period (after-school, expanded learning, or summer learning programs and summer camps), it may be a good fit to include positive youth development principles in urban environmental education programming. Kudryavtsev, Krasny, and Stedman (2012) noted that although their research focused on sense of place and did not examine the role of youth development in urban environmental education programming, many programs they examined listed youth development as an important goal of their programming.

Some recent work explored the practice of youth development in the context of environmental education. In a study that included 33 teachers, informal science educators, community organizers, and youth program managers who facilitated youth participation in local environmental action, Schusler and Krasny (2010) identified nine practice themes educators working in youth environmental action used that mirrored those of positive youth development. These practice themes were creating safe spaces, providing structure, offering opportunities for meaningful contribution, building relationships, bridging differences, setting expectations, supporting youth, connecting youth with their community, and expanding horizons. Although Schusler and Krasny's
work was not directed to urban environments, many participants came from organizations whose work was rooted in urban environmental education. More recently, Delia and Krasny's (2018) work on youth development focused exclusively on stewardship-based programs in urban settings. Their narrative inquiry work of youth participants found five key themes that highlight the positive outcomes of participating in a stewardship-based youth development program: somewhere to belong (provided a warm, welcoming, and caring environment), to be pushed (held to high and clear expectations), to grapple with complexity (working with ongoing complicated tasks and concepts), to practice leadership (provided opportunities to take responsibility, serve as experts, and be team leaders), and to become yourself (developing a greater sense of self and trust in others). These findings, although stewardship based, may show how an urban environmental education program that is action-based can provide social and environmental affordances for positive youth development.

**Applied Conservation**

Aside from serving as a vehicle to enhance science education and ecological literacy, urban green space can also serve as a platform for learning through applied conservation practices such as ecological restoration, environmental stewardship, and civic ecology. These practices bring urban residents together to engage, learn, create, and beautify their communities and neighborhoods and may support citizen science projects.

**Restoration**

Ecological restoration is the practice of revitalizing degraded spaces that have been disturbed primarily by human impact (Light, 2006). In the field of conservation biology, restoration is commonly associated with rural or wilderness landscapes.
However, according to conservation biologist Holly Jones, restoration of habitats is the solution to fixing degraded rural and urban systems alike (personal communication, December, 2014). Restoration work within urban green space contributes to the sustainability of urban landscapes in terms of conserving natural areas and providing urban residents opportunities to interact with nature within their community. Restoration can encompass the diversity of both ecological and social values of nature in cities (Standish et al., 2013).

Urban ecosystem restoration projects are not uncommon. These projects focus on degraded or neglected land and often blend urban landscape features with learning opportunities (Krasny, Lundholm, Shava, Lee, & Kobori, 2013). Urban restoration projects work to address a variety of issues ranging from the loss of local biodiversity to decreased ecological literacy among urban residents (Hall & Bauer-Armstrong, 2010). Urban restoration may involve removing invasive species, planting native plant species, turning vacant lots into parks or native meadows, and cleaning rivers to generate potable water. Projects can range from restoring small-scale schoolyard teaching gardens to large-scale urban park or citywide restorations. Such restoration efforts not only bring community members together on a social level to work and learn from each other, but also raise awareness of urban ecological systems, structures, and influences.

Restoration projects enhance local-level biodiversity while creating green spaces for humans to learn and play (Adams, 2005; Breuste, 2003; Standish et al., 2013). Community-based projects provide immense opportunities to learn about natural urban ecosystems, build community, and develop a sense of place (Standish et al., 2013).
In a case study that explored participants' experiences of and stories about school-based habitat restoration, A. Bell (2001) found that habitat restoration initiated by the school provided tangible places and spaces where young people could develop an affinity for nature. As promising as A. Bell's research was, it should be noted that not all restoration projects are initiated by residents at the local level. Light (2006) explained that many restoration initiatives (especially those of a larger scale) are top-down government executed initiatives that do not rely on community input or volunteer labor to do the work and, therefore, provide little opportunity for learning and engagement.

Environmental Stewardship and Civic Ecology

The responsibility for environmental quality shared by all those whose actions affect the environment is commonly thought of as environmental stewardship (United States Department of Environmental Protection, 2015). Environmental stewardship has been strongly associated with rural or wilderness ecosystems as a means to mitigate loss of habitat and biodiversity (Moskell & Allred, 2013); however, environmental education that infuses environmental stewardship is becoming increasingly common in urban areas as a method to educate and engage urban residents (Fisher, Campbell, & Svendsen, 2012).

Environmental stewardship brings people together on a social level. Environmental education programs that focus on stewardship provide opportunities for participants to engage in hands-on work that allows them to learn about local ecosystems while integrating their value systems, cultural traditions, and socioeconomic activities (Standish et al., 2013). In a pilot study that surveyed volunteers in New York City's Million Tree project, participants cited various education foci (education of urban
forestry benefits, education of tree maintenance, and general public education) and stewardship of sense of place as important strategies for urban stakeholder engagement (Moskell, Broussard-Allred, & Ferenz, 2010). Further, a Boston evaluative survey study found that participants in urban stewardship projects reported significant increases in their willingness to take action to address community environmental issues and some increases in environmental or scientific knowledge (Robert, 2015).

Whereas restoration explores revitalization and stewardship emphasizes responsibility, civic ecology focuses more on grassroots or community-driven stewardship. Civic ecology is the study of how community environmental stewardship practices interact with humans and other organisms, neighborhoods, governments, nonprofit and business organizations, and the ecosystems in which they take place (Krasny & Tidball, 2015, p. xiv). Civic ecology involves the practice of restoring nature and community in areas of ecological or economic disturbance; therefore, civic ecology practices are well suited for urban areas. Dolan, Harris, and Adler (2015) asserted that civic ecology work is best situated in human-dominated systems such as cities because such work is as much about community engagement and collective impact as it about greening ecosystems. Some examples of civic ecology work in urban communities include community gardening, brownfield reclamation, urban park development, and community tree plantings.

Learning occurs when environmental education is infused into civic ecology practices; this is known as civic ecology education (Krasny & Tidball, 2007). For example, young people may work with and learn from community adults who are part of a local park association that removes invasive species or plants trees. Krasny and
Tidball's (2007, 2009, 2015) and Tidball and Krasny's (2010) work suggested that with civic ecology education, learning occurs individually and at the group level through knowledge gained about ecological systems and through building community and social capital.

**Theoretical Framework**

Because development of an ecologically and scientifically literate population is a core goal within the field of environmental education, the theoretical underpinnings of this research were informed by ecological literacy and science education. Educator practice is explored primarily through the lens of ecological literacy. *Ecological literacy* is defined as the ability to understand, and to act on those understandings, how people and societies relate to one another and to natural systems in a sustainable manner (Orr, 1990).

Because the development of ecological (environmental) literacy is a central goal of the field of environmental education (North American Association for Environmental Education, 2015), it may be assumed that many of Orr's (1990) propositions guide the practice of environmental educators in urban environments. This study used Orr's propositions, specifically those related to place, outdoor experiences, and complex systems, to guide initial inquiry into educator practice. This lens allowed the researcher to better understand where educator practice lies within the larger framework of ecological literacy. Additionally, this research draws heavily on the narrative inquiry work on sense of place of Kudryavtsev, Stedman et al. (2011), specifically in this study's goal to learn about the lived experience of urban environmental educators. However, this study also
differs from that work by nesting place-based education under the umbrella of ecological literacy.

Ecological literacy frames the research and science education heavily informs it. Although environmental education is sometimes critiqued for focusing too much on science (Robertson & Krugly-Smolska, 1997), support for science literacy is a key component of environmental education (North American Association for Environmental Education, 2015). Despite the interdisciplinary nature of urban environmental education, the goal for many educational initiatives in urban green space is to use the urban landscape as a platform to build scientific literacy (Cox-Petersen & Spencer, 2006). To understand this better, this research explored six pillars, or strands, that support effective science education in informal learning environments to help guide science learning in places such as urban green space. These elements were developed as an extension to the National Research Council's K–8 framework developed specifically to support informal science environments (Rahm & Ash, 2008). They include learners who experience excitement to learn scientific phenomena, generate understanding of scientific concepts, manipulate and explore the natural and physical world, reflect on scientific ways of knowing, participate in scientific language and using scientific tools, and see themselves as contributors to science (P. Bell, Lewenstein, Shouse, & Feder, 2009). These pillars offer a guide to understanding educator practice and learning experiences in urban green space. Even though it may not be possible to address all six pillars within the scope of one program, this study aimed to have these six pillars, along with Orr's (1990) seven propositions, serve as the backdrop for exploring a myriad of science education approaches in urban green space, including field studies, citizen science, and STEAM.
Because this study explicitly looked at the practices of frontline educators, the research approach and methods themselves were informed by the science instructional practice research of Abd-el-Khalick, Bell, and Lederman (1998) and Loughran, Mulhall, and Berry (2004). Abd-el-Khalick et al. (1998) found that with formal educators, there was often a disconnect between teachers and their conceptions of the nature of science and what actually took place in their classrooms. The researchers strongly advocated for the inclusion of better teacher training to minimize disconnect. Loughran et al. (2004) found that educators had a hard time articulating their practice as it related to pedagogy and content knowledge. Their work, and that of Abd-el-Khalick et al. (1998), was further supported by Jung and Tonso (2006) and S. M. Wilson and Berne's (1999) work on pre-service classroom teachers, which called for comprehensive training across content areas, pedagogy, and practice. Using formal teacher practice as a lens for this research allowed the researcher to draw parallels between what happened in formal and informal education in terms of educator approach. However, because this study used a grounded theory approach, other theoretical pathways were applied throughout the research process.
CHAPTER 3

Methodology and Analysis

Building from the theoretical framework established within the literature and discussed in the Literature Review chapter, this chapter addresses the research questions; the methodological framework in which they were addressed; and the context, data collection, and analysis of the study.

Research Questions

Stemming from the framework established in the literature (Figure 2), this research study focused on the following research question and subquestions:

How do informal environmental educators in a specific context or location articulate their approach to teaching environmental education programs in urban green space(s)?

(a) What content areas do they touch upon?
(b) What pedagogical practices do they employ?
(c) How do educators frame their work through the lens of science education, ecological literacy, and applied conservation?

Methodological Framework

To address the research question and subquestions, the researcher employed parallel mixed methods (Yin, 2016) using two distinct research phases and methodological approaches. Phase 1 was a context/location-based case study, and Phase 2 was survey research with a broadened national sample (Figure 3).
The context/location-based case study methodology was the primary research method, with grounded theory as the theoretical approach. Case study methodology was chosen because it allowed for inductive analysis of individual scenarios and situations (Glesne, 2005; Yin, 2016). In keeping with the grounded theory tradition as an inductive approach to research, this study aimed to develop a middle-range framework about urban environmental educator practice through cyclical data analysis (Glesne, 2005) using one city (Blue City) and its educators as the case of study. Consistent with Charmaz's (2014) constructivist approach to grounded theory, the researcher did not analyze the data collected within the framework of established theories but constructed a middle-range framework from the data, including the researcher's positionality. Initial data collection and analysis focused on the key research question around how educators articulated their approach, while research subquestions a, b, and c emerged as important additional questions for consideration through theoretical sampling and data analysis.

Constructivist grounded theory supported the inductive case study approach (Charmaz, 2014). That approach enabled flexibility and responsiveness when collecting...
data on the beliefs and practices of 12 environmental educators working in urban green space sites in a small city on the east coast of the United States.

**Data Collection Instruments**

The data collection instruments were developed from the literature review frameworks and insights gleaned from early data collection and findings from additional investigations by Schusler and Krasny (2010) and Russ, Peters, Krasny, and Stedman (2015), specifically including survey questions from the works of Pederson and Yerrick (2000) and Gejda and LaRocco (2006). The instruments consisted of interviews (Appendix A), observations (Appendix B), and surveys (Appendix C). Interview questions were open-ended and focused broadly on educator practice. They included questions about the participants' programs, ways in which they defined their work, their goals, their opinions about the program's value, and pedagogies. Observations focused exclusively on observable teaching approaches and practices such as educator use of various ecological literacy tenants, whether or not they approached their work through the lens of applied conservation, and observable pedagogies used. The survey asked questions ranging from program audience and type to pedagogy use and value and content taught.

**Data Analysis**

Consistent with the methodological framework, the researcher analyzed the data collected and codes generated from initial interviews to help inform data collection and methodological tools for subsequent observations. Additionally, the interview and observation data were analyzed to inform development of the survey tool used with both Phase 1 and Phase 2 participants. Analyses from all three tools (i.e., interview questions,
observation protocol, and survey) then helped develop new theory rather than align to predetermined theories (Charmaz, 2014). Thus, the analyses were both formative and summative. Early analyses included creating initial and final codes (Appendix D), analyzing themes, and writing memos. These analyses informed the path and scope of future data collection and analysis. Codes developed from the interviews served as the coding structure for all other forms of data collection. However, out of step with Charmaz’s (2014) view of authentic constructivist grounded theory, the data collection and analysis in this study did not always occur at the same time because scheduling constraints limited opportunities for iterative theoretical sampling and data analysis.

The grounded theory that emerged from Phase 1 (the case study of 12 educators) was then tested in Phase 2 of this study through descriptive survey research. Phase 2 included surveying participants from Phase 1, but focused on a larger subset of urban environmental educators from throughout the United States as a means to address the emergent middle-range theory of urban environmental education practices.

**Validity**

Validity is a critical component of any research design. Validity demonstrates the trustworthiness of the research and should be visited throughout the research process. To address validity issues in this project, the researcher used the verification procedures of peer review and debriefing and member checking (Glesne, 2005).

**Peer review and debriefing.** Throughout this process, the researcher was seated as part of a team that included her doctoral committee, fellow doctoral students, and additional faculty scholars in the field of environmental education. In this setting, the researcher attended a minimum of two peer reviews per month throughout the research
process. These review sessions were chances to articulate the research to date with objective outsiders, receive their reflections, and provide feedback about the research.

**Member checking.** Member checks were implemented as additional safeguards in the research process. From the onset, study participants were fully informed of the research project goals; invited to view research observations, notes and interview transcripts; and given multiple opportunities to discuss with the researcher any inaccuracy in the data. No participants reported any inaccuracies or requested any changes to the data representation. However, due to the researcher's time constraints and the participants' limited availability, the researcher did not consult with the participants in regard to this final product. The researcher took an autocratic approach and made the final decision as to what data to present in the final analysis and discussion.

Interview data were validated through interrater reliability. An outside party reviewed and coded a subset of interview transcripts to insure accuracy and applicability of codes and themes. Additionally, the researcher triangulated data by collecting data across methods and over the 7-month course of research. Codes generated through interview analysis also served as the primary coding structure for program observations and qualitative survey questions. These procedures insured data triangulation from multiple viewpoints and a consistent coding structure for the varied methods over time. Data was also triangulated with evidence presented from research identified in the literature review, which aided support of the research validity.

**Researcher Identity**

Urban communities are melting pots for ethnic, gender, and class diversity. As such, any research into urban areas must take into account researcher identity and how it
is shaped by social, cultural, and professional phenomena. This researcher's perspective as it related to urban environmental education was shaped by her personal experiences examining ecology in the city and her professional experiences as an environmental educator, program manager, and consultant working within urban areas.

Because humans are the dominant species in urban ecosystems, the researcher took into account the sociocultural dimensions that informed her understanding of urban environmental education. The researcher's view stemmed from her identity as a middle-aged White female who grew up in both urban and suburban environments (and not as a first-generation immigrant, person of color, or in a family of poverty). As a child, she had positive experiences with nature in the city and was part of a culture that highly valued nature appreciation and experiences.

The researcher is a seasoned environmental educator, teaching environmental education to young people in formal and informal learning environments for over 15 years. For the past 10 years, she focused primarily on urban environmental education, and currently works as a program manager of urban-focused environmental education programs for a nongovernmental environmental organization. She has authored one state environmental literacy plan, served on the board of one state professional environmental education organization, and serves on the advisory board of another state's environmental literacy assessment plan. Over her career, her curriculum development and instruction focused on a wide range of content areas related to science, conservation, and environmental literacy. She sees the world in systems and interconnections between the human and the natural world, and living things and nonliving things. She believes the solutions to ecological problems at hand lay in the ability of people to become
ecologically and scientifically literate. In her career, she has strived to provide young people with instruction and opportunities to allow them to see the world with heightened awareness of how the world is connected—especially in cities, which may then lead to their greater desire to be civically engaged stewards of our communities.

Aside from the researcher's passion for ecology, urban ecology, and scientific literacy, she also had a profound interest in educators' abilities to have their voices heard. She believes frontline educators contribute much more to the field of environmental education than they are credited for and that, all too often, research focused on learner outcomes. Frontline educators are the first points of contact for an audience at large. As such, an understanding of how they articulate their work is critically important for the field of environmental education.

This research project not only fulfilled the researcher's passion, but also brought her face to face with her professional career by studying colleagues and peers—many participants were a part of the researcher's professional network. As such, the researcher saw herself as both an outsider and an insider to this study; an outsider in that she did not work directly with or for any research participant or organization, and an insider in that, like the participants, she was a practitioner in the field of urban environmental education. Her position as an insider, outsider, or both certainly influenced how she perceived the study topic throughout the research process, and potentially how some participants approached their participation in the research.

The researcher was well aware of some of her bias and assumptions and anticipated more bias would be revealed as the research progressed. Because the research participants taught for environmental-based organizations, the researcher assumed they
had some knowledge of ecological principles. This assumption stemmed from the researchers' own understanding of what educational background is required of a frontline environmental educator. She also assumed the participants had some understanding—broad environmental education instructional practices or pedagogies—of urban environmental education, reflected on what it meant to be an urban environmental educator, and understood what made urban systems and urban populations a unique platform for environmental education. However, because she was studying frontline educators from a variety of places, academic and professional backgrounds, and organizations, she also assumed participants may have lacked a robust understanding of ways to teach urban environmental education or defined and approached it in different ways. These assumptions came solely from reflecting on her own experiences of what she knew or felt prior to pursuing a master's and doctorate degree.

Researcher bias was of utmost importance—participants may not have shared the researchers' passion and opinions. To deal with her assumptions and bias throughout the research process, the researcher critically reflected throughout the process, challenging herself to keep an open mind. To do this, the researcher forced herself to step out of her own shoes and try not to allow any of her own biases or assumptions to trickle into the data collection. She maintained research memos, continuously reviewed notes, and held regular check-ins with her research committee to check for bias. This approach was fairly effective. Some researcher assumptions proved true; others did not.

Perhaps the most important thing the researcher focused on was conducting ethical research. No matter how important a research topic is, if not conducted in an ethical manner, then it is meaningless to the field at large. Glesne's (2005) analysis of
ethical codes, researcher dilemmas, and the importance of understanding the many shades of gray in qualitative research echoed the researcher's feelings on the importance of ethics in research. Within the scope of this research, ethical considerations focused on informed consent, voluntary participation, doing no harm, maintaining confidentiality, and communicating.

**Ethics**

The Lesley University Institutional Review Board (IRB) approved the study (Appendix E) in December, 2017, with an addendum in July, 2017 (Appendix F). Initially, all Phase 1 participants committed (verbally or via email) to participate in this research project and followed-up with an official written consent form (Appendix G) that detailed all phases—interview, observation, and survey—in which the participant would be asked to take part. Consistent with Yin (2016), the informed consent made participants aware that their participation was voluntary, of any risk to their wellbeing, and that they could drop out of the study at any point.

The researcher encountered dilemmas related to consent and voluntary participation surrounding the notion of signing a physical consent form and feeling obligated to participate in the research. Glesne (2005) stated that written consent is a debated issue when discussing research ethics. However, given the requirements of this research, and in accordance with IRB requirements, written consent was mandatory. Despite the participants' willingness to participate and commit verbally and via email, signing a physical paper added a sense of reality to the project that made some participants uncomfortable. Unaware whether they had participated in past research or had familiarity with consent forms, the researcher had concerns that participants with no
experience or knowledge about consent forms may feel contractually obligated to participate and therefore would decide not to participate. To avoid that outcome and overcome participants' dilemma, the researcher verbally shared as much about the research as she could prior to presenting them with official documentation (e.g., explaining the reasons for the research and that it was a doctoral dissertation, not a performance evaluation or related to their jobs in any manner). All Phase 1 participants willingly signed the consent form (Appendix G) and received a copy for their records. All Phase 2 participants provided consent via a check box imbedded in the first page of the survey (Appendix C).

Additionally, although participants may have had no problems voluntarily participating in the entire research project, they may have had issues with being audio recorded during the interviews. Should they state they did not want to be interviewed on tape or for some reason change their minds during an interview, then the researcher planned to rely on her notetaking (with permission) to document the interviews. Because the notes jotted during an interview are susceptible to human error (Glesne, 2005), the researcher carefully explained that although the tape recorder may feel less comfortable, it would ultimately provide better accuracy in representing their stories. All participants gave permission to be audio recorded.

There was no foreseen risk of physical, emotional, or professional harm from direct participation in this research project. However, because the research studied people among the researcher's professional network, it was important that it did not negatively impact the participants' work. The participants allowed the researcher to come in and examine their practice. As such, the research may have resonated with them in a positive
way, but it also could have provoked critical reflection in a negative way. The researcher had no control over what the participants personally and professionally took away from participating in this project, but did her best to maintain open communication and build rapport prior to, during, and after project conclusion. The researcher made it clear that she was there to learn about their practice. Through to the end of the research, no participants provided any negative feedback or evidence of any "harm."

The researcher maintained open communication throughout the research process. Nearly all communication between the researcher and the research participants was verbal (in-person) and focused on explanations about voluntarily participation and participants' ability to withdraw from the research at any point; the research project scope and goals; expectations of participants and the researcher; and scheduling observation and interview time. Nonverbal communication consisted of brief email correspondence with participants about setting up the interview or observation and thank-you notes to the participants. Lastly, all research participants were offered a copy of a final research summary.

**Research Design**

Qualitative data collection methods, including observations, interviews, and memos, were used with Phase 1 participants, and the same quantitative survey was distributed to both Phase 1 case study and Phase 2 participants (Table 1). This research took place over a 9-month period from December, 2016 to September, 2017. Signed informed consent forms were obtained prior to the first interview (Phase 1 participants) and electronic consent obtained before Phase 2 participants completed the survey tool.
Table 1. *Research Method by Group*

<table>
<thead>
<tr>
<th>Participants</th>
<th>Interview</th>
<th>Observation</th>
<th>Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Phase 2</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Setting**

Phase 1 of this research occurred from January, 2017 to September, 2017 in Blue City (pseudonym), a small industrial city in the New England region of the United States. At the time of the study, Blue City had a population of approximately 180,000 residents with an ethnicity mix of 50% White, 27% Hispanic, 16% African American, and 6% Asian. Blue City is one of the largest cities in New England (United States Census Bureau, 2017b). It is situated on a major waterway and rich in both urban development and green spaces. Like many urban centers in the northeast, Blue City has a history of economic boom and bust rooted in manufacturing. After years of urban disinvestment, environmental organizations in Blue City recently organized around reviving and utilizing the city's green spaces.

Within Blue City, the researcher identified 31 organizations whose work was connected to environmental education. Of those 31, 16 (51%) organizations conducted some aspect of their work in urban green spaces. The researcher categorized these organizations by those with missions based in nature conservation and those that were social justice oriented. The scope of reach included statewide organizations, citywide organizations, and community-based nonprofits. Additionally, 38 "friends of" groups, whose work directly related to a specific park or city area, were identified. Thus, in total, 54 organizations or groups were identified as doing programming in urban green spaces.
in Blue City (Table 2). Blue City was chosen as the research location due to its size, location, demographics, and diversity of organizations doing environmental education in urban green space.

<table>
<thead>
<tr>
<th>Organization type</th>
<th>Number organizations in Blue City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature based</td>
<td>10</td>
</tr>
<tr>
<td>Social justice</td>
<td>6</td>
</tr>
<tr>
<td>Friends of</td>
<td>38</td>
</tr>
</tbody>
</table>

*Note. N = 54.*

**Phase 1 Participants**

Phase 1 participants were selected from the 54 Blue City organizations using purposive and snowball sampling (Yin, 2016) through peer and colleague referral. The researcher's goal was to identify a cadre of educators who represented a wide range of organizations—from statewide nonprofits to small-scale community groups—focused on "nature-based" environmental education, "social justice" and community development, and site-specific "friends of" groups. The criteria for choosing an organization was to diversify the organizations represented in the research sample; the organization's specified program audience, program theme, or specific green space location was not included. Tables 3 and 4 provide an overview of the criteria used to select the participants.
Table 3. *Mandatory Participant Selection Criteria*

<table>
<thead>
<tr>
<th>Include</th>
<th>Exclude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educators who:</td>
<td></td>
</tr>
<tr>
<td>Spend 50% of more of their time teaching or facilitating environmental</td>
<td>Are administrators</td>
</tr>
<tr>
<td>education programming (i.e., frontline educators)</td>
<td></td>
</tr>
<tr>
<td>Conduct at least 50% of their work in urban areas with urban residents</td>
<td>Do not conduct at least 50% of programming in urban areas with urban residents</td>
</tr>
<tr>
<td>Conduct programming in urban green space(s)</td>
<td>Do not actually do programming in green space(s)</td>
</tr>
</tbody>
</table>

Table 4. *Additional Selection Criteria*

<table>
<thead>
<tr>
<th>Preferred</th>
<th>Not considered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educators who work for:</td>
<td></td>
</tr>
<tr>
<td>Nature-based environmental education organizations</td>
<td>Are formal classroom educators</td>
</tr>
<tr>
<td>Social justice-based environmental organizations</td>
<td>Do not do work in green space(s)</td>
</tr>
<tr>
<td>&quot;Friends of&quot; groups</td>
<td>Are not affiliated with any group or organization</td>
</tr>
</tbody>
</table>

Yin (2016) stated that there is no formula for defining the sample size when using qualitative methods; rather, the goal should be to maximize information gathered. In Phase 1, the researcher reached out to 16 organizations and friends-of groups (Table 5). Originally, 13 informal environmental educators from nine organizations agreed to take part in the study. However, one educator was dropped from the study after the interview revealed the participant did not fully meet the criteria. In the end, the Phase 1 mix was five nature-based, six social-justice-based, and one friends-of (of a park) groups' participants.
### Table 5. Participant Organizations Considered or Selected and Type

<table>
<thead>
<tr>
<th>Area: Focus</th>
<th>Environmental education type</th>
<th>Urban green space utilized</th>
<th>Primary audience</th>
<th>Selected organization participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statewide nonprofit: Conservation, advocacy, education</td>
<td>Nature based</td>
<td>Park</td>
<td>Elementary and middle school</td>
<td>Loretta, Susan</td>
</tr>
<tr>
<td>City-based government: Outdoor education in city parks</td>
<td>Nature based</td>
<td>Park</td>
<td>Elementary school, teachers, community</td>
<td>Ann</td>
</tr>
<tr>
<td>Friends-of: Community engagement in local park.</td>
<td>Friends of</td>
<td>Park, garden</td>
<td>Community</td>
<td>Tom</td>
</tr>
<tr>
<td>Watershed nonprofit: Stewardship and education</td>
<td>Social justice</td>
<td>Park, greenway</td>
<td>Elementary school, community</td>
<td>Ashley, Kim</td>
</tr>
<tr>
<td>Zoo: Statewide outreach to enhance conservation and environmental education</td>
<td>Nature based</td>
<td>Park</td>
<td>Pre-K, elementary school</td>
<td>Sheila</td>
</tr>
<tr>
<td>Statewide nonprofit: Stewardship and education in urban communities</td>
<td>Social justice</td>
<td>Garden</td>
<td>High school, community</td>
<td>Amy</td>
</tr>
<tr>
<td>City-based botanical center: Education through gardening and landscaping</td>
<td>Nature based</td>
<td>Park, garden</td>
<td>Elementary school</td>
<td>Rosa</td>
</tr>
<tr>
<td>Friends-of: Community stewardship and education, neighborhood park on reclaimed land</td>
<td>Friends of</td>
<td>Park</td>
<td>Community</td>
<td>David</td>
</tr>
<tr>
<td>Statewide nonprofit: Local design &amp; build projects with youth</td>
<td>Nature based</td>
<td>Park, garden</td>
<td>Middle and high school</td>
<td>Amber</td>
</tr>
<tr>
<td>Friends-of: Community engagement and education in local park and cemetery</td>
<td>Friends of</td>
<td>Park, cemetery</td>
<td>Community</td>
<td>Henry</td>
</tr>
<tr>
<td>Citywide nonprofit: Development of urban agriculture and garden-based education</td>
<td>Social justice</td>
<td>Garden</td>
<td>High school, community</td>
<td>Corrine</td>
</tr>
<tr>
<td>City and regional: Organic food production and education through farming</td>
<td>Social justice</td>
<td>Garden</td>
<td>High school, community</td>
<td>Marsha, Abby</td>
</tr>
<tr>
<td>Neighborhood and school-based community garden: Garden-based education and neighborhood beautification</td>
<td>Nature based</td>
<td>Garden</td>
<td>Elementary school</td>
<td>Tammy</td>
</tr>
<tr>
<td>Citywide: Engaging youth and community members in city-owned community gardens</td>
<td>Social justice</td>
<td>Garden</td>
<td>Elementary school</td>
<td>Jasmine</td>
</tr>
<tr>
<td>Regional: Conservation, stewardship, and education of open space</td>
<td>Nature based</td>
<td>Park</td>
<td>Elementary and middle school, teachers</td>
<td>Margaret</td>
</tr>
<tr>
<td>Statewide nonprofit: Conservation and education</td>
<td>Nature based</td>
<td>Park</td>
<td>Elementary and middle school, families</td>
<td>Jenna</td>
</tr>
</tbody>
</table>
Table 6 lists the Phase 1 research participants (pseudonyms) and organizations they represented. Demographic and socioeconomic information was not deemed a variable in examining the educators' work and was not collected.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Organization</th>
<th>Organization type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abby</td>
<td>L</td>
<td>Social justice</td>
</tr>
<tr>
<td>Amy</td>
<td>F</td>
<td>Social justice</td>
</tr>
<tr>
<td>Ann</td>
<td>B</td>
<td>Nature based</td>
</tr>
<tr>
<td>Ashley</td>
<td>D</td>
<td>Social justice</td>
</tr>
<tr>
<td>Corrin</td>
<td>K</td>
<td>Social justice</td>
</tr>
<tr>
<td>David</td>
<td>H</td>
<td>Friends of</td>
</tr>
<tr>
<td>Kim</td>
<td>D</td>
<td>Social justice</td>
</tr>
<tr>
<td>Loretta</td>
<td>A</td>
<td>Nature based</td>
</tr>
<tr>
<td>Marsha</td>
<td>L</td>
<td>Social justice</td>
</tr>
<tr>
<td>Sheila</td>
<td>E</td>
<td>Nature based</td>
</tr>
<tr>
<td>Susan</td>
<td>A</td>
<td>Nature based</td>
</tr>
<tr>
<td>Tammy</td>
<td>M</td>
<td>Nature based</td>
</tr>
</tbody>
</table>

*Note.* There were 12 participants (six from social-justice organizations, five from nature-based organizations, and one from a friends-of organization) from nine different organizations.

**Phase 2 Participants**

Although representative sampling is not typically part of a qualitative study (Yin, 2016), in this case the researcher felt it would be beneficial to test the theory/framework generated from research Phase 1 in a second phase to examine a wider field of urban environmental educators. The population of individuals who identified as environmental
educators was unknown; therefore, it was difficult to determine the population of environmental educators whose work occurred in urban green space(s). However, the researcher identified 31 organizations whose programs were connected to urban environmental education in Blue City and an additional 46 U.S. cities that maintain a population of at least 175,000 and population density of greater than 1,600 square kilometers. Thus, the researcher estimated the population of urban environmental educators to be at least 800.

Therefore, in addition to the Phase 1 case study participants, additional participants were recruited to participate in Phase 2. Phase 2 participants were recruited via unsolicited email sent to 20 environmental, environmental education, and affiliate organizations the researcher identified as doing environmental education in urban green spaces; 50 state and regional professional environmental education organizations; three graduate programs noted as having urban environmental education course work; the researcher's own personal and professional network; and social media outlets.

Participation criteria were the same as for Phase 1 case study participants (Tables 3 and 4). In total, Phase 2 consisted of 135 participants (96 fully participating), representing a diversity of organizations and regions.

**Tools**

**Interviews.** Interview approaches were guided by methods described by Yin (2016), Glesne (2005), and Seidman (2006). Semistructured interviews (Glesne, 2005) were conducted with all Phase 1 participants over the 6 weeks from late December, 2016 to early February, 2017. The interview questions were open ended and informed by the literature review, Kudryavtsev, Stedman, and Krasny's (2011) and Russ et al.'s (2015)
narrative inquiry work on urban environmental education, and Abd-el-Khalick et al.'s (1998) work on science teacher practice. The interviews were used to understand the ways in which participants thought about urban environmental education in green space, to identify their approach to their work, and to provide the researcher additional insight into their practice and clarify the organizational frame prior to conducting program observations. Interview questions included questions such as: What is your primary role in your organization, what do you see as the primary goals of your work as an urban environmental educator, what do you see as the benefits of doing environmental education in urban green spaces, and tell me about what practices or instructional approaches you use in your teaching. Seidman (2006, p. 9) noted that at the root of any interview is an interest in understanding the experiences of others and the meaning they make out of their experiences. In keeping with the tradition of grounded theory as an inductive approach to research, the interview questions (Appendix A) broadly focused around the participants' thinking and experiences (Charmaz, 2014) in urban environmental education and their work in green space(s) to help guide the field observations.

Individual interviews lasted 15 to 60 minutes and took place at a location chosen by each research participant. For some, the interview setting was their place of employment; others chose a public space. Each interview was recorded and transcribed verbatim within 48 hours via an online transcription company, Transcription Puppy, and then verified for accuracy by the researcher. Once their accuracy was verified, the transcripts were uploaded to NVivo software for analysis. Although Seidman (2006) suggested that notetaking can benefit the interview process, the researcher took none in
order to insure the participants felt comfortable and the researcher was fully engaged in
the dialog without the distraction. However, the researcher drafted analytic memos at the
conclusion of each interview. Researcher thoughts and ideas were important throughout
the research process (Yin, 2016) because such memos documented overall ideas and
impressions about how the educators approached their work and thought about their
teaching practices.

**Observations.** The interview findings were used to develop the observation
protocol (Appendix B). Observations took place over a five-month period after all
interviews were conducted, transcribed, and subjected to three rounds of coding.
Although helpful in providing a framework for data collection, an observational protocol
was not originally planned for use in this research. Qualitative research scholars
including Yin (2016), Glesne (2005), Charmaz (2014), and Schutt (2004) cautioned
against the use of protocols or rubrics. Yin (2016) stated that protocols in qualitative
methods may limit the discovery process. Noting that protocols were an option, Yin
suggested that if new discoveries are made in the research, then protocol, design, and
intention may need to be revisited. Thus, the researcher consulted the dissertation
committee after the interview analysis. In keeping with inductive grounded theory, the
researcher determined that an observational protocol would allow a focus on the
participants' key approaches and practices that emerged as key themes through interview
data analysis and literature review. That is, the interview findings and literature informed
the observational approach, and the codes generated from the interviews helped in
analyzing the observations.
The protocol focused on distinct observable instructional approaches or practices related to science education, ecological literacy, and applied conservation and provided uniformity in what was be observed across all 12 Phase 1 participants. Yin (2016) suggested that when protocols are used, they should serve as mental frameworks from which to make observations and accompanying field notes. As such, the researcher took field notes in addition to the observational protocol. Due to the participants and researcher's scheduling constrains, the observation protocol was not pilot tested prior to use, and so the researcher maintained flexibility to revise or adapt the protocol as needed. However, the protocol was found to be a valid tool for focusing on instructional approaches, and no revisions or adjustments were needed.

Each Phase 1 participant was observed teaching or leading a program one time for a period of 1.5 to 3 hours. The researcher took an observational approach informed by Glesne's (2005) and Yin's (2016) work. Specifically, she assumed a participant-observer role wherein her presence was known not only by the participants, but also by their audiences. Each participant took time to make the researcher's identity known to the audience, and the researcher engaged in casual conversation with the participants and their audience as needed. Additionally, the researcher asked clarifying questions of the participants based on what she observed, to not only ensure understanding, but also serve as a form of member check (Glesne, 2005).

The researcher did not fill in the observational protocol forms during the observation, but took field notes throughout each observation. Field notes were both descriptive and analytic (Glesne, 2005). Informed by Lederman's (1998) and Kang and Wallace's (2005) work on science teaching practices, the researcher used field notes to
document overall what was observed, but with a particular focus on the actions, instruction, content, delivery, and practices of the participating educator. These notes provided an overall picture of the setting and program. More importantly, they focused on the participants' instructional approaches, content addressed, and pedagogy. The notes followed an approach commonly used in ethnography that included jottings and field notes (Schutt, 2004; Yin, 2016). At the conclusion of each observational session, the researcher completed the observational protocol form and attached relevant field notes. Lederman (1998) also suggested including written lesson plans or outlines; however, typical of some informal educators, no formal lesson plans existed among the study participants.

After the observational protocol was completed, the data was uploaded to NVivo for further analysis. In addition to the field notes and observational protocol, the researcher also drafted research memos after the conclusion of each observation, documenting—post-observation—her initial thoughts on educator practice, approach, and content. These memos were also uploaded to NVivo for coding analysis.

**Survey.** Within any mixed-methods study, coherence between qualitative and quantitative data is important (Yin, 2016). In this study, additional qualitative and primary quantitative data were collected in the form of a survey. The survey included closed- and open-ended questions and was tested with nonparticipating educators. This survey provided a further way to triangulate and validate data collected in research Phase 1 and to test the middle-range framework of urban educator practice in Phase 2.

The same survey was distributed to both Phase 1 case study participants and to the larger group of Phase 2 participants via an online survey platform. The researcher
developed the survey tool inductively, based on themes that emerged from the interviews and observations of Phase 1 case study participants. The goal of including the survey was to test the theory generated in Phase 1 and to gain insight into instructional practices in the greater urban environmental educator community. It was first distributed to Phase 1 participants as a pilot, then preliminarily analyzed before being distributed to Phase 2 participants. No changes or edits were made to the survey between the case study group and national sample distributions.

The development and use of a survey post-interview and post-observation may be an uncommon approach to research environmental education and education broadly. The researcher identified no previous uses of a post-interview and post-observation survey. This could be in part due to the limited use of survey or quantitative methods in studies undertaking a grounded theory framework (Charmaz, 2014; Montgomery & Bailey, 2007). The survey structure was informed by those done by science education researchers Pederson and Yerrick (2000) and Gejda and LaRocco (2006).

No pre-existing survey tools could be adapted for this study; therefore, the researcher created her own measurement tool designed to understand the reported instructional practices of urban environmental educators called, Urban Environmental Education Teaching Practices (UEETP, Appendix C). It consisted of 25 questions (three of which were open-ended qualitative) informed by interview and observation results and the reviewed literature. The UEETP related to how urban environmental educators used urban green space(s) for programming, which audiences they worked with and content areas they addressed, and their pedagogical approaches and thoughts on partnerships and professional development. A key difference between the question structure of the
interview and the survey was that in interviews, all questions were open ended. In the
survey, answer choices were provided and, in some cases, defined for participants. For
example, in interviews participants were asked to openly respond to a question about
which pedagogies they used in their practice, whereas the survey asked the same question
but with predetermined and defined answer choices. The aim was to determine ways in
which the Phase 1 case study participants would self-report on their approach to their
work.

The same survey was distributed to Phase 1 case study and Phase 2 participants.
online via Survey Monkey. Phase 1 participants received the survey 1 month after the last
program observation, with 2 weeks to complete it.

In keeping with an inductive grounded theory approach to the research, Phase 2
participants were recruited after all Phase 1 participants completed the survey. Phase 2
participants consisted of urban environmental educators from throughout the United
States who met the same criteria as Phase 1 participants. Their inclusion served as a way
to test the theory generated from Phase 1. They also responded to the survey online via
Survey Monkey, but were allotted 1 month to complete the survey. No incentive was
offered for participation.

**Analysis**

**Interviews**

All interviews were transcribed verbatim via the online transcription company
Transcription Puppy within 48 hours of the interview taking place. The researcher
verified the transcripts for accuracy and then transferred them to NVivo for qualitative
analysis.
In NVivo, all interview transcripts were initially analyzed for word frequency followed by coding. Interview data were subjected to three rounds of coding. Provisional coding (Seidman, 2006) began the coding process with an established start list of codes based in previous research on urban environmental education and environmental education practices. They included concepts relating to urban environmental education trends (Russ & Krasny, 2015) and instructional practices that could be utilized in urban green space, such as inquiry, critical thinking, youth development, hands-on stewardship, citizen science, and place-based education. As the researcher encountered more data, codes were revised, modified, deleted, or expanded to include new codes. Subcodes were added as second-order tags assigned after the parent scale to expand, detail, or enrich the entry.

The second round of coding used open coding because provisional coding can be critiqued for being based in preconceived approaches and therefore inflexible in allowing other codes to emerge (Charmaz, 2014). Initial coding strategy included coding for all possible theoretical directions. These codes were treated as provisional and revised or removed as coding progressed. Throughout this process, the researcher often coded the initial codes simultaneously with provisional codes when they provided both descriptive and inferential meaning.

The third round of coding aimed to further connect provisional codes with open codes by identifying commonalities and overlaps between Russ and Krasny's (2015) trends and environmental education practices. This practice gave the research a final set of five distinct areas or code sets in which to focus the research: science education,
intention, and focus; ecological literacy and awareness; applied conservation and action; pedagogy; and partnerships.

Finally, a third party checked the researcher's coding for interrater reliability. In addition to being an environmental education scholar, the third party had served as the researcher's advisor and mentor for her master's degree. Both the third party and the researcher had backgrounds working with and training environmental educators in pedagogy and content in both formal and informal settings. The third-party researcher was not paid for her work, but was trained to use the same coding structure as the researcher for accuracy and validity.

The third party reviewed and coded seven of 12 interview transcripts using the same set of final codes (Appendix D) the researcher used. The reliability percentage score between the two coders was 90% with a Cohen's kappa score of .40, showing moderate agreement. "The kappa is designed to take into account the probability of guessing, but the assumptions it makes about rater independence and other factors are not well supported, and thus it may lower the estimate of agreement excessively" (Salkind, 2011, citing McHugh, p. 276).

After reconciling interrater reliability, the researcher conducted brief member checks with participants for accuracy in understanding of how they approached their work. Finally, the researcher analyzed all interviews for emergent themes by participant and among the participant groups. Interview codes were further consolidated into final codes (Appendix D) that focused on key thematic areas that emerged from the interviews; these codes then served as the primary coding mechanism for the observations and open-ended survey questions.
Observations

At the conclusion of each observation, the researcher organized, clarified, and reconciled field notes with the observational protocol. She compiled an observational protocol form for each participant and uploaded it into NVivo for qualitative analysis and against final codes validated in the interview analysis for themes per participant and among the group of Phase 1 participants.

Surveys

The tool was pre-tested with two nonparticipant environmental educators prior to being administered to research participants to insure question clarity, determine expected completion time, and assure questions allowed freedom in answer choice to maintain an inductive research approach. The UEETP tool was developed using the online Survey Monkey platform due to the ease with which the researcher could reach out to participants in a variety of communities and with which participants could complete the survey.

All survey data were collected, stored, and analyzed within the Survey Monkey platform. The survey sample for Phase 1 participants \( n = 12 \) was small and not intended to gauge statistical significance. Rather, the survey for Phase 1 participants primarily served as a pilot for Phase 2 and as a triangulation (Figure 4) and validation tool for Phase 1 interview and observational data.
For Phase 2 participants, the final number of survey respondents was 135 with 39 incomplete surveys. The 96 fully completed surveys were considered representative of the estimated population of urban environmental educators (800; see estimate calculation at Research Design: Tools). Data for Phase 2 participants were analyzed for descriptive statistics in the form of frequency and average to report on content area, instructional framing, pedagogical approach, and use of partnerships. Phase 2 data were used to test the grounded theory proposed in Phase 1.

The researcher used Microsoft Excel software to analyze the entire data set. All survey results were coded and entered into Excel spreadsheets, and descriptive frequency and average statistics calculated to analyze program types, reported content area addressed, teaching practices used, and opinions on professional development needs.
Limitations

This study's limitations came in the form of participant numbers and population, participant-researcher time and interactions, research tools, and the research questions themselves. Although the Phase 1 participant sample \( n = 12 \) represented the diverse organizational type (nature-based, social justice) and urban environmental educator population in Blue City, only one participant represented a "friends of" group.

This study's Phase 2 sample \( n = 96 \) was robust. However, because Phase 2 participants were recruited broadly through environmental education networks across the country, and participants self-selected based on criteria in Tables 3 and 4, it is possible that some completed the survey but in fact did not meet the full selection criteria. Upon expanding the research to an audience beyond Blue City, it was difficult to determine the true population of urban environmental educators. Who does and does not identify as an urban environmental educator is difficult to know, and there is no central data source that can attest to the true population size.

Many outside variables affected what occurred in the programs, how the educators approached their practices, and how program attendees reacted. For example, despite educators discussing the importance of teaching about climate change and citing it in the survey as key content area, climate change as a content area of focus was not necessarily apparent in the research observations. Additionally, youth development has been shown to be an important instructional approach in urban environmental education, but educators in this study did not cite it as part of their practice. The study's limited timeframe did not allow follow-up interviews or observations to gather additional data when the researcher identified such potential discrepancies.
The researcher created her own research tools—interview questions, observation protocol, and survey. Although the tools did a good job of addressing the research questions of concern for this study and were informed by prior scholarly work in the field, not all tools were pretested for reliability and validity.

This study was initially framed through the lens of ecological literacy and science education. However, through the inductive approach, the study ending up focused on the five major areas of practice that surfaced in interviews with the majority of Phase 1 participants. Many more issues and practices surfaced in the interviews but could not be fully investigated due to time constraints. To fit the allotted time, this study correlated frequency with importance. Additionally, the literature review revealed youth development as an important pedagogical approach in urban environmental education. However, because Phase 1 participants did not clearly cite it as a key approach, it was not examined in Phase 2.

The survey often allowed participants to choose multiple answers to questions related to the approaches they used in their teaching. The researcher developed the survey tool in this manner to mirror the freedom of an interview and to reduce the constraint of selecting only one approach or practice within the areas of science education, ecological literacy, and applied conservation. However, selectivity of three areas could have unintentionally elevated an approach or practice as superior to others. Lastly, the researcher approached this study through an ethnographic lens—focusing on how educators viewed their own work—rather than an evaluation of the educators' practices.
CHAPTER 4

Phase 1 Findings

Phase 1 research with the 12 participants found that urban environmental educators who worked in urban green space(s) articulated their approaches to their work in a myriad of ways. The following sections highlight the seven key themes that emerged from this research: program value, teaching for ecological literacy, framing through applied conservation, science education as intention, content area variability, pedagogy, and partnership.

Program Value

Broadly speaking, urban environmental educators in Blue City articulated their approach to teaching as rooted in understanding the value and importance of environmental education experiences in urban green spaces for urban audiences.

Participants saw their work (and urban green space environmental education, broadly) as having value for program attendees beyond teaching approach, programmatic content, or organizational goal. A common theme that emerged during data analysis was that of programmatic value for equity and accessibility and for health and wellness (Table 7).

Equity and Accessibility

Educators in Blue City had strong feelings about the value that urban environmental education provides to program attendees in the form of equity and accessibility and social and psychological wellbeing. During interviews, study participants talked about their programs and instruction as having value in orienting their program attendees to the equity and accessibility of their local parks and gardens. For
example, in response to an interview question about the benefits of environmental education in urban green space, Ann stated:

For me, my work teaching, I think in terms of equity, to show my participants that they can, anyone, is welcome to come and use a city park. It doesn't matter if you are rich or poor or your color . . . everyone that comes to city park is on equal grounds. Everyone is welcome, it is accessible to all, and that is fabulous.

<table>
<thead>
<tr>
<th>Code</th>
<th>Code description: Educator stresses the importance of urban environmental education in green space because it is a place that all can access—low cost and physically close to where people live</th>
<th>Cited in interview</th>
<th>Noted in observation</th>
<th>Cited in survey (pilot for Phase 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity and accessibility</td>
<td></td>
<td>9</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Social-emotional health and wellness</td>
<td>Ways participants acquire and effectively apply knowledge, attitudes, and skills necessary to understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions through urban environmental education. May include discussion on how the program connects humans to humans, not just humans to the nonhuman world.</td>
<td>12</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

Note. N = 12.
Another educator, Loretta, echoed Ann's sentiment:

While I love to take my students to wildlife refuges, it is also important to know that we live in a city, and there are parks within 5 minutes of our homes. It is difficult for our students to get to some more wild places, so it is great for my students when I can show them that there are free and accessible places in their neighborhoods. Then we can see that we [humans] are not alone in this system, the value is in accessibility which then adds to connecting people to place.

It was also noted in programmatic observations (Table 7) that the research participants genuinely wanted their attendees to know and understand the accessibility of their local urban green spaces. Across all observations, at some point in every program, the Blue City educators mentioned the ease with which attendees could access the green spaces within the programs and on their own in their free time.

Social-Emotional Health and Wellness

In exploring the programmatic value for social-emotional health and wellness, all participants stated that the health benefits of time spent in urban green space was very important to them and how they think about their teaching practice. Specifically, mental health—that is, the social and emotional benefits of urban green space—was important to how they framed their work. For instance, when asked to more fully describe her program goals, Loretta stated:

I seek to facilitate outdoor experiences that improve the social and emotional wellbeing of those who participate in my programs. . . . I read
all these articles about the health benefits, social benefits, and independence-building benefits from being in urban outdoor space, so those things. They may not be an obvious teaching focus because we do a lot of science, but it is an important part of what I do.

Amy articulated it another way: "I see my program as a means to increase the self-esteem of my students, as well as provide them with a sense of wonder." In response to the same question, Tammy, remarked, "My teaching philosophy is more about the emotional or therapeutic quality of time spent in the garden. . . . I think for me, it is the most important part of my work."

Observations (Table 7) further supported the value educators put on their work as it related to enhancing the social and emotional wellbeing of their program attendees. In half of the program observations, Blue City educators discussed with attendees the therapeutic value of urban green space.

**Teaching for Ecological Literacy**

Whether programming happened in a large park, pocket park, or community garden, developing ecologically literate attendees emerged as a central instructional approach of the participating urban environmental educators in Blue City. Because the researcher did not want to lead her participants or evoke her own bias, she did not redefine or ask targeted questions about ecological literacy in interviews. However, the concept emerged as a key finding in this study, specifically in teaching approaches centered around three tenants of ecological literacy—outdoor experiences, place-based experiences, and systems thinking (Table 8).
Table 8. Teaching Ecological Literacy

<table>
<thead>
<tr>
<th>Code</th>
<th>Code description:</th>
<th>Cited in interview</th>
<th>Noted in observation</th>
<th>Cited in survey (pilot for Phase 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor experiences</td>
<td>Providing participants with outdoor experiences</td>
<td>12</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Place-based</td>
<td>Place-based education and emphasizing the importance of connection to place</td>
<td>10</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Systems</td>
<td>Stressing the importance of linking local lessons and experiences to interconnected systems</td>
<td>5</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

Note. N = 12.

Across interviews and surveys, Phase 1 educators cited providing positive outdoor experiences for building an increased sense of comfort being outside and having safe and engaging outdoor experiences as key to their work. In interviews, all 12 participants talked about their teaching approaches as rooted in facilitating and providing outdoor experiences for their audiences. Although outdoor experiences is only one component of ecological literacy, participants saw it as an important concept. In response to a question about the importance of doing environmental education in urban green space and their individual goals as educators, participants remarked about the importance of rooting their practice in facilitating positive and safe outdoor experiences. Participant Ann stated:

For me, well, first, it's about when a kid is more comfortable going outside. Because they know what to expect, they are more likely to go outside, they will feel more comfortable and welcome—and not just
engage in the outdoors for education, but also independent explorations and adventures.

For these urban environmental educators, the foundation of the work is in outdoor experiences. Many participants felt that only after their program attendees achieved a comfort level with being outside could they move to other important concepts, experiences, and approaches. When asked about her program approach and how much of it occurred outdoors, Participant Susan stated:

It's all about getting kids outside and into their local parks. . . . More than half of my teaching is outside. I want to help the kids have fun and get comfortable outside, that is important for them—and the hope that they will take their families back to these outdoor spaces later. . . . We really don't get to learning until they are comfortable outside.

The survey data, in which participants were asked explicitly about ecological literacy, showed similar results. In responding to a survey question about which pillars of ecological literacy their teaching practice addressed, participants cited the outdoor experiences as a very important approach to include in their work. This level of importance was further illustrated by Participant Kim who, when asked in the survey about personal teaching goals, stated, "I believe children need to have and enjoy outdoor experiences. I have a personal goal to improve and increase their access to the outdoors and open spaces in urban environments."

Secondary to facilitating outdoor experiences in building ecological literacy within urban environmental education programs was teaching with a place-based education approach. Participating educators in Blue City remarked about how their
instruction used a place-based approach. Amy, a participant whose organization did work across the state, summarized her approach as rooted in place:

So, I think place-based education is a lot of what I'm trying to do with youth outside . . . wanting to connect them to where they live and then empower them to make their city a cleaner greener place. . . . It's sparking their interest in their own small part of their community.

Shiela, who did programming across the state as well as in Blue City, also championed the importance of having a place-based approach to her teaching: "For me, my job is all about facilitating an exploration of place and instilling a sense of place."

Ann, whose organization worked only in Blue City, stated, "I really want to help bridge a gap. . . . My goal is to develop environment or ecological literacy in my city, and I want to do this through connecting my community to their place."

Although outdoor experiences and place-based approaches were found to be the most important approaches to building ecological literacy for educators in Blue City, this research also coded for the use of systems thinking as an instructional theme that emerged from interviews. Some educators mentioned using systems thinking as an additional approach in their teaching practices primarily to instill in their program audiences the interconnectedness of bioregions and between human and natural systems. Participant Ann explained:

It is important to get a child to recognize nature connections within their home or their block, but then move on to the bigger picture, to how things are connected within the city to areas beyond the city—places like wildlife.
refuges, giving them (audiences) a more global view of how things connect.

Participant Abby, who was very passionate about the use of systems thinking in how she approached her programs, stated:

Understanding and teaching about systems, it's just a foundation that really helps you think . . . to understand. It helps you know that then everything is connected, human and natural cycles and systems, nothing is separated, teaching with this approach, it is part of what I do and it's especially important in urban environmental education.

**Framing Through Applied Conservation**

Conservation and local community action emerged as an important concept for how participating urban environmental educators in Blue City articulated their approaches to their programming and framed their work (Table 9).

<table>
<thead>
<tr>
<th>Code</th>
<th>Code description: Educator</th>
<th>Cited in interview</th>
<th>Noted in observation</th>
<th>Cited in survey (pilot for Phase 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sense of stewardship talk</td>
<td>Talks with participants about importance of fostering stewardship, but not necessarily participates in direct stewardship work</td>
<td>10</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Activism and civic engagement</td>
<td>Frames work around advocacy and importance of activism and civic engagement</td>
<td>9</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Stewardship as practice</td>
<td>Physically practices stewardship activities with participants</td>
<td>9</td>
<td>5</td>
<td>8</td>
</tr>
</tbody>
</table>

*Note. N = 12.*
During the interviews, the majority of educators talked about having goals of instilling a conservation ethic and empowering local civic engagement and action upon their program participants. Participant David, whose practice was rooted in one neighborhood, described his work as one that enhanced and empowered action in the neighborhood:

This work, it not just about me, it can't be about me, but what can I do. . . . So for me it's really about looking at a community, conservation of open space in our community first, and how can what I do serve and empower the community—and bolster what is already happening in these green spaces.

Participant Ashley, who worked in many neighborhoods across Blue City, stated she felt she needed to use empowerment as the vehicle with which to instill conservation ethics and civic engagement in her students:

I like to think of my work as action based, empowering them, encouraging stewardship of their areas . . . maybe even getting something like a second grader to care for one plant, that one plant is starting them on a path conservation or even environmental justice. It is important to let youth feel they have a voice, they can make a change, and show them they can care for things, that it's important to care about the world.

Survey and observation results showed two key ways educators framed their teaching work around conservation and civic engagement: through hands-on experiences and through conversation and dialogs.
For some educators, the concept of conservation and action was addressed through hands-on experiences in the form of stewardship, restoration, and civic ecology activities such as cleaning park, reclaiming vacant lots, planting gardens, or removing invasive plants. However, hands-on was not always achievable. For some educators, addressing conservation and action issues came through facilitated discussion and program messaging rather than through direct physical work. Regardless of the ways in which applied conservation was approached, it is clear that applied conservation framing was central to the practice of educators in Blue City.

**Science Education as Intention**

For participating educators in Blue City, not all programming in urban green space tied to academic areas of study or schools (Table 5). However, for educators whose work was heavily involved with schools and school-aged children, science education was an important part of their work.

In general, participants used science broadly as an approach in their programs. For example, in interviews, the majority cited science education as part of their teaching practice, and in the survey, 11 (92%) of 12 documented it as an instructional focus. Further, the researcher directly observed the practice in seven (58%) of 12 program observations. Table 10 details the specific approaches the educators in Blue City focused their science education around—incorporating STEM, STEAM, and science-based field work into their programs.

Participant Loretta described how she used a science education approach in her teaching and why she focused her teaching around science education:
I just personally love science, so I always want to point out science and science connections. I like to do a lot of ecosystem survey type stuff, but I try to use a lot of STEM approaches or STEAM (we can't forget about the art), where I have kids building or designing something, but also experimenting with something. But then, because we are coming into a school and asked to coordinate with their science curriculum, so that brings the science focus too.

Table 10. *Science Education Practices*

<table>
<thead>
<tr>
<th>Code</th>
<th>Code description: Educator addresses</th>
<th>Cited in interview</th>
<th>Noted in observation</th>
<th>Cited in survey (pilot for Phase 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEAM</td>
<td>Science and science education in their program but emphasizes not just science, but rather integration with technology, math, art, engineering</td>
<td>10</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Field studies</td>
<td>Science and science education in their program, but emphasizes field studies such as tree surveys or biodiversity counts</td>
<td>7</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Citizen science</td>
<td>Role of science and science education in their programming, but emphasizes participation in citizen science projects</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

*Note. N = 12.*

Participant Tammy had nearly identical thoughts:

I would say science education is at the root of what I do. I try to support what the kids work on with their classroom teachers, then I try to bring in
an art-based project, get into the whole STEAM approaches. But with the real outdoor exploration component, we'll do a lot of species counts and surveys in the garden and neighborhood.

Additional survey data showed that 11 (92%) of 12 educators cited their primary audiences as those of K–12 schools and school-aged children. As such, it seemed they focused their teaching on science in response to meeting the needs of their audiences—schools.

**Content Area Variability**

Participating Blue City educators discussed varied and conflicting ideas about content area and addressed a wide array of content areas in their programs (Table 11). Across interviews and program observations, wildlife and plants were found to be the most prevalent content area explored in participant programming. Wildlife as content was more prevalent with educators who worked for nature-based organizations, whereas plants as content was often tied to educators who worked for agriculture-based organizations or whose work was conducted in gardens.

In discussing why she focused much of her teaching on wildlife, and birds in particular, Participant Loretta talked about her organization's mission coupled with the reliability of birds:

So I think my organization's approach is really focused on wildlife, but even more so on birds. So there is that, and we use that as a way to get people who may not be already interested in the environment interested, and then broaden it to other ecology topics from there. But I also like to
follow what Cornell Lab of Ornithology says of birds—they are everywhere, so it is a good way to reach a lot of people.

For Abby, an educator who worked in urban gardens, focusing her content on plants started with her organizational mission but went well beyond that to teach about systems and cycles:

Our mission is all about food security, so my teaching content all sort of falls there. . . . So, for kids, it is all about gardening—growing plants and taking care of the gardens. But then, I use food to introduce them to the rest of the environment and how we are connected to the environment, and use plants to learn about the natural systems and life cycles that we need.

Although plants, trees, and gardening were the topics most frequently mentioned in participant interviews, observed, and cited in the surveys, no participant rated it as the most important content area. Somewhat lower numbers but a similar trend was revealed for ecology and animals. However, although urban ecological systems was cited far less often in the interviews and noted in observations only twice, participants rated it as a high-priority topic area on the survey, and identified it as the most important topic to teach more, next to climate change and environmental justice. Additionally, the majority of participants addressed the subject of general ecology across interviews, observations, and surveys as a key content area; however, similar to plants and wildlife, it was not seen as an important content area about which to teach.
### Table 11. *Content Addressed*

<table>
<thead>
<tr>
<th>Code</th>
<th>Code description: Program topic or content area of study includes</th>
<th>Cited in interview</th>
<th>Noted in observation</th>
<th>Cited in survey as content taught (pilot for Phase 2)</th>
<th>Cited in survey as most important content area (pilot for Phase 2)</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant, flora</td>
<td>Plants, trees, gardening (nonfood)</td>
<td>7</td>
<td>7</td>
<td>11</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>General ecology</td>
<td>Ecology, biodiversity, ecological cycles</td>
<td>7</td>
<td>5</td>
<td>11</td>
<td>1</td>
<td>24</td>
</tr>
<tr>
<td>Wildlife, fauna</td>
<td>Animals, wildlife, animal life cycles</td>
<td>7</td>
<td>6</td>
<td>9</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td>Urban ecology systems, cycles</td>
<td>Urban ecological systems and cycles</td>
<td>4</td>
<td>2</td>
<td>11</td>
<td>4</td>
<td>21</td>
</tr>
<tr>
<td>Food, nutrition</td>
<td>Food growth, production, nutrition</td>
<td>5</td>
<td>4</td>
<td>8</td>
<td>1</td>
<td>18</td>
</tr>
<tr>
<td>Climate change</td>
<td>Climate change</td>
<td>4</td>
<td>0</td>
<td>10</td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td>Watershed</td>
<td>Watersheds (including issues of storm water)</td>
<td>5</td>
<td>3</td>
<td>9</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Habitat</td>
<td>Habitats, homes for biotic species</td>
<td>3</td>
<td>4</td>
<td>9</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Soil, geology, dirt</td>
<td>Dirt, soil, or geology</td>
<td>3</td>
<td>0</td>
<td>10</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Environmental justice</td>
<td>Environmental justice</td>
<td>1</td>
<td>1</td>
<td>8</td>
<td>3</td>
<td>13</td>
</tr>
</tbody>
</table>

*Note. N = 12.*
There was also some disconnect between the content addressed as participants stated in interviews and what they reported in the survey or that the researcher observed. For example, environmental justice was mentioned and observed with only one participant, yet eight of 12 participants cited it as a content area addressed in the survey, with three stating it was the most important content area to address. Similar results were found with climate change—four of 12 educators talked about it (interview) as a program content, and it was not observed in any participant observations, but 10 of 12 participants cited it as an addressed content, with three claiming it as the most important content area to teach about.

**Pedagogy**

Educators in Blue City did not necessarily subscribe to a given pedagogy (Table 12). They seemed to lack the language and understanding around pedagogy. When asked in interviews about their pedagogical approach, few could answer definitively. In fact, many asked for examples and clarification about what pedagogy was. For example, when asked about her pedagogical, methodological, or instructional approach to teaching, Participant Corrin said, "I am not sure I understand. What do you mean by pedagogy?"

Asked the same question, Participant Abby stated, "Oh, like, you mean what materials do I use?"

When pressed to clarify and reflect on their teaching approach or pedagogy, participants most commonly discussed inquiry-based science practices in interviews. Kim illustrated this point in her response to the question of pedagogy. Talking about activities and practices without truly identifying a pedagogy, she stated, "I like to facilitate a lot of experiments, really do hands-on learning, use the scientific method, ask questions, and
learn about empirical reasoning." Participant Ann echoed this sentiment, stating, "I really like my kids to learn how to observe and ask questions. My job is not to tell. So, really, my program becomes more of a lesson on asking questions than anything else, really inquiry-based."

<table>
<thead>
<tr>
<th>Table 12. Pedagogies Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>Inquiry practice</td>
</tr>
<tr>
<td>Play</td>
</tr>
<tr>
<td>Modeling</td>
</tr>
<tr>
<td>Experiential education</td>
</tr>
<tr>
<td>Critical exploration, free choice exploration</td>
</tr>
</tbody>
</table>

*Note. N = 12*
Among educator interviews and observations, play was found to be the second most commonly noted pedagogical approach. Talking about play as her secondary pedagogical approach, Ann stated, "Well, there is always play, play-based. I don't do as many of them as inquiry, but play is definitely a part of it." Participant Susan stated, "From my background as a children's museum educator, I approach my work from a play perspective. This pedagogy is all about allowing kids a chance to lead their own discovery and freedom—freedom to self-discover and take risks." However, in the survey (in which the researcher provided specific pedagogy definitions), participants cited experiential education as their most frequently used pedagogy, followed by play, and then inquiry.

**Partnership**

Interviews (9 of 12), observations (10 of 12), and surveys (12 of 12) revealed that all research participants partnered with other organizations to accomplish their work and saw partnerships as a crucial aspect for successful urban environmental education programs. The most prevalent partnerships were with other community-based organizations and schools.

For Ann, the foundation of her organization and teaching practice centered on partnerships. In talking about the role of partnerships, she explained:

My job is literally to be a liaison between many different partner organizations that work with us and in our community doing environmental education in parks. Many organizations that work in the city have the goal of building environmental literacy, so I try to help
bridge these organizations together towards common environmental education goals.

In other cases, partnerships were more targeted. Participant Kim explained:

Well, I try to partner with organizations to help leverage funding and achieve mutual goals. . . . I partner with a lot of schools to support their science curriculum. Right now, I am working on partnering with a neighborhood development organization on a state housing grant, but then I also partner with the state Natural Resources Department on a fish project to bring to youth, then the city Parks Department, the community centers, and even the afterschool organizations.

Nearly all observations included a partnership. Across survey responses, educators noted the use of partnerships in their programming in the forms of a partnering organization that was also a part of each program through co-teaching, program coordination, or sponsorship. For some participants, the partner was a school or teacher; for many, it was another environmental education group.
CHAPTER 5

Phase 2 Findings

Phase 2 consisted of 135 participants (with 96 fully participating) representing a diversity of organizations and regions. Aside from using the survey as a pilot tool, the results presented in this chapter do not include participants from Phase 1. Phase 2 was designed to test the middle-range framework of urban environmental educator practice developed from the Phase 1 results. The framework centered around a desire to build ecological literacy and provoke conservation ethics primarily through facilitating science-based programs with natural-science-based content. The nexus of this framework is rooted in urban environmental educator practice within the pedagogies of inquiry, experiential education, modeling, play, and critical exploration. Phase 2 results (Table 13) primarily support this framework.
Table 13. *Summary of Survey Findings, Phase 2 (and Phase 1 Pilot for Phase 2)*

<table>
<thead>
<tr>
<th>Theme/Finding</th>
<th>Frequency cited sample (pilot)</th>
<th>Percent cited sample (pilot)</th>
<th>Practice detail</th>
<th>Frequency sample (pilot)</th>
<th>Percentage sample (pilot)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science as intention</td>
<td>90 (11)</td>
<td>94 (92)</td>
<td>STEAM</td>
<td>56 (7)</td>
<td>62 (64)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Field study</td>
<td>70 (6)</td>
<td>78 (55)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Citizen science</td>
<td>67 (5)</td>
<td>74 (45)</td>
</tr>
<tr>
<td>Practice rooted in ecological literacy</td>
<td>82 (11)</td>
<td>85 (92)</td>
<td>Outdoor experience</td>
<td>74 (9)</td>
<td>90 (82)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Place-based</td>
<td>81 (11)</td>
<td>99 (100)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Systems</td>
<td>59 (8)</td>
<td>72 (73)</td>
</tr>
<tr>
<td>Pedagogies used</td>
<td>71 (6)</td>
<td>74 (50)</td>
<td>Inquiry</td>
<td>64 (4)</td>
<td>90 (67)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Critical exploration</td>
<td>36 (3)</td>
<td>50 (50)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Play</td>
<td>56 (5)</td>
<td>79 (83)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Modeling</td>
<td>46 (4)</td>
<td>65 (67)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Experiential</td>
<td>64 (6)</td>
<td>90 (100)</td>
</tr>
<tr>
<td>Applied conservation: Framing civic and environmental action</td>
<td>58 (11)</td>
<td>60 (92)</td>
<td>Stewardship talk</td>
<td>57 (11)</td>
<td>98 (100)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Stewardship work</td>
<td>51 (8)</td>
<td>88 (73)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Restoration</td>
<td>47 (8)</td>
<td>81 (73)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Civic ecology</td>
<td>42 (2)</td>
<td>72 (18)</td>
</tr>
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<td>Content area</td>
<td>96 (12)</td>
<td>100 (100)</td>
<td>Urban ecology</td>
<td>64 (11)</td>
<td>67 (92)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Environmental justice</td>
<td>34 (8)</td>
<td>35 (67)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Wildlife, fauna</td>
<td>84 (9)</td>
<td>88 (75)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>General ecology</td>
<td>80 (11)</td>
<td>83 (92)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Habitat</td>
<td>89 (9)</td>
<td>93 (75)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Climate change</td>
<td>53 (10)</td>
<td>55 (83)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Soil, geology, dirt</td>
<td>63 (10)</td>
<td>66 (83)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Food nutrition</td>
<td>41 (8)</td>
<td>43 (67)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Plant, flora</td>
<td>87 (11)</td>
<td>91 (92)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Watershed</td>
<td>76 (9)</td>
<td>79 (75)</td>
</tr>
<tr>
<td>Partnership</td>
<td>92 (12)</td>
<td>96 (100)</td>
<td>Individual teachers</td>
<td>70 (9)</td>
<td>76 (75)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Community organization</td>
<td>82 (11)</td>
<td>89 (92)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Community members</td>
<td>64 (7)</td>
<td>70 (58)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>State/national organization</td>
<td>66 (7)</td>
<td>72 (58)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Whole schools</td>
<td>74 (9)</td>
<td>79 (75)</td>
</tr>
</tbody>
</table>

*Note.* Nationwide Phase 2 sample \( n = 96 \); (Phase 1 Pilot sample) \( n = 12 \).
Teaching Ecological Literacy

When exploring whether participants focused their instructional approach on building ecological literacy, Phase 2 survey results suggest that teaching for ecological literacy was an important component of teaching environmental education in urban green space(s). Table 13 shows that 85% of the Phase 2 national sample of participating educators cited that their teaching was rooted in ecological literacy and it further details ways they approached teaching for ecological literacy. Educators who responded yes, they root their approach in ecological literacy, were then asked to further break down the ways in which they articulate their approach to teaching for ecological literacy between place-based approaches, outdoor experiences, systems thinking, or other. Although educators approached their work through a mix of the three tenants of ecological literacy—place-based approaches, outdoor experiences, and systems approaches—and cited all three as a part of their teaching approaches, they emphasized place-based education slightly more.

Framing Through Applied Conservation

Similar to Phase 1 participants, many Phase 2 participants focused much of their teaching approach around provoking a sense of conservation stewardship. When asked in the survey whether their teaching was framed through the lens of civic and environmental action, the majority (60%) of Phase 2 participants stated yes.

The ways in which they addressed the concept of conservation work varied, including discussion of stewardship, doing direct stewardship work (local and regional), participating in civic ecology practices, conducting ecological restoration projects, and introducing youth to green jobs and career paths. Based on survey responses, participants
used no one clear approach significantly more than others; rather, they addressed this element of urban environmental education work nearly equally in many ways.

**Science Education as Intention**

Also similar to Phase 1 participants, Phase 2 participants used science education as a programmatic focus. When asked whether their program instruction focused on science education, a vast majority (94%) of Phase 2 participants said yes. Within that science education focus, the participants cited ecological field studies (78%) and STEAM (62%) as approaches to science-based instruction. Interestingly, as was not the case in Blue City, citizen science was seen as a key approach to teaching science education, with 74% of Phase 2 participants citing it as an approach.

**Content Variability**

When asked specifically about what content area(s) educators participating in Phase 2 addressed in their programs in urban green space(s), they responded with a wide range of content areas. No one content area was much more prevalent than the others. Table 13 shows the breakdown of content areas addressed. Those addressed by 80% or more of the participants included habitats (93%), plants (91%), wildlife/fauna (88%), and general ecology (83%).

**Pedagogy**

When asked whether they subscribed to or used specific pedagogical approaches in their teaching, 74% of Phase 2 participants reported that they indeed utilized specific pedagogies in their work. Figure 4 shows the most commonly used pedagogies among those educators who used specific pedagogies: 90% stated they used experiential education pedagogy, 90% used inquiry-based pedagogy, and 79% cited play. Unlike for
interviews with Phase 1 participants, the researcher defined pedagogies within the survey for Phase 2 participants. As such, there was no way for the researcher to determine the level with which the participants understood the different pedagogies; it was assumed that because the definitions were given Phase 2, participants seemed to have a better grasp of the pedagogies.

**Partnership**

It is clear from this research that partnerships are a crucial part of urban environmental education instruction and programming. Nearly all (96%) Phase 2 participants stated that they utilized partnerships in their work and partnered with many types of groups—no one type dominated the responses. Instead, partnerships consisted of community organizations, schools, individual teachers, community members, and state or government organizations.
Figure 4. Framework for understanding urban environmental educator teaching practice.
CHAPTER 6

Discussion

The results of this study suggest that urban environmental educators who work in urban green space(s) articulate their practices through a myriad of lens and approaches. These results present a new lens through which to understand the practice of urban environmental education (Figure 4). The resulting framework suggests that the practice of urban environmental education focuses on a desire to build ecological literacy and provoke conservation primarily by facilitating science-based programs with natural-science-based content.

Regardless of program type, the fact that the educators in Phase 1 of this study placed much of value in their work and programs as being equitable and accessible highlights the importance of proximity to green space in urban environmental education programs. It seems greatly important to educators that their instruction actually takes place within walking distance of the program audience's home or school. This finding supports the work of Agyeman (2005), Platt (2014), Dallimaer et al. (2012), Standish et al. (2013), and Chawla and Salvadori (2003), highlighting the importance of cities providing accessible green spaces to all residents. Additionally supported is the notion that many nonacademic, social, and emotional health outcomes are associated with time spent in urban green space. Educators found much value in their work to enhance social-emotional health and wellness. Although they did not specifically speak to framing their beliefs about value as rooted in positive youth development, the ways they spoke of value in equity, accessibility, and social-emotional health and wellness aligned well with key attributes of positive youth development, such as the support of social and emotional

Across both Phase 1 and Phase 2 of this study, ecological literacy was found to be an important approach with which urban environmental educators articulated their instructional approach. The results of this study suggest that ecological literacy is addressed not as one uniform approach but through implementation of some of Orr's (1990) propositions of ecological literacy such as outdoor experiences, place-based experiences, and systems thinking. This is an important distinction because even Orr himself called for a diversified approach in teaching for ecological literacy. The results of this study connect to and support prior research documenting positive student or learner outcomes in place-based education (Barnett, Lord et al., 2006; Fisman, 2005; Kudryavtsev, Krasny et al., 2012; Meichtry & Smith, 2007; Powers, 2004), outdoor experiences (Carrier, 2009; Simmons, 1999; Wells & Lekies, 2006), and systems thinking (Hopper & Stave, 2008; Monroe et al., 2015). Through the results of this research, it may be inferred that if place-based education, outdoor experiences, and, to a lesser degree, systems are key instructional approach to urban environmental education, then we can hope to also find positive learner outcomes.

Throughout this study, applied conservation was found to be an important way in which urban environmental educators who work in urban green space articulate their approach to their work. Applied conservation was addressed through a mixture of stewardship-based discussions, direct stewardship and restoration work or through participating in civic ecology practices. No one approach to applied conservation work emerged as clearly a dominate approach. The results of this study may show that there is
some level of confusion and misunderstanding as to what constitutes these different applied conservation practices, which may have resulted from either the research questions asked, the research tool itself or the variability in the participant sample pool. Overall, the results of this study support past work on the notion that applied conservation is an important aspect of urban environmental education in green spaces (A. Bell, 2001; Moskell et al., 2010; Robert, 2015). What was surprising is that within this study, Phase 2 participants (Table 13) places less emphasis on applied conservation than Phase 1 participants (Table 9). This may suggest that applied conservation is less of an instructional approach nationally than in Blue City.

Environmental educators who teach in urban green space(s) root much of the practice in science and science teaching. Participants both in Phase 1 (Table 10) and Phase 2 (Table 13) cited science as a lens through which they approach their work. These results support P. Bell, Lewenstein, Shouse, and Feder's (2009) inclusion of six pillars or strands to successfully address science literacy in informal settings: experiencing excitement to learn scientific phenomena, generating understanding of scientific concepts, manipulating and exploring the natural and physical world, reflecting on scientific ways of knowing, participating in scientific language and using scientific tools, and seeing themselves as contributors to science. Additionally, these findings may have much to do with the environmental educators primary audience—that is, if they market their programs towards schools and school-aged children, then science education would be a logical focus. In fact, in the literature, the vast majority of studies that explored science practices and intentions looked at programs that worked with schools (Almeida et al., 2006; Barnett, Lord et al., 2006). Interestingly, citizen science was not seen as a
key approach with Phase 1 participants despite its advocacy as an important and beneficial approach to teaching environmental education (Fleming, 2013; Wolford, 2003).

When attempting to understand the ways in which urban environmental educators infuse various content areas into their work, this study showed mixed results. Participants clearly utilize a wide diversity of content areas in their programs. This diversity in content areas addressed may indicate the diversity of organizations and the content areas most relevant to their missions, lack of agreement among urban environmental education practitioners as to what content areas should be most often addressed in programs, or simply a result of the individuals' diversity and the content areas they had the most comfort or interest in teaching. However, the results of this study show that there may be some disconnect between what educators actually teach about, such as wildlife and plants, versus what they feel is important to teach about, such as climate change, urban ecology, or environmental justice (Tables 11 and 13). These results may simply mirror the use of science educational approaches, especially with the use of ecological field studies (Berkowitz, Nilon et al., 2003; Lakin, 2006) and their emphasis on natural history content.

Developing an understanding of pedagogical approaches proved to be a very interesting finding of this study. When pedagogical terms and definitions were not provided, research participants struggled to articulate their work in terms of pedagogy. However, when terms and definitions were provided, educators in both Phase 1 and Phase 2 cited a mix of pedagogical approaches as being central to their practice (Tables 12 and 13). This finding mirrors results found with formal classroom educators.
(Loughran, Mulhall, & Berry, 2004) and suggests that although educators indeed infused a myriad of pedagogies into their practice, they may have lacked the pedagogical language to clearly articulate or describe what they did. Additionally, this finding may speak to the level and importance of using a variety of pedagogies in urban environmental education programming.

Finally, this research found that programmatic partnerships are a central part of urban environmental educator practice in urban green space(s). Both Phase 1 and Phase 2 participants cited partnerships as an important aspect of their teaching approaches. These partnerships came in the form of working with other environmental education organizations, schools, individual teachers, community members, and government organizations. This finding is especially interesting because the use and role of partnerships in urban environmental education is not strongly revealed in the literature. Overall, these results show that partnerships may be one of the most important pieces of successful urban environmental education teaching from the perspective of educators, and can speak to the importance of collaboration and network building as an important component of environmental education in urban areas.

**Further Study and Recommendations**

The results of this research provide a lens through which to understand the practice of urban environmental education, as well a framework to understand how urban educators view their practice of teaching urban environmental education in urban green space(s). Findings show that educators desire to build ecological literacy and provoke a conservation and stewardship primarily through facilitating science-based programs with natural-science-based content. However, as noted in Figure 4, much more—such as
partnerships, equity, diversity of content areas, and pedagogy—goes into this work and is worthy of future study.

This research builds on and supports the work primarily of Kudryavtsev and Krasny (2012), Barnett, Lord et al. (2006), and Fisman (2005) on urban environmental education and sense of place (Tables 8 and 13). Whereas these foundational works explored the implications of urban environmental education programs on urban youth and their sense of place, this research illustrates that place and place-based education—extensions of ecological literacy (Orr, 1990)—are indeed key instructional approaches for urban environmental educators.

Although Phase 1 research participants cited the importance of equity and social-emotional health and wellness as key goals for their program attendees, the results of this research did not document youth development as a key practice in urban environmental education. However, youth development is an important programming component. Other studies, framed through the lens of youth development, documented it as a useful approach with urban youth, especially in programs working with teens (Delia, 2014; Schusler & Krasny, 2010). The lack of data around youth development may result from this study's use of the grounded theory approach or its initial framing around ecological literacy as opposed to youth development. That is, because youth development was not an initial theoretical direction of this research, and it did not emerge in Phase 1, it was not a concept specifically pursued in Phase 2. However, because there is valid prior research supporting youth development as a key approach to urban environmental education, this study did include it in its final framework (Figure 4). Further studies would be well served to include youth development as an investigated approach.
In both Phase 1 and Phase 2, the primary audiences of many participating educators were schools and school-aged children. As such, it is not surprising to see the educators' practices address science education as a key academic subject (Cox-Petersen & Spencer, 2006), inquiry as an important pedagogy (Harnik & Ross, 2004), and natural history as a central content. These areas are also those in which the most studies can be found in the literature (Berkowitz, Nilon et al., 2003; Doris, 2010; Lakin, 2006). By maintaining a strong focus around science content and practice, educators may not align with the urban ecology framework in its distinctions of ecology in cities and of cities. However, we must ask ourselves whether urban environmental education should be approached through the lens of urban ecology. Scholars and program administrators may want to help educators transform their practice away from one of basic natural history knowledge and science practices and work to reach a place of a deeper understanding of urban systems. Future studies could further explore questions around developing a framework for urban environmental education that is rooted in the field of urban ecology.

For reasons outlined herein, natural history and science education have been a primary focus in environmental education (Cox-Petersen & Spencer, 2006), but frontline educators may be willing to do more. Educators may simply need training and more program oversight to develop a deeper understanding of relevant and important content (Table 11) in areas such as climate change, environmental justice, and pedagogy (Table 12) beyond science and in ways they can still meet their audiences' needs. Inclusion of and participation in professional development programs will be an important step towards less disconnect between what educators say they do, what they do, and what they should be doing in their practice. Professional development is a mandatory aspect
for formal classroom teachers, but much less common and oftentimes optional for informal environmental educators.

Not unlike findings from formal classroom education that informed the theoretical underpinnings of this research (Abd-el-Khalick, Bell, & Lederman, 1998; Jung & Tonso, 2006; Loughran et al., 2004), the results of this study highlight the need for more research, training, and professional development in this field. This research, specifically in Phase 1, found some disconnect between what educators say they do and actually do (Tables 8–12). This may simply reflect a lack of understanding about ultimate goals and advocated practices of not only the organizations the educators work for, but also the field at large (North American Association for Environmental Education, 2015). Environmental educators may want to start treating this work more like a field of study and root their work in relevant research, evaluation protocols, and pedagogy. It is not good enough to simply say we teach a certain way or about a certain content area because it "feels good."

**Summary**

This study, as seen through the theoretical framework of ecological literacy, documents how the practice of teaching urban environmental education in urban green space can be understood (Figure 4). The results of this study show that urban environmental educator practice is centered on a desire to build ecological literacy and provoke conservation primarily by facilitating science-based programs with natural science-based content. The findings root urban environmental educator practice within the pedagogies of inquiry, experiential education, modeling, play, and critical exploration.
This study presents a framework (Figure 4) in which to understand the complexities that account for an instructional practice in urban environmental education. It documents what is currently happening in the field of urban environmental education from educators' perspectives. The rich data identify numerous areas worthy of future study, such as content selection, how educators use and understand pedagogy, the role of partnerships, and the disconnect between the importance and the practice of stewardship. Program administrators and practitioners can use the data presented as a benchmark against which to assess their own programs—to not only self-assess where their staff and programming fit into the framework, but also insure the organizations are meeting and growing their stated missions. Research that compares the results from this study to the frames and findings of other urban environmental educator studies will help further and professionalize this emerging field.
APPENDIX A

INTERVIEW QUESTIONS
Please share you name, title, and the organization you work for.

What are your primary roles and responsibilities in your organization?

How long have you been at your organization? How long have you worked in this field (environmental education)? How long have you been in the education field?

Can you describe your primary audiences of your work?

How do you define urban environmental education?

What do you see as the primary goals for urban environmental education?

Generally, can you describe your program(s)?

How would you describe the environmental education work/programming you do in urban areas/green space? What component of this work is done in urban green space?

What are the goals of your program?

Do you think that you are achieving your goals?

What do you think are the benefits of doing environmental education in parks/gardens? Why do it?

What practices, methods, or instructional approaches do you employ when teaching? Which of these do you use in urban green space?

Tell me more about some of the practices you mentioned. Can you share why you might use the practices you mentioned over other types of educational practices or instructional approaches?

What topics, subjects, content areas, or skills do you think are central to teach about in urban green space?

Is there anything else you'd like to share about your work and how your think about it?
APPENDIX B

OBSERVATION PROTOCOL
ENVIRONMENTAL EDUCATION IN URBAN GREEN SPACE: EDUCATOR PRACTICE

Educator ___________________________________ Date _____________________

Organization_________________________ Grade/Age of Audience

________________________

Observer ______________ Program topic _________________________________

Location_________________________ Time/Duration of Program ____________

# of participants ______ school/ group name____________________________

Other leaders present______________________________________________

Site type: garden park cemetery brownfield

greenway Other__________________

Brief description of program observed:
URBAN GREEN SPACE ENVIRONMENTAL EDUCATION

SCIENCE INTENTION or FOCUS

Is the educator using science and science education as a primary vehicle with which to teach and learn about and in urban green spaces?

Yes (if yes, please complete section B below)
No

Did the program primarily consist of (check all that apply and mark a * next to the one most prominent):

- Conducting ecological field studies (birding, habitat, or ecosystem survey; bug collecting)?
- Using citizen science (e.g., Celebrate Urban Birds, Monarch Watch, Project Budburst, etc.)?
- Emphasizing STEAM education (science, technology, engineering, arts, math)?
- Other:______________________________________________________________

Description:

ENVIRONMENTAL AWARENESS (ECOLOGICAL/ENVIRONMENTAL LITERACY)

Is the educator's instruction centered around building ecological literacy through experiences and awareness?

Yes (if yes, please complete section B below)
No

Did the program or experience primarily aim to provide (check all that apply and mark a * next to the one most prominent):


Participants with positive and safe outdoor experiences (some/most of the time)?
Use of place-based education (as primary/secondary focus)?
Emphasis and importance of systems thinking (as primary/secondary focus)?
Other:____________________________________________

Description:

PEDAGOGICAL APPROACHES

Did the educator engage in observable pedagogical approaches or methods in their programming?

Yes (if yes, please complete section B below)
No

Did the pedagogical approaches or methods primarily include utilizing (check all that apply and mark a * next to the one most prominent):

Inquiry-based instruction in the delivery of the program/lesson?
Experiential education in the delivery of the program/lesson?
Play-based approaches in the delivery of the program/lesson?
Critical exploration or student driven choice exploration in the delivery of the program/lesson?
Modeling in the delivery of the program/lesson?
Other:____________________________________________

Description:
ACTION CONSERVATION FRAMING

Does the educator frame their work through the lens of civic and environmental action?

Yes (if yes, please complete section B below)
No

B. Did the educator/program address the importance of civic and environmental action primarily through (check all that apply and mark a * next to the one most prominent):

- Discussing the importance of stewardship?
- Including the use of hands-on stewardship work?
- Including civic ecology practices (local community-driven environmental stewardship)?
- Emphasizing career paths, green jobs, or incorporate opportunities for participant community leadership?
- Other: __________________________________________________________

Description:

PARTNERSHIPS

A. Did the educator/program attempt to build bridges between formal and informal educators, organizations, and communities?

Yes (if yes, please complete section B below)
No

B. Did the educator/program collaborate or partner with (check all that apply and mark a * next to the one most prominent):

*next to the one most prominent):
Local schools?
Formal classroom teachers?
Other community organizations?
Other community members?
Other: ________________________________________________________________

Description:

OBSERVATION NOTES

Throughout the lesson, please note, if you feel necessary:
• Any anomalous practices or unusual circumstances in this lesson
• Indicators of the observed educator's style of teaching
• Indicators of the quality of the instruction
• Details of the context of the lesson which might inform your post-observation coding or future analysis
APPENDIX C

SURVEY QUESTIONS
Welcome to My Survey

Thank you for participating in our survey. Your feedback is important.

Environmental education in urban green space: Understanding educator practice

<table>
<thead>
<tr>
<th>Researcher</th>
<th>Dissertation committee chair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jennifer Klein</td>
<td>Susan Rauchwerk, EdD</td>
</tr>
<tr>
<td>Lesley University</td>
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</tr>
<tr>
<td>School of Education</td>
<td>School of Education</td>
</tr>
<tr>
<td>(248) 854-7658</td>
<td>(617) 349-8652</td>
</tr>
<tr>
<td><a href="mailto:jklein3@lesley.edu">jklein3@lesley.edu</a></td>
<td><a href="mailto:srauchwe@lesley.edu">srauchwe@lesley.edu</a></td>
</tr>
</tbody>
</table>

Purpose of study
This research study seeks to examine how different educators practice environmental education in urban green space in the United States. You have self-selected because you are an environmental educator whose program provides urban environmental education, in urban green space, in the United States.

Who Am I?
I am a PhD candidate at Lesley University studying urban environmental education. In addition to my academic work I have also worked in the field of environmental education for 14 years; in Michigan, Massachusetts, and Rhode Island. The past 8 years of my professional work has focused on urban environmental education. It has been my work as an urban environmental education practitioner that has led me to a deeper point of inquiry to pursue a PhD and conduct this research to gain better insight into the teaching practice of fellow urban environmental educators.

Who I am looking for?
- Educators who spend 50% of more of their time teaching/facilitating EE programming
- (i.e. frontline educators)
- Educators that conduct at least 50% of their work in urban areas with urban residents
- Educators conduct programming in urban green space
- Educators who work for traditional environmental education organizations
- Educators who work for non-traditional environmental organizations
- Educators who work for 'friends of' groups

What are you being asked to do?
This research project will take a maximum of 10 minutes of your time. In this survey you will be asked to share information about your role, experience and perspective. This survey is anonymous, and all appropriate steps to preserve your privacy, confidentiality and, your identity will be taken. Pseudonyms will be assigned.

Taking part is voluntary. You have the right to refuse to be in this study. You have the right to remain anonymous, and all references within the data will be coded to protect anonymity. Your records will be kept private and confidential to the extent allowed by law. Numerical identifiers and pseudonyms will be used on all study records, and your name and other facts that may identify you will not appear when this study is presented or published.

Contact information
If you have questions at any time about this study you may contact Jennifer Klein, whose contact information is provided on the top of this page. There is also a Standing Committee for Human Subjects in Research at Lesley University to which complaints or problems concerning this research project may, and should, be reported if they arise. Contact the Lesley Committee Co-Chairs Drs. Terry Keeney or Robyn Cruz (rb@lesley.edu) at Lesley University, 29 Everett Street, Cambridge Massachusetts, 02138.
* 1. Do you agree to the above terms? By clicking Yes, you consent that you are willing to answer the questions in this survey?

○ yes
○ no
2. Do you currently live in an urban area?

☐ yes
☐ no

3. What type of area did you grow up in (check all that apply)?

☐ Urban (a community whose landscape is dominated by a mix of multi-family housing, single family housing, office buildings, etc with a population density greater than 3,500 people/ square mile)

☐ Rural (comprise open country and settlements; areas designated as rural can have population densities as high as 999 per square mile or as low as 1 person per square mile.)

☐ Suburban (A residential area on the outskirts of a city whose landscape is dominated by single family houses and retail with a population density of 1,000-3,500 people/square mile)

4. What type(s) of urban green space(s) do your current education program(s) occur (check all that apply)?

☐ park
☐ Garden or agriculture site
☐ greenway
☐ cemetery
☐ Brownfield

Other (please specify)

5. Please briefly describe the organizational goals of your environmental education program(s).
6. Who are the audiences your program focuses on (check all that apply)?

- Pre K (ages 2-4)
- Elementary (ages 5-10)
- Middle School (ages 11-13)
- High School (ages 14-18)
- Formal classroom teachers
- Overall Community
- Adults (persons over the age of 18)
- Families (adults and dependent children)

Other (please specify)

7. What types of programs do you teach (check all that apply)?

- Day school (field trips and outreach for teachers and students during the school day)
- Out-of-school time (after school, extended day, and/or summer academic learning for youth)
- Family (weekend, summer, or daytime programs for adults and dependent children)
- Community (daytime, evening, or weekend programs for various community members and stakeholders)
- Camps (one day-multiple week programs not affiliated with schools or academic learning for youth)

Other (please specify)
* 8. Out of the topics listed alphabetically below, what topics or content areas are taught in your program(s), (check all that apply)?

- [ ] climate change
- [ ] environmental justice
- [ ] food and nutrition
- [ ] General ecology
- [ ] habitats
- [ ] plants/flora (gardening, trees, flowers)
- [ ] soils and geology
- [ ] urban ecology
- [ ] Watersheds
- [ ] wildlife/fauna (birds, insects, mammals, fish, reptiles, amphibians)

Other (please specify)

* 9. Out of the content areas listed below, Please rank the topics in importance to YOU that should be included in urban environmental education programs—most important to least important (1 being most important, 10 being least important)

- [ ] climate change
- [ ] environmental justice
- [ ] food and nutrition
- [ ] General ecology
- [ ] habitats
- [ ] plants/flora
- [ ] soil/geology
- [ ] urban ecology
- [ ] watersheds
- [ ] wildlife/fauna
10. Is science and science education a focus of your program?

☐ yes
☐ no
11. Which of the following science approaches do you emphasize in your instruction (check all that apply)?

- [ ] ecological field studies (biodiversity inventories, bird surveys, insect collections, tree study)
- [ ] Citizen science (monarch watch, bud burst, celebrate urban birds, etc)
- [ ] STEAM (science, technology, engineering, arts, math)
- [ ] Other (please specify)

12. How important are the following science approaches in your program?

<table>
<thead>
<tr>
<th></th>
<th>extremely important</th>
<th>very important</th>
<th>moderately important</th>
<th>slightly important</th>
<th>not important at all</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecological field studies (bird surveys, bug collecting, biodiversity inventories)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Citizen science (celebrate urban birds, monarch watch, bud burst)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STEAM (science, technology, engineering, arts, and math)</td>
<td></td>
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<tr>
<td>other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
13. Is your teaching and instruction centered around building environmental/ecological literacy?

☐ yes
☐ no
14. Which of the following pillars of environmental/ecological literacy do you emphasize in your instruction (check all that apply)?
- [ ] positive and safe outdoor experiences
- [ ] connection to place and place-based education
- [ ] systems and systems thinking
- [ ] Other (please specify)

15. How important are the following pillars of environmental/ecological literacy to your teaching?

<table>
<thead>
<tr>
<th></th>
<th>extremely important</th>
<th>very important</th>
<th>moderately important</th>
<th>slightly important</th>
<th>not important at all</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>positive and safe outdoor experiences</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>connection to place and place-based education</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>systems and systems thinking</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>other</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>
16. Do you use specific pedagogical approaches in your instruction?

- [ ] yes
- [ ] no
17. Which of the following pedagogical approaches do you primarily use in your instruction (check all that apply)?

- Inquiry-based learning (an approach that uses the inquiry cycle or components of inquiry cycle—observation, questions, hypothesis, experimentation, communication of results)
- Experiential learning (an approach that aims to provide participants with concrete experiences and as a result of those experiences opportunity for participants to reflect and to develop their own opinions of concepts based on interaction with the information.)
- Play-based (an approach where educators make provision for play and playful approaches to learning and teaching)
- Critical exploration/student driven choice exploration (an approach that allows students to direct their own investigations within the framework of the program focus. This may include choice as to which direction an investigation takes within a topic or content area provided by the educator or learning that is driven by the needs and interests of the participant rather than by the dictates and needs of the educator.)
- Modeling (an approach in which the educator demonstrates a new concept or approach to learning and participants learn by observing)
- Other (please specify)

18. How important are the following pedagogies to your instruction?

<table>
<thead>
<tr>
<th>Pedagogies</th>
<th>Extremely Important</th>
<th>Very Important</th>
<th>Moderately Important</th>
<th>Slightly Important</th>
<th>Not Important at All</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inquiry-based</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experiential learning</td>
<td></td>
<td></td>
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<tr>
<td>Play-based</td>
<td></td>
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<tr>
<td>Critical exploration/student driven exploration</td>
<td></td>
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<tr>
<td>Modeling</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
19. Do you frame your work through the lens of civic and environmental action?

☐ yes
☐ no
20. In what ways do you address issues of civic and environmental action (check all that apply)?

- discussing the importance of stewardship (talking about the importance of stewardship and having a sense of stewardship)
- doing direct hands-on stewardship work (actually working on stewardship projects such as river clean up, rain garden installation, or tree plantings—this work does not necessarily occur in the local or community of your environmental education programming)
- participate in civic ecology practices (local community driven and/or led environmental stewardship actions)
- emphasize career paths, green jobs, or incorporate opportunities for community leadership
- ecological restoration (revitalizing degraded spaces that have been primarily disturbed by human impact)
- Other (please specify)

21. How important are the following approaches to civic and environmental action to your teaching?

<table>
<thead>
<tr>
<th></th>
<th>extremely important</th>
<th>very important</th>
<th>moderately important</th>
<th>slightly important</th>
<th>not important at all</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>discussing the importance of stewardship</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>doing direct stewardship work</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>participating in civic ecology practices</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>emphasize career paths, green jobs, or incorporate opportunities for community leadership</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>ecological restoration</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>other</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
22. In your practice, do you partner with formal educators, other informal educators, community-based organizations, or individuals?

- [ ] yes
- [ ] no
23. Who do you partner with in your practice (check all that apply)?

- ☐ local schools (working with an entire school or school system)
- ☐ individual classroom teachers (working with one or two individual teachers)
- ☐ community-based organizations (local environmental organizations, after school organizations, community development organizations, etc)
- ☐ individual community members (individuals not affiliated with a particular organization or school)
- ☐ state-wide or national-based organizations (organizations whose work is focused beyond the community level to state-wide and national environmental, social, or economic initiatives)

Other (please specify)  


24. Please describe your own personal goals for your educational programs?


25. If you could receive professional development to enhance your practice, what type of training would you like (check all that apply)?

☐ content-specific training (urban ecology, environmental justice, climate change, wildlife, etc)

☐ pedagogy-specific training (experimental learning, inquiry learning, play, etc)

☐ skill-building training (cultural competency, youth development, stewardship practices)

Other (please specify)


26. Is there anything else that you would like to share about yourself and your urban environmental education teaching practice?


APPENDIX D

Codes
Environmental Education in Urban Green Space:
Educator Practice—Interview Codes and Definitions

<table>
<thead>
<tr>
<th>Parent grouping</th>
<th>Name of code</th>
<th>Code definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action and conservation framing</td>
<td>Activism and civic engagement</td>
<td>Educator frames their work around advocacy and the importance of activism and community civic engagement. They may see themselves as advocates or want to provoke their audience towards civic engagement.</td>
</tr>
<tr>
<td></td>
<td>Empowerment</td>
<td>Educator talks about the importance of empowering their audience. The educator may see it as their goal to empower others to work towards meaningful change.</td>
</tr>
<tr>
<td></td>
<td>Restoration work</td>
<td>Educator’s work is framed around ecological restoration. This work could include meadow restoration, fisheries restoration, etc.</td>
</tr>
<tr>
<td></td>
<td>Stewardship as practice</td>
<td>Educator talks about physically practicing stewardship activities with their audiences as something central to their work. This could include neighborhood trash clean ups, tree plantings, garden installations, and maintenance.</td>
</tr>
<tr>
<td></td>
<td>Sense of stewardship talk</td>
<td>Educator <em>talks</em> about the importance of fostering a sense of stewardship among their audiences, but does not necessarily <em>participate</em> in direct stewardship work.</td>
</tr>
<tr>
<td>Environmental awareness (ecological or environmental literacy)</td>
<td>Place-based</td>
<td>Educator is building ecological literacy through place-based education and emphasizing the importance of connection to place.</td>
</tr>
<tr>
<td></td>
<td>Outdoor experiences</td>
<td>Educator is building ecological literacy through simply providing participants with outdoor experiences.</td>
</tr>
<tr>
<td></td>
<td>Systems</td>
<td>Educator builds ecological literacy by stressing the importance of linking local lessons and experiences to interconnected systems. A desired outcome is to think beyond the linear.</td>
</tr>
<tr>
<td></td>
<td>Connection to and awareness of</td>
<td>Educator talks about the need to connect audiences to nature, build appreciation of urban nature, and foster awareness.</td>
</tr>
<tr>
<td>Content area of programming (Educator mentions…)</td>
<td>Urban ecology</td>
<td>Urban systems or cycles is a topic/content area taught in their program.</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>---------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Wildlife/fauna</td>
<td>Animals and/or animal life cycles is a topic of study/content area in their program.</td>
<td></td>
</tr>
<tr>
<td>Biodiversity</td>
<td>Biodiversity is a topic/content area of study in their program.</td>
<td></td>
</tr>
<tr>
<td>Climate change</td>
<td>Climate change is a topic/content area of study in their program.</td>
<td></td>
</tr>
<tr>
<td>Soils/geology</td>
<td>Dirt/soil/rocks is a topic of study and exploration in their program.</td>
<td></td>
</tr>
<tr>
<td>Earth science</td>
<td>Birds are a topic/content area of study in their program.</td>
<td></td>
</tr>
<tr>
<td>Ecology</td>
<td>General ecology and ecological cycles is a topic/content area of study in their program.</td>
<td></td>
</tr>
<tr>
<td>Plants/flora</td>
<td>Planting, plant life cycle, gardening, food growth, and production—organic or traditional—are a topic/content area of study in their program.</td>
<td></td>
</tr>
<tr>
<td>Land history</td>
<td>Land use history is a topic/content area of study in their program.</td>
<td></td>
</tr>
<tr>
<td>Landscape</td>
<td>Landscapes are a topic/content area of study in their program.</td>
<td></td>
</tr>
<tr>
<td>Food and nutrition</td>
<td>Food security and/or nutrition is a topic/content area of study in their program.</td>
<td></td>
</tr>
<tr>
<td>Watersheds</td>
<td>Watersheds (including stormwater) are a topic/content area of study in their program.</td>
<td></td>
</tr>
<tr>
<td>Place of engagement</td>
<td>Green space is a place where people can engage with nature, family, and community.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reasoning for urban green space environmental education (Green space as…)</th>
<th>Place of recreation</th>
<th>Green space is a place for play and exercise—playgrounds, picnics, baseball, soccer, walking.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place of solace and safety</td>
<td>Green space is a <em>safe</em> place of tranquility, quiet reflection, meditation, and spirituality.</td>
<td></td>
</tr>
<tr>
<td>Equity and accessibility</td>
<td>Educator talks about the importance of doing urban environmental education in green space because it is a place that offers access to all—low cost and physically close to where people live.</td>
<td></td>
</tr>
<tr>
<td>Place of critical thinking</td>
<td>Educator discusses the importance of using urban green space to enhance the audience's critical thinking.</td>
<td></td>
</tr>
</tbody>
</table>
### URBAN GREEN SPACE ENVIRONMENTAL EDUCATION

<table>
<thead>
<tr>
<th>Pedagogy</th>
<th>Inquiry practice</th>
<th>Educator uses inquiry cycle or components of inquiry cycle—observation, questions, hypothesis, experimentation, or communication of results.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical exploration, Free choice exploration</td>
<td>Educator mentions that in their work, they attempt to allow students to direct their own investigations within the framework of the program focus. This may include a choice as to which direction an investigation takes within a topic/content area provided by the educator or learning is driven by the needs and interests of the participant rather than by the dictates and needs of the educator.</td>
<td></td>
</tr>
<tr>
<td>Experiential education</td>
<td>Educator mentions that within their program, they aim to provide participants with concrete experiences and, as a result of those experiences, opportunities for participants to reflect and develop their own opinions of concepts based on interaction with the information.</td>
<td></td>
</tr>
<tr>
<td>Modeling</td>
<td>Educator discusses the use of modeling—a practice in which the educator demonstrates a new concept or approach to learning and participants learn by observing.</td>
<td></td>
</tr>
<tr>
<td>Play</td>
<td>Educator discusses the importance of allowing young people opportunities to play as part of their programs. With this approach, educators make provision for play and playful approaches to learning and teaching in how they design play/learning environments and in all the pedagogical decisions, techniques, and strategies they use to support or enhance learning and teaching through play.</td>
<td></td>
</tr>
<tr>
<td>Hands on</td>
<td>Educator discusses the importance of providing opportunities for learners to gain knowledge by actually doing something rather than learning about it from books, lectures, etc. Although hands-on learning is a component of experiential education and inquiry, hands on alone does not address the role and importance of critical reflection (as is the case in experiential) or the importance of question formulation leading to experimentation (as is the case in inquiry).</td>
<td></td>
</tr>
<tr>
<td>Science intention and focus</td>
<td>Citizen science</td>
<td>Educator discusses the role of science and science education in their programming but puts emphasis on participating in citizen science projects (Celebrate Urban Birds, Nest Watch, Monarch Watch, I Naturalist, etc.).</td>
</tr>
<tr>
<td>Field study</td>
<td>Educator discusses the role of science and science education in their programming but puts</td>
<td></td>
</tr>
<tr>
<td><strong>URBAN GREEN SPACE ENVIRONMENTAL EDUCATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>STEAM</strong></td>
<td>Emphasis on the use of ecological field studies (tree surveys, biodiversity counts, bird inventory, long- or short term habitat studies).</td>
<td></td>
</tr>
<tr>
<td>Educator discusses the role of science and science education in their programming, but puts emphasis on how science is not a stand-alone content area; rather, it is supported through integration of technology, engineering, arts, and math. Educator may not hit all five elements of STEAM in one program.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other key codes</strong></td>
<td>Educator discusses the ways through which urban environmental education attendees may acquire and effectively apply the knowledge, attitudes, and skills necessary to understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions. This may also include discussion on how their program connects humans to humans, not just humans to the nonhuman world.</td>
<td></td>
</tr>
<tr>
<td><strong>Social-emotional human connections</strong></td>
<td>Educator talks about exploration and importance of understanding the social and ecological aspects of cities—art, history, and urban planning.</td>
<td></td>
</tr>
<tr>
<td><strong>City as social-ecological system trend</strong></td>
<td>Works with organizations outside their own in green space programming.</td>
<td></td>
</tr>
<tr>
<td><strong>Organizational partnership</strong></td>
<td>Educator aims at building a pipeline—exposing youth at a young age and building on that through high school. The key is investing in younger kids.</td>
<td></td>
</tr>
<tr>
<td><strong>Investing in younger kids</strong></td>
<td>Programming geared towards the community at large.</td>
<td></td>
</tr>
<tr>
<td><strong>Neighborhood and community as audience</strong></td>
<td>Educator emphasizes the importance of simply connecting people to nature.</td>
<td></td>
</tr>
<tr>
<td><strong>Connect people and nature</strong></td>
<td>Educator explains views on whether they feel they are reaching their personal and institutional goals.</td>
<td></td>
</tr>
<tr>
<td><strong>Goal achievement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Topic</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Selflessness</td>
<td>Concern more with the needs and wishes of others than with one's own.</td>
<td></td>
</tr>
<tr>
<td>Separate environmental education from schools</td>
<td>Environmental education as a stand-alone area not imbedded in schools.</td>
<td></td>
</tr>
<tr>
<td>Sharing with family</td>
<td>Learning experiences are extended from learner to leaner's family.</td>
<td></td>
</tr>
<tr>
<td>Struggles</td>
<td>To contend resolutely with a task, problem, etc.</td>
<td></td>
</tr>
<tr>
<td>Teaching how they learned</td>
<td>Explaining that they teach how they perceived they best learned.</td>
<td></td>
</tr>
<tr>
<td>Veteran educator</td>
<td>Working in education for over 10 years.</td>
<td></td>
</tr>
<tr>
<td>Wary of false expectations</td>
<td>Importance of being realistic in program expectations.</td>
<td></td>
</tr>
<tr>
<td>Audience K–12</td>
<td>Educator discusses using K–12 as audience.</td>
<td></td>
</tr>
<tr>
<td>Culturally inclusive</td>
<td>Educator emphasizes the importance of cultural competency in urban environmental education work.</td>
<td></td>
</tr>
<tr>
<td>Funding as barrier</td>
<td>Institutional or grant funding is seen as an obstacle to program growth and goal achievement.</td>
<td></td>
</tr>
<tr>
<td>Peer-teaching youth development</td>
<td>Provides participants opportunities to learn from each other.</td>
<td></td>
</tr>
<tr>
<td>Personal and community benefits</td>
<td>How the programming benefits the self and the community.</td>
<td></td>
</tr>
<tr>
<td>Pop-up or organic programming</td>
<td>Discussion on how lessons or programs are not necessarily preplanned in setting, topic, or timing; somewhat impromptu programs</td>
<td></td>
</tr>
<tr>
<td>Program sustainability</td>
<td>How long the program will or will not last.</td>
<td></td>
</tr>
<tr>
<td>Project-based Educator discusses the role of project-based programming.</td>
<td></td>
<td></td>
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<tr>
<td>---</td>
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<td></td>
</tr>
<tr>
<td>Providing opportunities Talks about desire to open doors to meet future goals and desires for the learner/participant.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schools as audience teachers as partners/environmental education in schools Formal education (K–12) is the audience to which the program is marketed; however, the educator discusses the need to have formal educators as partners in the process and speaks of a desire to have environmental education as part of formal education.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Novice Been in their job for less than 5 years.</td>
<td></td>
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<tr>
<td>Partner in learning Educator allows space for participants to be teachers and leaders and for educator to learn with participants.</td>
<td></td>
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<tr>
<td>Health connections How urban environmental education in green space connects to health and wellness for humans.</td>
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<tr>
<td>Legacy How educator will be remembered and perceived.</td>
<td></td>
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<tr>
<td>Literacy connection Connecting literacy in urban environmental education programming.</td>
<td></td>
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<tr>
<td>Nature knowledge Instruction based on building content knowledge.</td>
<td></td>
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<tr>
<td>Not identifying as educator See themselves as something other than environmental educators.</td>
<td></td>
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<tr>
<td>Not imposing values Educator not pushing believes and values on audience.</td>
<td></td>
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<tr>
<td>Past training influences current practice Drawing on past career and training to frame current work.</td>
<td></td>
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</tr>
</tbody>
</table>
### Environmental Education in Urban Green Space: Educator Practice—Final Codes and Definitions

<table>
<thead>
<tr>
<th>Parent grouping</th>
<th>Name of code</th>
<th>Code definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action and conservation framing</td>
<td>Activism and civic engagement</td>
<td>Educator frames their work around advocacy and the importance of activism and community civic engagement. They may see themselves as advocates or want to provoke their audience towards civic engagement.</td>
</tr>
<tr>
<td>Restoration work</td>
<td>Educator's work is framed around ecological restoration. This work could include meadow restoration, fisheries restoration, etc.</td>
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<tr>
<td>Stewardship as practice</td>
<td>Educator frames work around physically practicing stewardship activities with their audience as something central to their work. This could include neighborhood trash clean ups, tree plantings, garden installations, and maintenance.</td>
<td></td>
</tr>
<tr>
<td>Sense of stewardship talk</td>
<td>Educator talks about the importance of fostering a sense of stewardship among their audiences, but does not necessarily participate in direct stewardship work.</td>
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<tr>
<td>Environmental awareness (ecological/environmental literacy)</td>
<td>Place-based</td>
<td>Educator is building ecological literacy through place-based education and emphasizing the importance of connection to place.</td>
</tr>
<tr>
<td>Outdoor experiences</td>
<td>Educator is building ecological literacy through simply providing participants with outdoor experiences</td>
<td></td>
</tr>
<tr>
<td>Systems</td>
<td>Educator builds ecological literacy through stressing the importance of linking local lessons and experiences to interconnected systems. A desired outcome is to think beyond the linear.</td>
<td></td>
</tr>
<tr>
<td>Content area of programming</td>
<td>Urban ecology systems and cycles</td>
<td>Urban ecological systems and cycles are a topic/content area taught in their program.</td>
</tr>
<tr>
<td>Wildlife/fauna</td>
<td>Animals, wildlife, and animal life cycles are a topic of study in their program.</td>
<td></td>
</tr>
<tr>
<td>General ecology</td>
<td>Ecology, biodiversity, and ecological cycles are a topic/content area of study in their program.</td>
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<tr>
<td>Habitats</td>
<td>Habitats, homes for biotic species are a topic of study in their program.</td>
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<tr>
<td>-------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
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<tr>
<td>Climate change</td>
<td>Climate change is a topic/content area of study in their program.</td>
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<tr>
<td>Soil/geology/dirt</td>
<td>Dirt/soil/geology is a topic of study and exploration in their program.</td>
<td></td>
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<tr>
<td>Food/nutrition</td>
<td>Food growth and production and nutrition are a topic/content area of study in their program.</td>
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<tr>
<td>Plant/flora</td>
<td>Plants, trees, gardening (nonfood) are a topic/content area of study in their program.</td>
<td></td>
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<tr>
<td>Watersheds</td>
<td>Watersheds (including issues of stormwater) are a topic/content area of study in their program.</td>
<td></td>
</tr>
<tr>
<td>Environmental justice</td>
<td>Environmental justice is a topic of focus in their program.</td>
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</tbody>
</table>

| Value of environmental education in green space                         |Social-emotional human connection| Educators value the ways through which urban environmental education participants may acquire and effectively apply the knowledge, attitudes, and skills necessary to understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions. This may also include discussion on how their program connects humans to humans, not just humans to the nonhuman world. |
|-------------------------------------------------------------------------|Place of solace and safety| Green space is a *safe* place of tranquility, quiet reflection, meditation, and spirituality. |
|-------------------------------------------------------------------------|Equity and accessibility| Educator stresses the importance of doing urban environmental education in green space because it is a place that offers access to all—low cost and physically close to where people live. |

| Pedagogy                                                               | Inquiry practice| Educator uses inquiry cycle or components of inquiry cycle—observation, questions, hypothesis, experimentation, or communication of results. |
|-------------------------------------------------------------------------|Critical exploration, free choice exploration| Educator allows students to direct their own investigations within the framework of the program focus. This may include a choice as to which direction an investigation takes within a topic/content area provided by the educator or learning that is driven by the needs and interests of the participant rather than by the dictates and needs of the educator. |
### Experiential education

Educator aims to provide participants with concrete experiences and, as a result of those experiences, opportunity for participants to reflect and to develop their own opinions of concepts based on interaction with the information.

### Modeling

Educator employs the use of modeling—a practice in which the educator demonstrates a new concept or approach to learning and participants learn by observing.

### Play

Educator stresses the importance of allowing young people opportunities to play as part of their program. With this approach, educator makes provision for play and playful approaches to learning and teaching in how they design play/learning environments and in all the pedagogical decisions, techniques, and strategies they use to support or enhance learning and teaching through play.

### Science intention and focus

#### Citizen science

Educator focuses on the role of science and science education in their programming but puts emphasis on participating in citizen science projects (Celebrate Urban Birds, Nest Watch, Monarch Watch, I Naturalist, etc.).

#### Field study

Educator focuses on the role of science and science education in their programming but puts emphasis on the use of ecological field studies (tree surveys, biodiversity counts, bird inventory, long- or short-term habitat studies, etc.).

#### STEAM

Educator focuses on the role of science and science education in their programming but puts emphasis on how science is not a stand-alone content area; rather, it is supported through integration of technology, engineering, arts, and math. Educator may not hit all five elements of STEAM in one program.

### Other key code

#### Organizational partnership

Works with organizations outside of their own in green space programming.
APPENDIX E

IRB APPROVAL
Institutional Review Board

DATE: December 21, 2016

To: Jennifer Klein

From: Robyn Cruz and Terrence Keeney, Co-chairs, Lesley IRB

RE: IRB Number: 16/17-018

The application for the research project, "Environmental education in urban green space: Understanding educator practice" provides a detailed description of the recruitment of participants, the method of the proposed research, the protection of participants' identities and the confidentiality of the data collected. The consent form is sufficient to ensure voluntary participation in the study and contains the appropriate contact information for the researcher and the IRB.

This researcher has sufficiently addressed the concerns of the previous review in this revised application. It is understood that the researcher will apply for an addendum to this application at a later date when the first round of interview data is completed and the researcher is ready to institute the survey. The addendum request must be granted and information on how the survey will be anonymous and the data protected must be included in the request.

This application is approved for one calendar from the date of approval.
You may conduct this project.

Date of approval of application: 12/21/16

Investigators shall immediately suspend an inquiry if they observe an adverse change in the health or behavior of a subject that may be attributable to the research. They shall promptly report the circumstances to the IRB. They shall not resume the use of human subjects without the approval of the IRB.
APPENDIX F

IRB ADDENDUM
Date: August 31, 2017

To: Jennifer Klein

From: Robyn Cruz and Terrence Keeney, Co-chairs, Lesley IRB

RE: Addendum of IRB Number: 16/17-018

This memo is written on behalf of the Lesley University IRB to inform you that your request for an addendum of project IRB Number: 16/17-018 has been approved.

Date of IRB Approval: 8/31/17
APPENDIX G

INFORMED CONSENT FORM
Title of study

Environmental education in urban green space: Understanding educator practice

Principal Investigator
Jennifer Klein
Lesley University
School of Education
(248) 854-7668
jklein3@lesley.edu

Dissertation committee chair
Susan Rauchwerk, EdD
Lesley University
School of Education
(617) 349-8652
srauchwe@lesley.edu

Purpose of study

This research study seeks to examine how six different educators practice environmental education in public parks and agriculture sites in urban green space in Providence, Rhode Island. You were selected because you are an environmental educator whose program provides urban environmental education, in urban green space, with urban youth, in the city of Providence.

Who am I?

I am a PhD candidate at Lesley University studying urban environmental education. In addition to my academic work, I have also worked in the field of environmental education for 14 years; in Michigan, Massachusetts, and Rhode Island. The past 8 years, of my professional work has focused on urban environmental education. It has been my work as an urban environmental education practitioner that led me to a deeper point of inquiry to pursue a PhD and conduct this research to gain better insight into the teaching practice of fellow urban environmental educators.

What are you being asked to do?
This study will take a maximum of 5 hours of your time over a period of 6 months. You will be asked to share information about your role, experience, and perspective. Before you decide to participate in this study, it is important that you understand the scope and what it will involve. This includes:

1. Participating in up to two 1-hour interviews
2. Allowing the researcher to observe you teaching/leading a program with young people
3. Complete an online survey.

Please read the following information carefully. Please ask the researcher if there is anything that is not clear or if you need more information.

**Study procedure**

You will be interviewed for 60 minutes and asked a few general questions about the ways in which you approach or practice urban environmental education. Interviews will be recorded, and after the interview, all recordings will be transcribed. You may be contacted following the interviews by telephone to clarify my understanding of what you said or ask a few follow-up questions. Interviews will be scheduled at your convenience. All appropriate steps will be taken to preserve your privacy, confidentiality, and anonymity. If desired, your name and/or place of employment will not be used. Instead, you will be given a pseudonym, and other identifying characteristics, such as place of work or city and state of residence will not be written down or shared with anyone. All interviews will be transcribed and stored in my password-protected computer. You may request a copy of the transcript.
If you were to reveal something which Federal or State laws requires me to report (such as planning to harm someone), then I will be obligated to do so. Applicable Federal and State laws take precedence over confidentially.

I will observe a 1–2 hour class period in the outdoors and take some detail notes about what I see. I will analyze the observation field notes to identify any emergent themes. I will take all appropriate steps to preserve your privacy, confidentiality, and anonymity. If desired, your name will not be used. After the observation, I will transcribe the notes and save the file to my password-protected computer.

To better understand how environmental educators in [blurred text] articulate their approach to practicing environmental education in urban green space compare to educators across the United States, all research participants will also be asked to partake in one survey. This survey will be conducted anonymously, and the results will only be accessible by me via password protection.

Risks

There are no anticipated risks from participating in this research.

Benefits

The information obtained from this study can be used to inform us about the approaches and practices used by urban environmental educators. You may also personally benefit from participating in this study by discussing and reflecting on your practice with the researcher and colleagues.

Compensation for participation

There is no payment for taking part in this research project.

Taking part is voluntary
Participation in this research is voluntary. You have the right to refuse to be in this study. If you decide to be in the study, I sincerely hope you will participate for the duration. However, you certainly have the right to drop out at any time. You may decline to answer any or all questions and you may terminate your involvement at any time if you choose. Withdrawing from this study will not affect the relationship you have, if any, with the researcher. If you withdraw from the study before data collection is completed, the data may be used unless you specifically request otherwise.

**Anonymity**

You have the right to remain anonymous, and all references within the data will be coded to protect anonymity. Your records will be kept private and confidential to the extent allowed by law. Numerical identifiers and pseudonyms will be used on all study records. Your name and other facts that may identify you will not appear when this study is presented or published. If for some reason you do not wish to remain anonymous, you may specifically authorize the use of material that would identify you as a subject in this study.

**Contact information**

If you have questions at any time about this study, you may contact Jennifer Klein, whose contact information is provided on the first page. If you have questions regarding your rights as a research participant, or if problems arise which you do not feel you can discuss with the primary investigator, please contact Robyn Flaum Cruz, Ph.D at the Institutional Review Board at (617) 349-8517 or email r cruz@lesley.edu
Your Consent

I have read and I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Participant's signature __________________ Date _____ Printed
name____________________

Investigator's signature __________________ Date _____ Printed
name____________________
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