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INTERSECTING THE PARALLEL WORLD:

A GENERIC QUALITATIVE STUDY OF LOW NATURE USE TEACHERS' EXPERIENCES
AND PERCEPTIONS ON THE IMPLEMENTATION OF NATURE-BASED LEARNING FOR
EARLY ELEMENTARY STUDENTS WITH EXTENSIVE SUPPORT NEEDS

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INTERSECTING THE PARALLEL WORLD:
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Dedication

If I have seen further,
it is by standing on the shoulders of Heuers.

A product of your love and care.
A milestone not mine alone.
This for not without you.

Acknowledgements

I would like to extend my wholehearted gratitude to my dissertation dream team (like the '92 Dream Team not the '04) for their unending patience and unwavering support throughout this journey. Your guidance was invaluable, offering both gentle suggestion when I asked for it and decisive direction when I need it. I got to make some mistakes and grow in the effort to clean them up. I've gotten to see that good researchers, like good teachers, are magicians not wizards. Wizards create something out of nothing. But magicians hone their craft with countless hours of effort and determination, so that their performance looks like magic. You all make things look like wizardry, but having seen behind the curtain, I truly appreciate all the effort it takes. I am grateful for your dedication, care, and expertise, which have been instrumental in shaping this dissertation, and even more so in shaping me as a researcher and educator.

For everyone that has helped me get here, author Anne Lamott shares a lesson she learned in her 1994 book on "writing and life", *Bird by Bird*, that I will paraphrase: Writing a dissertation is like driving a car at night. You can see only as far as your headlights stretch out in front of you, but you can still make the whole trip that way. You don't have to see where you're going from the start. You don't have to see everything you pass along the way. You just have to see that space right ahead of you and keep going. My family and friends, you all were my headlights so that I could keep going.

Thank you!

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Abstract

This generic qualitative dissertation strives to explore the experiences and perceptions of low nature use teachers through their portrayals of nature-based learning for early childhood-school age students with extensive support needs. By aligning and amplifying the collective stories of these teachers and highlighting patterns in how they understand their experiences, this research seeks to reveal the practical insights of teachers as they describe their perspectives on the benefits and barriers to nature-based learning. Employing a pragmatic perspective and the use of a recruitment questionnaire / semi-structured interview sequence of data collection and theoretical thematic analysis, this study generated a framework of themes describing the mechanisms that generate a disparity between a value in nature-based learning and actually using nature-based learning. Benefits for nature-based learning are characterized by (a) Outcomes: connection, knowledge and skills, well-being and (b) Experiences: captivating engagement, creative exploration, practical experience. Barriers for nature-based learning are characterized by: (a) Nature not considered, (b) Constraints of time and expectations, (c) Preparation, resources, and support, (d) Confidence, (e) Outdoor spaces and safety, (f) Student behavior and readiness, and (g) Educational climate. These patterns of understanding offer valuable insights for practitioners, policymakers, researchers, or any other gatekeepers of educational experience interested in the advancement of inclusive nature-based learning in public education settings. These results can serve as fertile soil for the growth of more frequent intersections of nature-rich educational experiences and all learners.

Chapter 1: Introduction

Lively, mischievous, and curious, Norman was like so many other children his age. He had that four-year-old unkempt mop of chestnut brown hair that was often as tenacious as he was. Woe to the brush that tried to take on that cowlick. He was the kind of ceaselessly wiggly kid that could wear-out his clothes from the inside. Norman possessed a toothy smile so big it dwarfed the other features of his slight face. It was a smile of such abundance, both in size and in frequency of use, that it was often as contagious as the runny noses in his pre-K classroom.

Norman was a downright delightful kid that never seemed to let speech delays and cerebral palsy slow him down. Morning circle time often became more like morning oval time as he enjoyed not so surreptitiously scooting away to stretch the borders of his spot on the carpet like some pre-K campaign of manifest destiny. His favorite lunchtime “game” was to repeatedly push his chair as far from the table as possible so that an adult or nearby friend would have to help shimmy him back within reach of his food. In the hallways, Norman’s teachers could rely on him steering his gait trainer walker anywhere but the direction the rest of the class was going, swiftly breaking free from the line (or for Pre-K what can best be characterized as a semi-orderly procession with line-like qualities) on the way to music or an assembly. His impromptu reconnaissance missions requiring the hurried sprint of an aide to catch up and redirect the gleefully giggling boy back to where the rest of the class was headed. In a life that presented barriers, Norman delighted in discarding them.

When it was time to go outside, Norman made sure that his teachers knew that he was ready to be the first one through the back gate. To the eye of a four-year-old, the vines that wound their way in, out, and over that chain link fence behind the playground hid what lay beyond. Though Norman knew well that the other side of that verdant fence meant exploring his

school's gardens and greenspace. He had the habit of stationing his walker right at the threshold of the garden gate, blocking out the mob of his pre-K peers as if positioning himself under the basket for a rebound.

Fortunately, the gate opened both ways because the chaotic swarm of childhood excitement left no room to pull it in toward the playground side. The unlocking of the latch acted like the firing of a starter pistol. As the gate swung open Norman and friends of various abilities poured in, resembling the tsunami of humanity unleashed by the parting of a store's sliding doors on Black Friday. Instead of chasing bargains, children got to chase bugs and butterflies. Inside the garden Norman was free to roam the meandering crushed granite paths and explore dense plantings of native trees, grasses, and wildflowers.

Though designed to be accessible, the rocky paths of the garden were not always forgiving to the leg braces, wheels, and lemon-yellow walker frame that Norman needed to support his own slender frame. Nonetheless, Norman blazed those trails calling upon another gear to drive him forward, fueled in equal parts by thrill and determination. For Norman, and his peers, entering that garden was to enter a place purposefully prioritized to cultivate opportunities for their wonder and well-being.

Statement of the Problem

This liberating and enriching schoolyard experience that Norman had so early in his educational career is regrettably an anomaly. Yet, it exists as such because we, as a society, have succumb to a host of self-inflicted barriers largely losing touch with the natural world. The field of education has done the same. Nature is still close by because nature is all the living and non-living constituents of the physical world, including humans, the organic materials influenced by humans, and the instructive ways of knowing latent in the bonds between all living beings and

the phenomena of the earth (Kimmerer, 2015; Leopold, 1989; Taylor, 2011). But it is challenging for teachers to leverage the diverse benefits that can be found through nature (Chawla, 2015; Kuo et al., 2019; Mann et al., 2021), because it is difficult to see beyond the boundaries erected around the notion that standard classrooms are the sole site for learning for their students (Ernst, 2014; Ray & Jakubec, 2018). Teachers appear to believe in the advantages of using nature for the learning experiences of their students, but most yield to a complex tangle of constraints that inhibit their capacity to utilize it.

The Making of a Parallel World

“Our origins are of the earth. And so there is in us a deeply seated response to the natural universe, which is part of our humanity” (Carson, 1999, p. 247). As human beings we have an innate belonging to the natural world (Kimmerer, 2015; Leopold, 1989; Wilson, 1984). For the entirety of human existence our survival has been dependent upon the natural world around us. Today our dependence has not changed, but our connection to nature has. As our instinct to survive has been overtaken by our desire and capacity to thrive, our accumulated knowledge and effort have built us a modern society that has come to insulate us from the common dangers of the natural world but serves to isolate us from the rest of nature. Most Americans now live in landscapes of concrete, steel, and glass.

Our technology-laden lives in these large and densely populated urban areas tangibly separates us from the wilderness we have narrowly come recognize as nature (Pollan, 1991). As of the last United States census, rural areas contain only around 20% of the population but cover over 95% of the nation's land area, leaving over 265 million people in America living in our heavily populated metropolitan areas (US Census Bureau, 2021, 2022). Social media, a technology that by its name implies greater connection, is showing a concerning capacity to do

the opposite, dividing us and addicting our brains to toxic silos of gratifying bias (Allcott & Gentzkow, 2017; Lelkes, 2016; Zhuravskaya et al., 2020). Video games open us to a world of immersive entertainment, but can compulsively tether children (and adults) to screens for hours a day, exploring artificial worlds while the real world goes on largely unnoticed (Griffiths et al., 2012; Kuss & Griffiths, 2012). On average, young children use screens (e.g., television, mobile devices, video games) almost two and a half hours daily, with early childhood students of school age tripling screentime recommendations with more than three hours of use (Common Sense Media, 2022; Rideout & Robb, 2020; World Health Organization, 2019). Early childhood-school age (EC-SA) students are those children in school and school-like instructional settings pre-kindergarten through third grade. This level of screentime, this early in life, would mean that in a 14-hour day, a third grader might spend over 70% of their waking hours with their face fixed on a screen or sitting at school, where they are also using screens more and more.

Schools could be a great equalizer, however public disinvestment in parks and physical education over much of the last century has made physical activity tantamount to a luxury good, attainable mainly by those who have more time, have more wealth, and are more able to get out to exercise (Petrzela, 2023). A sedentary lifestyle, spending most our time inside staring at screens, can over a lifetime increase all causes of mortality, raising the risks of some types of cancer, high blood pressure, osteoporosis, depression, and anxiety as well as doubling the risk of cardiovascular diseases, diabetes, and obesity (World Health Organization, 2020). Glorious benefits to our modern lifestyles and technologies do exist, but there are not privileges without obligations. There are not profits without costs. Life today has alienated us from the natural world in what has been conceptualized as a “nature-deficit disorder” (Louv, 2008).

In *Sojourns in the Parallel World* poet Denise Levertov (1996, p. 49) gracefully distills the rift in our contemporary relationship with nature:

We live our lives of human passions,
cruelties, dreams, concepts,
crimes and the exercise of virtue
in and beside a world devoid
of our preoccupations, free
from apprehension -- though affected,
certainly, by our actions. A world
parallel to our own though overlapping.
We call it 'Nature;' only reluctantly
admitting ourselves to be 'Nature' too.
Whenever we lose track of our own obsessions,
our self-concerns, because we drift for a minute,
an hour even, of pure (almost pure)
response to that insouciant life:
cloud, bird, fox, the flow of light, the dancing
pilgrimage of water, vast stillness
of spellbound ephemera on a lit windowpane,
animal voices, mineral hum, wind
conversing with rain, ocean with rock, stuttering
of fire to coal -- then something tethered
in us, hobbled like a donkey on its patch

of gnawed grass and thistles, breaks free.

No one discovers

just where we've been, when we're caught up again

into our own sphere (where we must

return, indeed, to evolve our destinies)

-but we have changed, a little.

Levertov captures this self-imposed separation from nature and how when we find cause to reconnect, to intersect this parallel world, it offers us something that can be transformative. This is something that our schools have known in the past but have now mostly forgotten.

Schools and Our Nature Deficit

Before formal schools came into being, before nature ran parallel to culture, the natural world itself was a child's classroom. As the prevalence of school as we know it arose, one of the early trends in education was an esteem for the world outside the classroom. Contemporary to the popularity of the naturalist works of Ralph Waldo Emerson, John Muir, Henry Wadsworth Longfellow, Jack London, and Henry David Thoreau, the "nature study movement" peaked in elementary schools between the 1890s and 1920s (Pollan, 1991; Rillero, 2010). Nature study combined the study of science and a naturalist philosophy into an educational approach that focused instruction on learning through firsthand observations in natural environments. The call to "study nature, not books" guided educators of the era to teach by emphasizing learning based in nature, using objects and experiences inside and outside the classroom (Rillero, 2010; Tolley, 1994).

Today, in response an ever-quickenning pace of life and learning, driven by an inundation of assessments, modern schools have progressively eliminated the kinds of practices and

activities that once got kids actively playing and learning outdoors (McKenzie & Kahan, 2008; Ravitch, 2020; Tremblay et al., 2015). The emphasis on standardization and assessment beginning in the 1980's, which is only now beginning to loosen its stranglehold, has encouraged schools to move attention toward rigorous, systematic, and measurable benchmarks (Duschl et al., 2007). These high stakes conditions have pushed schools to forfeit arts, electives, and the physical activity that in the past would have at least encouraged incidental natural interaction through outdoor play at recess and in PE (McKenzie & Kahan, 2008; Tremblay et al., 2015; Wilkins et al., 2003).

Students and teachers today find themselves boxed into claustrophobic learning spaces “that are far from being in harmony with our human nature, that in fact make intelligent and effective thinking very difficult” (Paul, 2021, p. 117). Teachers have a four walls problem (Feille, 2019; Gallegly, 2020). By not thinking more about spaces outside the four walls of our conventional classrooms there develops a “disconnect between what educators want to do and what their learning environment will allow them to do” (Nair, 2017, p. 2). Outdoor natural settings are ubiquitous yet are profoundly underutilized as intentional learning spaces. With nature as context and content for learning there is mounting evidence that there are broad and significant social, emotional, cognitive, and physical health benefits to engaging students with learning experiences based in nature (Frumkin et al., 2017; Jordan & Chawla, 2019; Stevenson et al., 2020). Nature-based learning (NBL) is learning through the experience of nature strategically added as content or context of instruction for an array of objectives made accessible to all children (Broda, 2007; Chawla, 2018; Jordan et al., 2017; Stevenson et al., 2020). Barriers to NBL means that those potential benefits are being lost to students, especially those that require extensive supports through special education. Obstacles to access by means of conventional

mindsets and inaccessible physical spaces appear to represent another frontier of exclusion (Garland-Thomson, 2011).

Exclusion of Students with Extensive Support Needs

Students with extensive support needs (ESN) are those learners requiring comprehensive and continual supports across the school setting in both academic and adaptive behavior domains, necessitating the use of alternate assessments based on alternate achievement standards (Root et al., 2020; Taub et al., 2017). Experiences based in nature have the potential to provide students with ESN widespread cognitive, social, emotional, physical benefits that may be difficult to achieve at home or in other public settings outside of school (Ardoin & Bowers, 2020; Jordan & Chawla, 2019; Miller et al., 2021; Stevenson et al., 2020). However, a constellation of research surrounding the use of nature for learning and activity suggests that students with ESN are placed at notable disadvantages through systemic obstacles and insufficiently experience nature and the outdoors (Case et al., 2020; Nabors et al., 2001; Yantzi et al., 2010).

In our society children with ESN experience consequences for their disjunction with structural barriers of normalcy. Their “discrepancy between body and world, between that which is expected and that which is, produces fits and misfits” (Garland-Thomson, 2011, p. 593). Those that do not fit, experience both attitudinal and environmental barriers to their full and effective participation in the world. Inside classrooms, students with ESN remain more likely to spend most of their school day in specialized settings separate from their typically developing peers (Kurth et al., 2014; Morningstar et al., 2017), leaving them removed from the activities that take place in general settings. In the spaces outside of classrooms, educators report that their outdoors spaces are not designed to be accessible and constrain the full participation of students with

disabilities (Stanton-Chapman & Schmidt, 2016; Yantzi et al., 2010). Things like physical barriers, inadequate facilities, and lack of specific understanding of specialized needs contribute to an underrepresentation of individuals with disabilities as users of outdoor spaces (Woolley, 2012).

Children with ESN are not getting the recommended levels of daily physical activity (Case et al., 2020; Wouters et al., 2019). They spend less time physically active and participate in significantly fewer types of physical activities when compared to typically developing peers (Bandini et al., 2013; Carlon et al., 2013). Particularly notable here, children with ESN participate in outdoor play less than their typical peers (Stermann et al., 2016). The space these obstacles create between students with ESN and meaningful experiences with nature is complex, yet because these gaps are largely of our own making, they can also be unmade.

Uncharted Paths for Intersecting the Parallel World

In a 1786 letter to friend Dr. Benjamin Vaughan, Benjamin Franklin wrote “you will observe with concern how long a useful truth may be known and exist before it is generally received and practiced on” (Committee on Environment and Public Works, 1984, p. 5). This characteristic of human nature captured here is at the core of the problem of this study. Good spaces and good ideas alone are not enough to overcome the inertia of what is already being done (Fixsen et al., 2005), especially where technology is so fiercely pushing in the opposite direction. The divide that exists between the development of knowledge and its applied use is well known as the research-to-practice gap.

The field of education is particularly encumbered by this incongruity between research and practice. Research-to-practice gaps open when research functions as an end in itself, focused on the “what” but not the “how” to make “science useful to service” (Fixsen et al., 2005, p. 68).

Bridging these gaps has long been and continues to be of particular importance to the field of special education (Boyd et al., 2022; Carnine, 1997; Greenwood & Abbott, 2001; Odom et al., 2020). Because of the special populations they work with and care for, special education practitioners have rightful concerns about the useability and accessibility of research findings (Carnine, 1997). And much of the current research on NBL experiences has rightfully been focused upon student outcomes to establish a foundation of efficacy (Dring et al., 2020). However, the paths to expanding effective implementation are not yet distinguishable. Little is known about how teachers make judgements about adopting new practices that bring students into contact with nature. And while some attention has been given to how educators evaluate the built environments of schoolyards (Stanton-Chapman & Schmidt, 2016), much less seems to be known about how educators take on the added complex and multifaceted obstacles that they must face if nature, and its benefits, are to be accessible for all students. So, if it can indeed benefit our students with ESN to breach those prominent barriers (Frumkin et al., 2017; Jordan & Chawla, 2019; Soga et al., 2017; Stevenson et al., 2020), it will be imperative to know more about how teachers navigate the use of NBL as part of their approaches to instruction.

Purpose of the Study

Centuries of our Sisyphean attempts to dominate nature is beginning to roll back in the direction of a more mutualistic relationship (Kolbert, 2021). A growing sense of uncertainty about our planet's fate has lit a fire under our collective conscience regarding how humanity interacts with nature. Despite much contentious and unresolved debate about the root causes, level of urgency, and solutions, accumulating decades of attention on our environment has finally begun to drive fundamental changes in the priorities and processes of our society. Modern life may have divided many of us from nature, but it is a connection fayed, not severed. It is time to

stem the tide of our estrangement from nature. It is time to probe the thresholds of what encourages and what obstructs NBL use for teachers. The purpose of this study is to systematically investigate the stories that EC-SA teachers, with Low NBL use, tell about the benefits and barriers to using NBL for students with ESN. Gathering and aligning these stories that teachers have developed through the interpretation of their distinctive experiences can cultivate insight into the mechanisms that generate the apparent disparity between believing in NBL and actually using NBL.

Significance of the Study

It is critical to not leave what teachers are doing and thinking unexamined if we hope to give Norman and students like him more than the uninspiring vistas of four walls, repetitious rows of desks, and the constant glow of screens. Early childhood school-age students with extensive support needs cannot be cordoned off from meaningful learning or from the nourishing connections obtainable through the natural world so very close to us (Jimenez et al., 2021; Mann et al., 2022; Miller et al., 2021). Through teacher stories this study seeks to explore and describe the current experiences with NBL that Low NBL use teachers have, make legible their perceptions for both why NBL is used and why NBL is not used, and begin to outline the ostensible gap between the perceived value of NBL and its real-world utilization. Cultivating a detailed depiction of the lived practice of Low NBL use EC-SA teachers offers a foundation of understanding to build future steps toward informing and improving the ways in which we teach, bringing students that experience disabilities more equitably into learning with nature during this critical stage of early childhood.

Results of this generic qualitative study can begin informing the development of strategies to overcome entrenched barriers to NBL implementation. With a guide to the status of

present practices, educators can have an anchoring point for evolving their instructional toolboxes and promoting enhanced levels of NBL use focused specifically for students with ESN. Diversifying options to include more instructional approaches and environments as viable pathways to learning gives more teachers more choices and more settings for the success of more students. Students that by their very placement in special education means they have had little success before in the traditional spaces of our schools. And while getting teachers out of their cubicles of comfort cannot alone fill those toolboxes immediately or automatically with instructional tools, it does open up room (literally) to do more and try new things that have new ways of connecting to students that are not possible in conventional settings (Almers et al., 2018; Dallas, 2021).

The findings of this research can help transform policy and thinking about how we use both the outdoor spaces and indoor spaces at our schools. It contributes a much-needed special education centered perspective to existing research that is at present predominantly populated by the fields of health/medicine, environmental science, and environmental psychology (Fyfe-Johnson et al., 2021; Jordan & Chawla, 2019; Mann et al., 2021). Additionally, this research can function to integrate the field of special education more broadly into larger societal trends allowing individuals with disabilities to be a driving force, rather than an afterthought, in a future more focused on nurturing self, society, and environment. By better understanding the re-integrating, the remembering, of nature at school, educators can strive to give children what they are missing, give them what they need, and give them a relationship with nature that they will take with them into healthier and more whole lives beyond school (Kimmerer, 2015).

Definition of Key Terms

The effort of this dissertation is rooted in the confluence of three core concerns: (1) school age-early childhood students, (2) students with extensive support needs, and the understanding and practice of (3) nature-based learning. These concerns served as anchoring points for inquiry guiding the review of existing literature and the composition of the research methods. The following definitions are provided to facilitate a stronger understanding of research design and interpretation of findings.

Early Childhood – School Age

Early childhood as an emphasis of study and practice is typically defined by a focus on children from birth through age eight. The 0-8 age range for this developmental stage of life is reflected in the definitions of “early childhood” found in instructional texts (Essa & Burnham, 2019; Trawick-Smith, 2019). This range is also the core priority of professional organizations such as the National Association for the Education of Young Children and The Council for Exceptional Children’s (CEC) Division for Early Childhood (DEC) (Division for Early Childhood, 2022; Friedman et al., 2021). In a systematic review of the literature on early childhood environmental education, Ardoin and Bowers (2020) affirm this age-based framework of early childhood, using birth to eight-years-old as a primary criterion for inclusion in the review. This dissertation narrows this broader early childhood range to concentrate specifically on those young children of school age. I will use *early childhood-school age* (EC-SA) here to refer to students in pre-kindergarten through third grade, corresponding to children most commonly spanning the ages of four to eight. The focus on this understudied (in the domain of this research) population (Ardoin et al., 2018) is to enrich understanding about these young children as students, receiving a teacher-lead education in school and school-like (e.g., early

childhood/daycare centers, preschools, playgrounds) instructional settings up to the age where they typically first start to encounter state standardized assessments.

Extensive Support Needs

The concept of extensive support needs is often represented by other parallel terms like significant disabilities, severe and profound disabilities, or low incidence disabilities. Such terminology has come a long way from the objectionable language of earlier eras. However, I will use *extensive support needs* (ESN) here, as its formulation is an attempt to lean away from a deficit focus or concentration on prevalence, toward an emphasis on the needs of individuals and how we respond to those needs. As there is a universality in our “needfulness”, the language of ESN aids in shedding the moniker “disabled”, choosing instead to recognize and value the diverse range of needs that are a fundamental part of being human (Hendren, 2020).

For the purposes of this research, students with ESN are defined as those learners requiring comprehensive and continual supports across the school setting in both academic and adaptive behavior domains, necessitating the use (or anticipated future use) of alternate assessments based on alternate achievement standards (Root et al., 2020; Taub et al., 2017). Students with ESN are characterized by a need for substantial support related to the experience of physical, communication, and/or cognitive impairments pervasive throughout lifespan that qualify under IDEA for categories that include, but are not limited to, developmental delay, autism spectrum disorder, intellectual disability, and multiple disabilities (*About TASH*, n.d.; Kurth et al., 2019; Quirk et al., 2017; Ryndak et al., 2008; Taub et al., 2017). By not indicating absolute or prescriptive categories of qualification, ESN also begins to account for the tremendous diversity of abilities and needs within each IDEA category.

Nature and Nature-Based Learning

Because “nature” can be understood in a spectrum of ways across time and disciplines of study (Ducarme & Couvet, 2020; Hunter et al., 2014), it will be advantageous to clarify first how nature is conceptualized for this research before defining the third core concern, nature-based learning. The concept of nature depicted here is informed by a perspective that bends in the direction of biocentrism (Taylor, 2011).

Nature. The dominant, Western, anthropocentric idea of nature frames humans as superior and separate from nature, with nature then consisting of the physical features and materials of the earth along with the categorical kingdoms of subordinate life (e.g., plants, animals, fungi, etc.) whose importance is derived from their usefulness to us as resources (Curry, 2011; Hunter et al., 2014). Humanity has developed “a deeply ingrained habit of seeing nature and culture as irreconcilably opposed; we automatically assume that whenever one gains, the other must lose” (Pollan, 1991, p. 4). But this was not always the way we understood nature. What was once a mutualistic relationship has given way to this zero-sum disconnectedness, a reciprocity crumbling under the force of exploitation (Kimmerer, 2015). We have internalized and acted upon this human-centered construction of nature, this story, where we are the protagonist conquerors at the pinnacle of a hierarchy and this “story has spread like wildfire, with uneven results for human well-being and devastation for the natural world. But it is just a story we have told ourselves and we are free to tell another, to reclaim the old one” (Kimmerer, 2015, p. 31).

That old story of nature (perhaps the original one) aligns well with a biocentric perspective. I am not attempting here to thoroughly explain biocentrism as a moral or ethical stance (which could be its own dissertation in ecological ethics). What I am offering is a

practical scratch at the surface of a biocentric viewpoint to operate as the substrate for a definition of nature that is inclusive and innately ripe for learning.

In Aldo Leopold's description of a "land ethic" and E.O. Wilson's explanation of "biophilia", humanity is not seen as independent of nature, we are but one fiber among the incalculable inter-reliant strands of the natural world (Leopold, 1989; Wilson, 1984). It is this kind of boundless bond that is at the core of a biocentric stance on nature. In his influential text, *Respect for Nature*, Paul W. Taylor (2011) outlined the core beliefs of a biocentric outlook on nature: (a) humanity and all that surrounds us is part of a community of life (i.e., belonging), (b) that all of nature has value (that does not equate to economic value or usefulness to humans), a right to survive, and a connected dependence (i.e., inherent worth and interdependence), (c) that all life is unique and deserving of understanding as an individual which is seeking to control its own life in the best ways it knows how (i.e., respect and self-determination) and (d) humans are not innately superior to all other things (i.e., equity).

There is an instructive nature to nature. Nature is a wellspring of wisdom co-created with the intricate web of symbiotic relationships among all life on earth and the earth itself (Kimmerer, 2015). It is a source of knowledge that can be nurtured anywhere and does not require the kind of wilderness that is so often exclusively equated to nature (Pollan, 1991). Nature exists throughout our lived spaces, often bent and built upon by our needs, but it is not merely a stage for the undertakings of humanity or a reservoir of resources to be endlessly commodified and consumed. Given this accretion of understanding, excluding the artificial products of human endeavors (i.e., that which is man-made), *nature* is all biotic and abiotic components of the physical world, including humans, and the instructive ways of knowing latent

in the bonds between all living beings and the earth (Kimmerer, 2015; Leopold, 1989; Taylor, 2011).

Nature then is the tree not the table, the puddle not the pool, and the wind not the windmill. Moreover, nature is both the magnificent and the ordinary. Nature is the grand, awe-inspiring, and miraculous: granite monoliths, forests of towering redwoods, the marathon migrations of monarch butterflies. But just as it is imposing and ostentatious, nature is the small, mundane, but equally miraculous (if we stop to appreciate it): the petite ruby orbs of a school garden tomato plant, the beating of your heart right now, the found roly-poly that tickles both the hand and the wonder of a child.

Conceivably, nature would exist in the absence of humanity, but it would be a nature altered and diminished by the loss of the human thread, just as we are (too long imperceptibly) diminished by the threads we have helped weaken and cut from the vast web of nature. Using a definition, where we no longer hold ourselves above an inferior nature but immerse ourselves in connectedness with it, grants us a reprieve from a fiction urging the exhaustion of nature, and gives us pathways to where nature is a vital and cherished part of living and learning well (Kimmerer, 2015).

What was striking in working toward this definition of nature inclusive of humanity is how the core beliefs identified can likewise be considered foundational principles of special education. This similarity belongs to a pattern of parallels recognized by the efforts of this research. Belonging, inherent worth, interdependence, respect, reciprocity, duty, knowledge, self-determination, and equity (Carson, 1999; Kimmerer, 2015; Leopold, 1989; Taylor, 2011; Wilson, 1984), these are ideals that are most certainly at the roots of a Free and Appropriate

Public Education (FAPE), an Individualized Education Program (IEP) co-constructed with students and parents, and membership in the Least Restrictive Environment (LRE).

Nature-Based Learning. More than a decade ago outdoor learning academic, author, and advocate Herbert W. Broda (2007) identified the “name game” tangling-up those invested in returning children to learning in nature. At its broadest, many labels have been applied to a philosophy of harmony between nature and education over the years: experiential learning, play-based learning, place-based education, outdoor education, environmental education, horticultural therapy, schoolyard-enhanced learning, green schoolyards, schoolyard pedagogy. Scholars and devotees of these concepts can certainly make the case that some of their philosophies have unique distinctions, describing different goals or methods with some common themes, some overlap. To tweak the old idiom of apples and oranges, some of these concepts are more like apples and pears. Yet, examination of other approaches reveals that they are essentially different names for the same thing, like trying to articulate the difference between Kleenex and facial tissues. With no polestar approach and lacking clearly agreed upon terminology (Miller et al., 2021) it is important here to explicitly define the focus of this research. I will use the term *nature-based learning* (NBL). Pollinated by its predecessors, NBL is a contemporary iteration, folding in principles and practices found in previous approaches, while building in key features that most closely encapsulate how the alliance of education and a primarily biocentric conceptualization of nature are being conceptualized for this research.

Nature-based learning formally emerged in 2015 through a National Science Foundation grant awarded to the Children and Nature Network, the North American Association for Environmental Education, and research partners at the University of Minnesota and the University of Illinois Urbana-Champaign (Chawla, 2018). NBL is an approach to education that

sets learning with nature at its core. The last few decades have produced mounting research that demonstrates the diverse benefits that nature can have for the education and well-being of children (Ardoin & Bowers, 2020; Jordan & Chawla, 2019; Miller et al., 2021; Soga et al., 2017; Stevenson et al., 2020). To leverage these benefits a NBL approach first emphasizes nature as a context for learning (Chawla, 2018; Jordan et al., 2017). With teachers as the gatekeepers of place, NBL shifts the focus of educators from more classrooms to more room for classes. It challenges teachers to consider the use of spaces outside of their classrooms as viable places of learning, literally encouraging teachers to think outside the box of their four walls (Feille, 2019; Jordan & Chawla, 2019). In a school setting, it is our “schoolyards” that are our outdoor places beyond those boxes.

A *schoolyard* is the immediate outdoor surroundings of the school (Broda, 2007; Mann et al., 2021). A schoolyard can be a fully loaded outdoor classroom or a nearby forested creek. But just the same, it can be an urban rooftop, a courtyard, or a lawn. A schoolyard is not exclusively the playground, nor is it limited to any specific outdoor elements: e.g., sports fields, gardens, trails, or trees. To be in a schoolyard is to be in the most readily available, most relevant natural space possible for students. A schoolyard is simply any outdoor space that teachers can use for instruction and students can use for learning (Broda, 2007; Feille, 2019; Stevenson et al., 2020). So, every school has a schoolyard.

Guided by a NBL approach, teachers critically analyze their curriculum and use their schoolyards to strategically add to instruction for an array of objectives (Ardoin et al., 2018; Broda, 2007; Jordan et al., 2017). Any content or values that can be taught in a classroom can conceivably be taught in a schoolyard (Broda, 2007; Chawla, 2018; Jordan & Chawla, 2019; Mann et al., 2021; Miller et al., 2021). Instruction can be relocated to schoolyards for both the

formal learning of goal-driven, structured lessons and the informal learning that takes place in unstructured exploration or play (Chawla, 2018; Jordan & Chawla, 2019; Mann et al., 2021). To advance student attitudes, behaviors, knowledge, and skills teachers can use NBL as an intellectually engaging, effective, and equitable complement to traditional instructional practices (Ardoin & Bowers, 2020; Stevenson et al., 2020). This “emphasis of any” (any outdoor space, at any school, for any objective, with students of any age, to teach any subject) means that using nature-based learning has the capacity to enhance any kind of instructional purpose.

This kind of flexibility and breadth does not mean that NLB is completely without boundaries or would claim to be a magic bullet method, somehow being all things to all people. NBL is not singularly focused on the stewardship or environmentalism of environmental education (Broda, 2007) or the cultural and ecological politics of the critical pedagogy of place (Gruenewald, 2003), and it is not primarily focused on community involvement as in place-based education (Sobel, 2004), though aspects of each may be a by-product. NBL does not seek to altogether replace indoor classrooms with outdoor classrooms as in nature kindergartens or forest schools, where students are outside as much time as possible (O’Brien, 2009; Sobel, 2020). Technologies used to access information about nature or to show pictures and videos of the natural world do not alone constitute nature-based learning (Chawla, 2018). NBL does not demand a universal change of mindset or an absolute overhaul of how a teacher teaches. However, for many, the application of nature-based learning does call upon a new attention.

A nature-based learning approach importantly goes beyond its own priority of place. Ultimately, NBL values an attention to how students experience nature. NBL holds that nature-rich experiences (Ardoin et al., 2018) invariably belong in the learning process as an integral aspect of its design. While the schoolyard is a vital piece of NBL, it is just one instrument of how

the experience of nature can take place. This accessibility of experience is a key feature that is critical to the use of NBL for students with extensive support needs.

In response to the social, cultural, and educational trends of the “No Child Left Behind” era along with the recognition of a growing nature-deficit disorder, Richard Louv, journalist, Children and Nature Network co-founder (one of the very same non-profit organizations involved in coining the term “nature-based learning”), and author of the influential *Last Child in the Woods* (2008) made a call to action to “leave no child inside” (Louv, 2013). Yet, what do we do for our students with ESN who may need to stay inside when schoolyards are inaccessible and/or inappropriate? When the level of essential student support does not allow for direct use of the schoolyard, nature-rich experiences can be provided in indoor classroom settings. Special education teachers can still utilize NBL by leaving no child without – experiences of nature. For students that require the extensive supports only available in their classrooms, special education teachers can bring in natural objects for students to see, touch, taste, or smell, ensure views of the outdoors, or provide sounds from nature (Jordan et al., 2017; Jordan & Chawla, 2019). School may be the only place that can provide the supervision, support, and opportunity for students with ESN to get the nature-rich experiences that they might not otherwise have. NBL is learning through the experience of nature made accessible to all children.

Key Terms

- Early childhood-school age (EC-SA): narrowed from the broader range (0-8) of early childhood (Division for Early Childhood, 2022; Essa & Burnham, 2019), those children that are students in school and school-like instructional settings pre-kindergarten through 3rd grade, corresponding to ages commonly spanning four to eight.

- Extensive Support Needs (ESN): those learners requiring comprehensive and continual supports across the school setting in both academic and adaptive behavior domains, necessitating the use of alternate assessments based on alternate achievement standards (Root et al., 2020; Taub et al., 2017).
- Nature: all the living and non-living constituents of the physical world, including humans, the organic materials influenced by humans, and the instructive ways of knowing latent in the bonds between all living beings and the phenomena of the earth (Kimmerer, 2015; Leopold, 1989; Taylor, 2011).
- Nature-Based Learning (NBL): is learning through the experience of nature strategically added as content or context of instruction for an array of objectives made accessible to all children (Broda, 2007; Chawla, 2018; Jordan et al., 2017; Stevenson et al., 2020).
- Schoolyard: the immediate outdoor surroundings of every school that teachers can use for instruction and students can use for learning (Broda, 2007; Feille, 2019; Mann et al., 2021; Stevenson et al., 2020).

These final key terms were not defined for this study until the completion of data collection; detailed in Chapter 3. However, clearly understanding all terms of the guiding research questions from the start is integral to following this research as it unfolds in the chapters that follow.

- High NBL Use: self-reported participant estimation that a NBL approach is used with instructional experiences for EC-SA students at frequency of – Daily, 2-3 times a week, Once a week, and 2-3 times a month.

- Low NBL Use: self-reported participant estimation that a NBL approach is used with instructional experiences for EC-SA students at frequency of – Once a month, 2-3 times a year, or Never.

Research Questions

To fashion a rich account of current NBL use based on real world data from teachers that have yet to incorporate nature-based learning into their instructional practice with substantial frequency, this study seeks to explore the following central questions:

- RQ 1: What are the stories that EC-SA teachers, with Low NBL use, tell about the benefits to using NBL for students with ESN?
- RQ 2: What are the stories that EC-SA teachers, with Low NBL use, tell about the barriers to using NBL for students with ESN?
- RQ 3: How do early EC-SA teachers demographics, teaching characteristics, and nature experiences/perceptions converge or differ according to their level of NBL use?

Chapter 2: Literature Review

Literature Search: Strategy and Sources

To capture the literature emerging across fields of study, an abbreviated scoping review was conducted in the Fall of 2021. After consultation with a research librarian, both the EBSCO and ProQuest database search applications were used to search targeted databases. EBSCO databases selected for an abstract search were: Educational Resources Information Center (ERIC), GreenFILE, MEDLINE, Psychology and Behavioral Sciences Collection, Social Work Abstracts, and SocINDEX. An abstract search of ProQuest databases included: APA PsycArticles, APA PsycInfo, and ProQuest Dissertations & Theses Global.

Databases and the search terms were each selected to capture the three core concerns of this research: (1) nature-based learning (NBL) experiences, (2) teachers of early childhood – school age (EC-SA) students, and (3) students with extensive support needs (ESN). The following Boolean string was developed from these focal points and was used for a search of abstracts across both database search applications: AB("nature-based learning" OR "playgrounds" OR "playground" OR "green schoolyards" OR "place-based" OR "gardens" OR "garden" OR "gardening" OR "outdoor education" OR "outdoor" OR "schoolyard-enhanced" OR "schoolyard" OR "horticulture" OR "horticultural therapy") AND ("elementary" OR "early childhood" OR "early-childhood" OR "primary school" OR "preschool" OR "kindergarten" OR "teacher") AND ("accessibility" OR "disabilities" OR "inclusion" OR "inclusive" OR "special education" OR "extensive support needs" OR "intellectual disability" OR "autism" OR "developmental disability" OR "developmental disabilities"). To ensure the search was inclusive for students that are less likely to receive full instruction within general education settings, specific disability categories were included alongside broader terms (e.g. “special education” or

“extensive support needs”). No limiters were applied, such as “peer-reviewed” or publication date.

Study Selection

The search of the selected EBSCO databases returned 251 initial results spanning dates of publication from 1913 to 2021. The ProQuest search returned 196 results ranging from 1980 to 2021. These 447 search results were saved and exported as two separate .RIS files. The EBSCO and ProQuest bibliographic data were imported into the Zotero reference management software for review and organization. Zotero was used to identify and remove identical duplicate search returns within and between the results of each search application. There were seven duplicate articles removed from the EBSCO search results and 34 duplicate articles removed from ProQuest leaving 406 unique articles in the pool for title/abstract screening.

Title/abstract screening was conducted using the following inclusion criteria: (a) published in English, (b) from 2011 to 2021 (i.e. decade immediately preceding to this dissertation), (c) with a purpose to examine teacher perceptions and/or experiences related to at a minimum: (1) NBL practices and (2) EC-SA populations. The third core concern of this research, a focus on student populations with ESN within the study, was not required in this phase of selection. This condition was found to be exceedingly rare in the presence of the other two conditions. Of the 406 originally returned articles, 345 were eliminated through this inclusion criteria title screening.

Abstract screening of the remaining 61 articles added evaluation for (d) original empirical research studies. This additional emphasis on new research then excluded conceptual articles, literature reviews, and meta-analyses. Dissertations were not excluded, as dissertations provided a small set of additional original empirical research that offered strong alignment with the core

concerns of this dissertation. After title/abstract screening 11 studies were initially identified for use in the review of literature. One final article was eliminated after the university interlibrary loan office was unable to supply the article and the primary author did not respond to a request for the full-text of the article, leaving a final set of 10 articles for review.

Study Characteristics

Each of the articles identified for review ($k = 10$) possess a core content focus on the study of both children and nature in school and school-like settings. However, less than half ($k = 4$; 40%) of the studies identified have the additional element of special education or disability as a purposive and principal focus of the research (Dallas, 2021; Gallegly, 2020; Martin et al., 2015; van Engelen et al., 2021). One additional study represents a supplementary focus on students who receive special education services through an examination of an inclusive general setting (Guardino et al., 2019). At present, it is appreciably difficult to find original research examining the use of nature-based instruction and play for early childhood students with extensive support needs. It is the intent of this dissertation to help fill in this gap in our understanding.

The selected articles were published within the eligibility criteria window of 2011 to 2021 with the largest segment being published most recently in 2021 ($k = 4$; 40%). Most of the research identified was conducted in the United States ($k = 7$; 70%), with outside countries representing areas with a strong tradition of outdoor experiences and education (e.g., Canada, Netherlands, and Sweden). The school and school-like environments represented by the selected studies include: public schools (Feille, 2017; Gallegly, 2020; Guardino et al., 2019; Harper et al., 2021; Hotchkiss, 2011; Torquati et al., 2013), diverse early childhood settings (e.g., inclusive preschool, at-home day care, traditional daycare, nature preschool) (Dallas, 2021; Martin et al., 2015; Torquati et al., 2013), and specialized outdoor sites for learning and play (Almers et al.,

2018; van Engelen et al., 2021). Interestingly, the two studies that examine fully outdoor sites are the only two that represent research from northern Europe, a region which has a robust legacy of nature-based education for children which include the traditions of *friluftsliv* (outdoor life) and *udeskole* (outdoor school) (Ardoin & Bowers, 2020; Becker et al., 2017; Mann et al., 2021; van Dijk-Wesselius et al., 2020).

Study sample sizes ranged from two to 357. Most studies ($k = 8$; 80%) focused predominantly upon teachers as the primary participants: special education teachers, general education teachers, preservice teachers, forest garden educators. For the studies ($k = 2$; 20%) that used more heterogeneous groups of participants, samples included teachers, but also included parents, students, administrators, and/or other educational professionals (e.g., related service providers). The students associated with the study participants and sites of study ranged in age from infant to high school. Every study included in this review comprised a connection to students that fall within the 4 to 8-year-old EC-SA range used for the purposes of this dissertation. Of the five studies selected that report analysis of teachers that work with students with disabilities, four (Dallas, 2021; Guardino et al., 2019; Martin et al., 2015; van Engelen et al., 2021) provide some descriptive depiction of these student populations which include: intellectual and developmental disabilities, autism spectrum disorder, orthopedic impairment, speech or language impairment, visual impairment, multiple disabilities, or receive support services through speech, physical therapy, and/or occupational therapy.

One additional characteristic of the identified research informs the relevance of this dissertation's focus. This cluster of studies were primarily published in journals within the field of education ($k = 5$; 50%) followed by health and medicine ($k = 2$; 20%) along with a set of dissertations ($k = 3$; 30%). The studies that included teachers of students with disabilities were

found in each of these categories of publication. However, no study included in this review was the product of research in the field of special education or directed toward an audience of special education researchers or practitioners. Studies that included special education teacher participants were published in journals for early intervention, outdoor environmental education, and pediatrics or were dissertations submitted in partial fulfillment of the requirements for doctoral degrees in education or infant and early child development. This collection of research has no clear lens that originates from a special education perspective and has no clear landing space that could inform special educators.

Methodological Approaches of Identified Studies

A limited set of identified studies utilized exclusively quantitative methods ($k = 2$; 20%). One experimental study used a single-case design (i.e., multiple-baseline design across teachers) to evaluate a professional development package on embedding instructional interactions outdoors (Martin et al., 2015). The second, employed a descriptive survey predicated on the Teachers' Sense of Efficacy Scale (TSES) developed by Tschannen-Moran and Hoy (2001) to delineate and detail teachers' sense of efficacy in outdoor learning (Gallegly, 2020). The leading methodology utilized by researchers has been a qualitative approach, representing half ($k = 5$; 50%) of the studies identified for review. Qualitative approaches used case studies with interviews and focus groups (Harper et al., 2021; van Engelen et al., 2021), semi-structured interviews (Dallas, 2021; Feille, 2017), and exploratory interviews with participatory observations (Almers et al., 2018). This emphasis on the use of qualitative methodology was extended through the use of a mixed methods approach in three additional studies. All three used a survey as the main quantitative contribution, with two studies using semi-structured interviews analogous to those found in the pure qualitative work (Guardino et al., 2019; Hotchkiss, 2011), along with a single study that

used the minimally mixed open ended questions as a component of the survey instrument (Torquati et al., 2013). This lean toward qualitative methodology, as employed by the research reviewed, supports the use of a qualitative approach in this dissertation as an established and advantageous methodology for addressing the study of EC-SA teacher experiences and perceptions of NBL approaches for students with ESN.

Synthesis of Findings

It is a proposition of this dissertation that NBL can be conceptualized as learning through the experience of nature made accessible to all children. This definition is not all encompassing but is quite expansive and consequently is inclusive to a variety of methods and purposes represented by this set of literature identified for review. Whether it is specifically playgrounds (Harper et al., 2021; Martin et al., 2015; van Engelen et al., 2021), an outdoor classroom (Guardino et al., 2019), environmental education instruction (Hotchkiss, 2011; Torquati et al., 2013), an educational forest garden (Almers et al., 2018) or places and practices in-between (Dallas, 2021; Feille, 2017; Gallegly, 2020), each of these studies described here features a focus on NBL practices. While the definition of NBL adopted for this study emphasizes that learning with nature can take place indoors, this set of research centers exclusively on learning outdoors. This prevalence of outdoor oriented research was a product of a literature search strategy constructed to capitalize on the emergent body of knowledge across several fields of study that have committed a focus toward outdoor settings.

This qualitative leaning set of literature captures important stories that add to the understanding of teacher perceptions and experiences but individually are not meant to be generalized broadly across early childhood educators. This dissertation seeks to precisely convey the findings of this qualitative work by not overstating the implications of the findings and using

language commensurate with the conclusions reached by the original authors. Yet, it is the aim of this synthesis to identify and organize patterns of similar responses across findings to formulate coherent themes of operational understanding.

Findings across this curated cluster of outdoor-related research begin to point to two broad channels of understanding about NBL in relation to EC-SA teachers and their students with and without ESN: (1) Benefits – why NBL is used and (2) Barriers – why NBL is not used. Teacher understanding of the benefits of NBL practices first coalesce around how experiences in and with nature can improve aspects of health, mental health, socialization, and behavior as well as the fact that these benefits are not exclusive to the students they teach (Almers et al., 2018; Dallas, 2021; Guardino et al., 2019; Hotchkiss, 2011). Some benefits are then understood to be realistically achievable through the kinds of novel, complex, and wonder-inducing experiences that can only take place in outdoor environments (Almers et al., 2018; Dallas, 2021; Harper et al., 2021; Torquati et al., 2013). Out of these beneficial NBL experiences, teachers report valuable improvements to student knowledge and skills (Feille, 2017; Guardino et al., 2019; Martin et al., 2015; van Engelen et al., 2021).

The barriers that teachers portray in the literature exhibit the substantial complications and difficulties that surround early childhood teacher use of NBL for students with and without ESN. Barriers interpreted across the selected literature also demonstrate some reasonable suggestion of interconnectedness between barriers. A prominent initial barrier is simply that teachers do not think about taking their students outside to learn (Dallas, 2021; Gallegly, 2020; Hotchkiss, 2011). Teachers have compartmentalized learning in and with nature as distinct and isolated from their current responsibilities and practices, even though they are aware of the available benefits of NBL (Gallegly, 2020; Hotchkiss, 2011; Torquati et al., 2013). In high-stakes

accountability environments teachers are required to make risk/reward calculations for the limited time they have to meet the performance expectations often heaped upon them (Feille, 2017; Gallegly, 2020; Torquati et al., 2013). Preparation, resources, and support to implement NBL for EC-SA students is out there, but is at best meager and/or scattered (Dallas, 2021; Harper et al., 2021; Hotchkiss, 2011). Not feeling prepared and supported leaves considerable percentages of teachers not feeling confident enough to break out of their existing training, habits, and consequently their classrooms to engage in outdoor learning environments within school settings (Gallegly, 2020; Hotchkiss, 2011; Torquati et al., 2013). This lack of teacher confidence is matched by the apprehensions of some teachers over the accessibility and safety of their outdoor spaces, especially when teaching outside their traditional spaces (Dallas, 2021; Gallegly, 2020; van Engelen et al., 2021). While the physical safety of students is a conspicuous barrier that has drawn the bulk of attention, the social context of a space is an important consideration for students with ESN (van Engelen et al., 2021). Physical and social-emotional safety concerns, social stigma, accessibility of equipment, and legal liability are all facets of the complex issues connected to use of outdoor spaces for EC-SA students with ESN (Harper et al., 2021; van Engelen et al., 2021). Analogous research that fell outside of the search results for this literature review also found many of the same key barriers: time, confidence, preparation, outdoor space appropriateness/access, and safety (Ernst, 2014; Simmons, 1998).

Benefits: Nature and Wellbeing

One of the most broadly consistent findings in this research is that NBL experiences are understood to have a benefit on the wellbeing of students (Almers et al., 2018; Dallas, 2021; Guardino et al., 2019; Hotchkiss, 2011). EC-SA teachers believe that time outdoors for young children has a far-reaching positive impact on wellbeing with benefits for children's physical

health, social development, emotional welfare, and learning (Dallas, 2021; Hotchkiss, 2011). Those dedicated to this belief, the forest garden educators interviewed by Almers et al. (2018), indicated that the experience of using their bodies for physical work and being immersed in a sense of connectedness to other living things, promoted a greater feeling of happiness and comfort for those in the forest garden. Such experiences alter how children view a shared world, along with amplifying their agency and creativity in navigating that world. Children understand that they belong to something bigger than themselves and are an important part of it. Children in the forest garden were freed from the traditional forms of pressure to perform and this cluster of factors and experiences helped those active in the garden just “feel good” (Almers et al., 2018, p. 249).

Teachers in more conventional settings who were users of outdoor areas were encouraged by the enjoyment and motivation for learning they observed from their students when learning outside (Dallas, 2021; Gallegly, 2020; Guardino et al., 2019). The outdoors became a critical tool to generate calm and was seen as a healthy outlet for those children that craved opportunities for movement (Dallas, 2021). Educators have been motivated to create new outdoor learning spaces for their students because of their perceived capacity to alleviate stress and anxiety (Harper et al., 2021). Young children themselves report that class outside is more fun because of the things they experience there (e.g., plants, fresh air) (Guardino et al., 2019).

While this selected research focused on examining the benefit/barrier understanding of Low NBL use teachers to gain insight toward the enhanced use of NBL for EC-SA students with ESN (and without), this literature review also revealed that a byproduct of providing NBL experiences for students was a benefit that emerged for some of teachers themselves. Teachers indicated that they get something meaningful out of the time they spend outside with their

students. Even when the effort to use the outdoors did not demonstrate substantially improved learning outcomes, teachers enjoyed the experience of teaching outside compared to their normal classrooms spaces (Dallas, 2021; Guardino et al., 2019) and enjoyed teaching about the nature found there (Hotchkiss, 2011). Teaching outdoors seems to allow teachers to access their personal satisfaction from being in nature (Dallas, 2021; Feille, 2017). This time in nature becomes a chance for teachers to impart their affection for being outside, as context for shared experiences bonding teacher and student, and as an opportunity for both children and adults to broaden their view of the world to which we all belong (Almers et al., 2018).

Benefits: Only by Nature

Teachers believe that learning in and with nature deserves to be a part of the education for EC-SA students (Almers et al., 2018; Hotchkiss, 2011). Teachers and administrators hope to use NBL experiences to off-set our modern ways of life. Educators see the deleterious impacts on our attention exacted by our increasingly entwined relationship with technology. They feel the grueling stresses of frantic daily schedules and are motivated to use the creation of outdoor learning spaces to reconnect students to some of the things that have been left behind (Harper et al., 2021). The use of NBL practices provides teachers with experiences distinctly different from other environments and methods with abundant potential for pedagogic use (Almers et al., 2018). Unlike classroom lessons, experiences in nature can make real the abstract and can help students see things in new ways (Almers et al., 2018). Something as conceptually scientific as the interaction between the earth's atmosphere and hydrosphere can be made relatable and relevant to the mind of a young child by simply stepping outside with the intentionality to observe the evaporation of puddles after a rainstorm. Growing peas in a school garden offers an innate lesson in how nature and our actions are important to the production of our food. But just the same,

those pea pods cultivated by the students could themselves become the ingredients of a math lesson teaching addition using homegrown manipulatives. From Robert Frost and Ralph Waldo Emerson to Maya Angelou and Tupac Shakur, nature is both one of our oldest inspirations for writing and most pervasive metaphors for expression. Time immersed in nature can be the kindling of creativity for emerging writers eager to express themselves.

Only by nature can teachers so instantly provide authentic, sensory-rich experiences that summon the inherent curiosity and motivation to learn of their students. Being outside provides greater opportunities for immersive, engaging, hands-on experiential learning, activating the kind of exploration, discovery, and real-world connections that can benefit multiple dimensions of child development (Dallas, 2021). Through a set of phenomenological interviews, Dallas (2021) found that the contributing early childhood teachers believed that more meaningful learning was possible when they provided learning experiences outdoors. It was a unanimous sentiment of the participants ($n = 8$) that all children should be spending more time learning outdoors. All participants interviewed were again found to be like-minded in Hotchkiss (2011) where teachers believed time outdoors to be critical to children's emotional and physical health.

Teachers demonstrate an understanding of the distinctive differences that NBL experiences can provide. Outdoor play, observing the cycles of nature, engaging with plants and animals, gardening, food and nutrition are all vital and what teachers point to as a natural fit for learning about in nature (Almers et al., 2018; Torquati et al., 2013). However, topics that are conventionally taught inside, e.g., math, language, the arts, can also be taught outside where learning can connect to students in new and very tangible ways (Harper et al., 2021; Hotchkiss, 2011). Ultimately, utilizing the outdoors simply gives teachers more options (Dallas, 2021).

Teachers experienced in the use of NBL practices use nature to engage their students struggling in the conventional classroom setting. The outdoors serves as the bait for student attention. Opportunities to learn outside are the hook for capturing the attention and effort of their elementary students (Feille, 2017). As captured by a forest garden educator, more is possible through NBL experiences: “When children are allowed to do different things, they also dare to do more things. Then they can discern more possibilities to impact, which empowers them” (Almers et al., 2018, p. 250).

Benefits: Improved Outcomes

It is not just the conviction that NBL can benefit the general wellbeing and learning experiences of their students, some teachers also observe how interacting with nature aids in improving student knowledge and functional skills. NBL appears to present a positive impact on behavior and self-regulation. Teachers also described NBL encouraging creativity, fostering cooperation, bolstering student capacity for frustration, and improving attention (Almers et al., 2018; Dallas, 2021; Guardino et al., 2019). In a mixed methods study that examined early childhood educators’ perceptions about nature, science, and environmental education Torquati et al. (2013) found that early childhood professionals identified outdoor experiences as useful for cultivating curiosity, honing observational skills, and encouraging students to ask questions.

In another mixed methods study of kindergarten teacher use of outdoor classrooms, observations by Guardino et al. (2019) demonstrated that students that experienced disabilities were more engaged when the lesson took place outside, with off-task behaviors occurring less frequently. Dallas (2021) found that teachers perceived that performance improvements extended beyond just the time spent outside. Teachers reported that time outside earlier in the day facilitated better attention in class later in the day. These findings align with prior research using

more quantitative approaches to explore cognitive function and attention (Dadvand et al., 2015; Faber Taylor & Kuo, 2009; van den Berg & van den Berg, 2011).

Particularly for young children and children with ESN, NBL experiences can enhance skills essential to both learning and social inclusion. Teachers use outdoor activities as a forum to address social skills and peer relations (Dallas, 2021). The outdoors also offers a context for the development of independent play skills. In an evaluation of a teacher training to introduce more instructional interactions during outdoor time, results suggested that special education teachers may not need to maintain the treatment frequency of interactions over time because target students with ESN demonstrated improvements in their independent play skills (Martin et al., 2015). Teachers observed an increase in the independent engagement of play, so the need to intervene decreased. Giving students such opportunities to learn by doing, getting their hands dirty, motivated students to learn. And from the work that dirtied their hands, the digging, climbing, collecting, and jumping, teachers observed improvements to gross and fine motor skills (Dallas, 2021; Feille, 2017).

In the work of van Engelen et al. (2021) interviews and focus groups identified the inclusion of students with physical disabilities in outdoor play spaces as an important goal. Promoting the use of the outdoors for young children with physical disabilities was seen by some participants as a self-reinforcing, virtuous circle of normalization. When young children with physical disabilities are encouraged to play outside and able to access those outdoor spaces, then children without physical disabilities begin to see the child rather than the disability. Consequently, adults see children of all abilities playing together and these experiences inform their attitudes, beliefs, and intentions. Adults with a positive perception of inclusive outdoor play can then drive another cycle of this positive feedback loop by continuing to create more

accessible spaces that continue to encourage young children with physical disabilities to play outside with their peers. Slowly but surely inclusion builds to belonging.

After interviewing early childhood educators with experience teaching preschoolers with disabilities in outdoor settings, Dallas (2021) found that participants affirmed the value of NBL for EC-SA students with disabilities. Teachers believed that special education services did not have to be confined to classrooms and that the use of outdoor environments played a substantial role in the success of their students with disabilities (Dallas, 2021). The incorporation of students with and without disabilities while challenging made for enriching NBL experiences for all and made for stronger overall early childhood programs.

Barriers: Nature Not Considered

As gatekeepers to the activities of their students, it is the choices of teachers that determine not just the content of instruction but the context of learning as well. Teachers may get assigned their classrooms, but they have some pliable power over the environment where their instruction takes place and consequently where student learning happens. Educators actively make choices about how to arrange and decorate their classroom space to help facilitate student learning. The potential benefits of NBL cannot be achieved for any students if nature and students are never connected by teachers. Outside of sites specifically dedicated to outdoor learning, this selected research suggests that most teachers not only do not take advantage of outdoor environments, but NBL experiences are rarely considered an option (Dallas, 2021; Gallegly, 2020; Hotchkiss, 2011).

Hotchkiss (2011) conducted a mixed methods study of just over 200 randomly selected U.S. K-5 general education teachers' attitudes and self-efficacy toward environmental education. Results from the 37 item Likert-type questionnaire portion showed high percentages of

agreement on items indicating that teachers think environmental education concepts are critical at the elementary level and can be easily integrated into the elementary curriculum (nearly 80% to 90% participant agreement for associated questions). However, follow up interviews revealed informative contextual details surrounding those broader supportive beliefs. Most of the participants responded hesitantly to questions related to their specific practice and indicated that they rarely took students outside for instruction. Half ($n = 8$) of the teachers interviewed stated that, other than specific isolated activities such as Earth Day, they do not think about taking students outside for instructional activities (Hotchkiss, 2011). This lack of consideration of NBL extends beyond general education. For many children with disabilities, even when districts have nature-based programs in operation, educational experiences that rely upon outdoor play and learning are not typically contemplated (Dallas, 2021).

Young children with disabilities do not play outside often, even less than nondisabled peers (Sterman et al., 2016), so school becomes an important place, and the educational professionals there become key facilitators to provide NBL experiences (van Engelen et al., 2021). In an effort to examine the current gaps in research regarding outdoor education opportunities throughout K-12 public schools, Gallegly (2020) used The Teachers' Sense of Efficacy Scale to evaluate 69 teachers' (51.5% with special education certification) sense of efficacy when engaging in outdoor learning experiences. Here again, it is difficult to see if nature is authentically considered. Of the 69 respondents, 23.2% of the teachers reported that they taught no lessons outside over the course of a school year. An additional 53.5% reported their instruction took place outside for any amount of time five days or fewer per school year (Gallegly, 2020). In a conventional 180-day school year, these results would translate to almost a

quarter of teachers providing no outdoor instructional experiences and another half of all participating teachers providing at most 3% or less of their instructional time outside.

Gallegly's (2020) findings indicate again that most teachers do not utilize, much less consider, outdoor learning despite the strong majority of teachers (91%) indicating existing access to some form of outdoor learning environment at their school. This apparent discrepancy between the positive perceptions of NBL approaches and putting such approaches into practice is given some context through the work of Torquati et al. (2013).

Through analysis of their mixed methods data collection, Torquati and colleagues (2013) found that both practicing and pre-service teachers valued NBL, but not more than any other experience or outcome that was a response option. Language/literacy, developmentally appropriate practices, art, and math were on average all rated higher in importance of experience across curricular domains. Social/emotional, language/literacy, art, and math were again all rated as domains of greater importance for learning outcomes. These findings are in many ways not surprising considering the significant weight of attention and substantial time dedicated to both social/emotional growth and language/literacy development in EC-SA education (Torquati et al., 2013). The priority status that these domains hold is justified. However, the subordinate position of using nature in instruction has plausible links to constraints placed on teachers from the perceived barriers of time and expectations of performance.

Barriers: Constrains of Time and Expectations

Taken together, the findings of Hotchkiss (2011), Gallegly (2020), and Torquati et al. (2013) point to a notable teacher appreciation of the outdoors, but only token use of nature in practice. NBL is almost exclusively used for rare occasions and topics conducive to the outdoors and are by no means integral to core instructional efforts. This siloing of content and

environment appears to keep NBL experiences well detached from the higher priority of education's archetypal *three Rs*: Reading, Writing and Arithmetic. Teachers default to conventional methods and milieus for good reasons. A network of constraints that show signs of being built into our educational systems disincentivize deviation from orthodox instructional practices. Time emerged from the literature as a substantial barrier within this constraint network (Feille, 2017; Gallegly, 2020; Hotchkiss, 2011).

In his *Metamorphoses*, Roman poet Ovid wrote *tempus edax rerum*; time the devourer of everything. While in this work Ovid was likely more concerned by the lessons of transformation that can be derived from mythology, it is this same kind of tyranny of time that can today swallow the ambitions of teachers to use nature in their lessons. In Hotchkiss's (2011) qualitative follow up of an initial questionnaire on teachers' views on environmental education, the most prominent reason teachers expressed for why they did not take their students outside was time (75%). The time they perceived that it takes to prepare a lesson, the time it takes to implement a lesson, even purely the time it takes to transition to and from an outdoor setting was costly enough to deter teachers. Most of the teachers interviewed, 13 of 16 (81%) stated that they did not believe that they had the time to appropriately teach environmental education topics. This is the same content and practice that teachers conveyed positive attitudes toward and believed could be effectively integrated into core subjects (Hotchkiss, 2011).

Similarly, Gallegly's (2020) analysis suggested that utilizing outdoor environments for instruction does come with a perceived loss of time. Time away from the classroom is seen as a barrier in schools such that teachers do not assess NBL practices as worthy of the time necessary to implement them (e.g., Is taking my students outside for our next lesson better than what I am currently doing?). Time was also a repeatedly identified as a barrier from parents and educators

in the van Engelen et al. (2021) examination of inclusive play for children with a physical disability. Parents believed that there was not time for authentic outdoor play because they felt compelled to constantly safeguard their child's experience and prioritize the practice of social and motor skills over allowing children to try and experience their outdoor play environments for themselves. Education professionals were impacted by the time it takes to provide therapy and instruction onsite outdoors.

The flipside to this perceived lack of time are the expectations and pressures associated with what teachers feel like they need to be doing with their time. Prescriptive academic standards, rigid curriculum maps to cover, pacing guides to keep up with, building to federal and/or state accountability measures can all serve to discourage teachers from taking students outside (Feille, 2017; Gallegly, 2020). One of the themes that emerged from Feille's (2017) study of teacher professional life histories and how they learned to teach successfully outdoors, was this domino effect of standardized testing on learning outside. Teachers described the considerable pressure they feel from the myriad of demands brought on by testing, limiting the opportunities for teachers to think outside the box and get their students outside the boxes of their classrooms. This vicious cycle of standardized performance expectations and stress "ties teachers' hands and they end up doing cookie-cutter lessons; it takes away the ability to be creative and plan for their students" (Feille, 2017, p. 612). This barrier is reinforced by another interlocked layer of barriers: a lack of preparation, resources, and support.

Barriers: Preparation, Resources, and Support

This selected research communicates an inconsistency in the training teachers feel like they need to implement NBL for their EC-SA students. Most of the teachers who participated in the Hotchkiss (2011) mixed methods study had not received any kind of preparation for NBL

instruction. Two items within The Views of Environmental Education Questionnaire used in the study were related to training and staff development: (1) I have received quality training in environmental education; (2) I have attended staff/professional development related to environmental education. For each item, less than 20% of participants responded that they had received environmental education training or attended a related professional development (Hotchkiss, 2011). Moreover, during the qualitative interview phase, 93.8% of the participants stated that they had received little to no professional development at any point in their career related to environmental education (Hotchkiss, 2011). In the other direction, the forest garden educators studied by Almers et al. (2018) had noteworthy NBL related work backgrounds and training experiences (e.g., gardening), but had little formal training as teachers.

Conversely, all the early childhood teacher participants in Dallas (2021) reported professional development and training experiences in NBL practices, e.g., national conferences and/or professional certifications. This was however a purposeful sample, selecting for knowledge and experience with NBL instruction (i.e., work in a preschool program within the United States that spends at least 25-100% of the day outdoors). Feille's (2017) participants were also purposefully selected for their competence and practice in NBL environments, though interestingly these teachers had not originally received NBL style training in their pre-service preparation. Early in their careers many of these teachers concluded that teaching outdoors demanded a specialized skillset which required specialized training. These teachers found aid in achieving NBL proficiency through influential professional development experiences (Feille, 2017). This pattern of training and practice indicates that training is out there and some of those teachers who get professional development in NBL practices are the ones who put that training to use for their students.

In addition to knowledge and skills being a barrier, resources were a recurrent subject for teachers questioned about their use and implementation of NBL. Whether by survey or by interview, teachers appear to have common understanding of resources as the knowledge and tools that enable their instructional planning and activity. Teachers described resources coming in many different forms (e.g., print, digital) and from many different places (i.e., school, district, parents, peers, internet, local outdoor sites) (Dallas, 2021; Gallegly, 2020; Hotchkiss, 2011). When looking to develop outdoor spaces more favorable for NBL, money became a common resource concern (Harper et al., 2021). Other major resource related themes that emerged from Harper et al.'s (2021) case study exploring the naturalizing process for school playgrounds were that successful development of these spaces were facilitated by educator buy-in, perseverance, and multiple levels of support (e.g., district, community, staff, experts, students). Without the persistence of one or more of these levels of support, the educators involved in playground naturalization efforts believed that it would have been nearly impossible to implement these kinds of nature-centered renovations (Harper et al., 2021).

When the space is less the concern and NBL teaching becomes the focus, teachers looked toward curriculum. Curriculum is a common way of pre-packaging the resources needed (e.g., information, instructions, documents) to execute a lesson. Questionnaire data gathered by Hotchkiss (2011) suggests teachers believe that environmental education is not well integrated into the existing curricula with 19.4% responding that they do not have resources in their school district, and an additional 47.3% are uncertain about available resources. Interview data reiterated this perceived lack of curriculum resources with 69% of the interviewees agreeing that environmental education "it's not in the curriculum" (Hotchkiss, 2011, p. 67). This supports the assertion by the author that current resources are a fragmented collection of activities that do not

adequately prepare teachers to use implement environmental education (Hotchkiss, 2011). Survey data collected by Gallegly (2020) also found a handful of teachers ($n = 5$) noting that a "lack of curriculum and academic rigor" (behind only student behavior and weather) was a barrier they had repeatedly encountered when attempting outdoor learning. When asked to identify the factors that they repeatedly experienced which facilitated outdoor learning most teachers ($n = 26$) identified the need for the manpower of additional staff and the aid of additional financial resources.

Addition of such human and financial capital can facilitate NBL, but when it comes to support in schools it is not a surprise to see teachers' attention directed toward principals and other administrators as important drivers (Feille, 2017; Gallegly, 2020; Hotchkiss, 2011). Teachers voiced their concerns that a lack of support and an unsupportive school culture can be a barrier to NBL, whereas having administrative support was noted as a facilitator (Feille, 2017; Gallegly, 2020). The role of administrators was a key theme identified by Feille (2017). Participants told stories from their careers about how it was support from administrators that pushed and encouraged them to pursue new opportunities, e.g., it was the school administration that connected a teacher to an outside organization that had the resources to install a garden on their campus. By contrast, administrators that were seen to be negatively influenced by the constraints of standardized testing were believed to negatively affect the professional development of the participants. Without preparation, resources, and support it is not surprising that a lack of confidence is another barrier that impedes the use of NBL practices.

Barriers: Confidence

Confidence in using NBL practices for instruction was a barrier repeated among this set of literature. In a survey that represented the largest sample ($n = 357$) of the literature selected

here, Torquati et al. (2013) identified that early childhood educators rated nature and science the lowest among other content areas in both importance of learning experiences and importance of learning outcomes. Not surprisingly, when asked about their confidence in teaching in these same areas, teachers also felt the least confident to teach in the domain of nature and science and reported low confidence teaching in natural environments (Torquati et al., 2013). Gallegly (2020) found that 77% of the teachers rated their level of expertise in outdoor education as average to low, with no significant difference in grade levels taught or special education certification for these self-efficacy beliefs.

Hotchkiss (2011) identified a contrast in perceptions finding that 93.6% of surveyed teachers reported enjoying teaching students about nature and environmental issues but only 47.8% believed they had adequate knowledge to attempt it. Finding this gap in NBL aspirations and teachers' perceived ability to implement NBL suggests that these elementary teachers are not confident in their ability to teach environmental education (Hotchkiss, 2011). To be effective, nature educators teachers cannot be afraid of nature (Torquati et al., 2013). Increasing teacher confidence calls for a new conceptualization of where learning can happen (Feille, 2017). However, opening up learning to new places is made difficult when the space itself is seen as a barrier.

Barriers: Outdoor Spaces and Safety

Parallel to the barrier of confidence are the worries of some teachers over the accessibility and safety of the available outdoor spaces. Van Engelen et al. (2021) most specifically explored space/safety barriers. In a qualitative study using semi-structured interviews with parents of children with physical disabilities (2–12 years old) and focus groups of education professionals working with these children, playgrounds were described as

inaccessible by both groups. Parents were concerned that the playground spaces were not safe for their children. Both parents and professionals stated that indoor and solitary play for the child felt safer (e.g., playing with technology). This pattern of concerns is congruent with other research focused on playgrounds that also found safety concerns along with recurrent beliefs that playgrounds were largely inaccessible spaces for children with disabilities excluding them from participation in the learning and play (Stanton-Chapman & Schmidt, 2016, 2019; Yantzi et al., 2010).

In contrast, Hotchkiss's (2011) survey results indicated that teachers in the study did not consider safety a major reason for not learning outside. Follow-up interviews reflected these results with only one of the 16 teachers mentioning safety as a reason for not taking students outside for instruction, with time and student behavior as the leading responses. These findings do however come from a participant population of only early childhood general education teachers and point to potential aspects of these barriers that may have some dimensions that are more acute for students with disabilities. For instance, studies by both Dallas (2021) and Gallegly (2020) included teachers of students with disabilities and reported selected results indicating that safety features were an appreciable concern.

Literature about children with disabilities playing outside has been predominantly focused on the physical barriers (van Engelen et al., 2021). A noteworthy emphasis added by van Engelen et al. (2021) was exploring a wider definition of safety. Safety extends beyond students physically getting hurt. Parents of students with disabilities and their teachers are also concerned about emotional safety. Results of the study recognized that beyond the evident physical barriers it is the social-emotional barriers that seem to be the most important factors holding back children with disabilities from playground participation with typically developing peers: e.g.,

child fear and insecurity in the play space, embarrassment from the feeling of being stared at by others, shame from children with disabilities comparing themselves to the abilities of typically developing peers, overprotective parenting on the playground, a lack of friends, and bullying. Van Engelen et al. (2021) concluded that enabling participation in active, inclusive, outdoor play for children with disabilities required changes at all layers of (Dutch) society demanding the amelioration of both physical barriers through the improvement of playground accessibility as well as developing interventions specifically focused on the high social-emotional barriers experienced by children and their parents.

Concerns over the barriers presented by existing outdoor spaces motivated educators in the case study conducted by Harper et al. (2021). School stakeholders initiated the studied naturalization projects based on both their perceived need for safe, inclusive playground spaces, and their understanding of the positive benefits that these spaces can provide. Participants saw their existing school environments as lacking the space for children of different abilities to securely learn and play while also missing a space designed for them to feel emotionally safe (Harper et al., 2021). As this study examined the process of reshaping outdoor spaces for NBL, a distinctive barrier related to space and safety surfaced. Legal liability concerns tied to the potential for injury impacted design and the kinds of outside support required to complete the projects (Harper et al., 2021). With concerns for the all-around health and safety of students, along with the legal requirements established to help protect students, safe participation in outdoor spaces for children with ESN is complex and is impacted by multiple social and environmental factors (Dallas, 2021; Gallegly, 2020; Harper et al., 2021; van Engelen et al., 2021).

The Current Study

This abbreviated scoping review of literature was conducted to synthesize the current state of knowledge for the junction of nature-based learning experiences, early childhood – school age students, and students with extensive support needs. This research has principally resulted in the identification and description of *benefits* and *barriers* to incorporating nature into learning for students that do and do not experience disabilities (Almers et al., 2018; Dallas, 2021; Gallegly, 2020; Martin et al., 2015), although students with ESN were not well represented in existing NBL literature. What the research shows is that teachers report a recognition of available social, emotional, cognitive, and physical health benefits from engaging students with NBL experiences, that these experiences are best achieved through genuine exposure to nature, and that such benefits can extend to observable improvements in educational performance (Almers et al., 2018; Dallas, 2021; Feille, 2017; Guardino et al., 2019).

While teachers depict this value of NBL experiences, the benefits that NBL provides must constantly compete with the appropriateness and accessibility of outdoor spaces, physical and emotional safety concerns, limited instructional time, and the high-stakes standards of performance that are often held like the apocryphal sword of Damocles over the heads of teachers (Gallegly, 2020; Harper et al., 2021; Torquati et al., 2013; van Engelen et al., 2021). Teachers characterize learning that is nature-based in an isolated and subordinate role in relation to their current responsibilities and practices such that teachers generally do not think about using schoolyards for learning experiences (Dallas, 2021; Gallegly, 2020; Hotchkiss, 2011; Torquati et al., 2013). Lack of preparation, resources, support, and confidence to implement NBL for EC-SA students impede teachers from breaking loose of calcified instructional habits,

pedestrian approaches, and constrained learning environments (Dallas, 2021; Hotchkiss, 2011; Torquati et al., 2013).

The repeated recognition of these overarching themes of Benefits and Barriers across studies points toward a need to better understand the obstructing fissures between knowledge of NBL benefits and use of NBL in practice. Appreciable links within and between benefits and barriers exist, but the complex relationships of these elements as described by teachers are not well understood. It is important to assess the current state of NBL use in schools for students with ESN. Because any advancement made in the use of NBL that excludes understanding and consideration of students with ESN is a flawed progress.

The current study functions much like new fallen snow coating a vast and intricate landscape in a beautiful blanket of ivory uniformity, temporarily occluding the unending complexity of the world underneath. A magnificent consequence of this powdery veil is that all that travels across it leaves its path evident. Actions previously unknown or unobserved are made plain in the patterns left behind. It is the aim of this research to use a deep and supple blanket of a generic qualitative research to seek out those tracks and trails left behind to understand this complex phenomenon. This study represents an early exploratory effort to describe and understand the real-world implications of this the nexus of teacher use of nature-based learning for early childhood-school age students with extensive support needs. Deepening our insight with an orientation towards problem-solving allows us to seek out those otherwise unseen tracks and trails, to understand the subtle intricacies of who is going where, what ground remains untouched, and importantly why some were stopped while some others were able to successfully intersect the parallel world of nature.

Chapter 3: Methodology

Theoretical Framework

Our assumptions about the nature of reality and how we formulate an understanding of reality shapes how we expand that understanding (Schutz et al., 2004). What we choose to research and how we choose to research it flows from these views of the reality. When it comes to how I view reality, I have a hard time believing things I can't see, but I also can't believe that we can see everything that there is. My view of reality appears to share many of the characteristics of pragmatism as described by Biesta (2010) and the philosophical assumptions presented by Schutz et al. (2004); e.g. subjective constructions (and reconstruction), reality of individuals thoughts, and the coordination and combination of those subjective constructions.

I believe that there is an external reality to all minds. This reality, and the infinite cosmos that comprises it, exists even in the absence of human consciousness. This unbounded external expanse is an objective reality of limitless complexity. The design of our existence within this ambient reality is driven by the intrinsic instinct of cosmic energies. Energies that employ the dynamics of an evolution driven by the storage of knowledge in tandem with an intelligence driven by prediction. The reality beyond our brains is infinitely layered and intricate, a preponderance of which is beyond our capacity to comprehend and even beyond human perception. And then what is perceivable and comprehensible is subjectively interpreted and internalized to create each individual's internal reality. These are the stories we tell ourselves about ourselves and our world.

Our internal realities are erected from the unique constellation of subjective truths that work, stories which we generate and accumulate over the course of our lives. Our internal realities and the external reality are not the same. Our internal realities and their component

truths can never be absolutely proven to be “The” external reality (Biesta, 2010; Schutz et al., 2004). Our truths that work are our best approximations of the external reality. These approximations are generally maintained until they no longer work or are improved upon.

As consciousness imbued with curiosity, we seek out these truths. We form our reality approximations in multiple ways. One path is that we construct what Biesta (2010) called an “intersubjective” world; an interactive network of truths. We form our own truths through our experiences (social, societal, educational) and filter those experiences through innate predispositions. My personal experience as a teacher and parent has afforded me the privilege of very deliberate observation of how our stories are always a work in progress and experience with how different people develop their truths in very different ways. It is then through the telling of our stories, the sharing and interaction of our internal realities in a marketplace of knowledge (that primarily operates upon a currency of perceived efficacy), that we can inform and alter each other’s truths where something becomes more “true” as individual truths begin to align. It is these individual constructions as well as their degree of alignment that I seek to understand through my use of a second path to truth.

This path is the application of science as a strategic tool to generate new truth stories, piece truths together, and actively align truths between individuals. Where lacking truths, we employ science to simplify and summarize a complex world by articulating the phenomena that we observe within it (Duschl et al., 2007; Taber, 2014). By using the structured inquiry of science to explore the subjective experiences and interpretations of teachers of students with extensive support needs I believe that we can deepen and expand the intersubjective world of understanding surrounding nature-based learning.

This view of reality and knowing is the substrate of my approach to research, I recognize that I do hold aspirations beyond generating knowledge. I want to use knowledge that I glean from the world to help find possible solutions for the problems that students, like Norman, are likely to experience. Consequently, it is my view that a pragmatic perspective is the best fit for my research to solve the problems I perceive in the world (Biesta, 2010; Creswell & Plano Clark, 2018; Shannon-Baker, 2016). I believe pragmatism is the interpretive lens of a teacher. It offers a flexible set of real-world practice oriented, problem centered tools (Biesta, 2010; Creswell & Plano Clark, 2018). Pragmatism allows for the negotiation of philosophical orientations allowing for the multi-wielding of paradigms as tools that cultivate “complementary strengths” and “nonoverlapping weaknesses” (Johnson et al., 2007; Onwuegbuzie & Johnson, 2006; Shannon-Baker, 2016). As an interpretive framework “it presents a very practical and applied research philosophy: Study what interests and is of value to you, study it in the different ways that you deem appropriate, and use the results in ways that can bring about positive consequences within your value system” (Tashakkori & Teddlie, 1998, p. 23). This pragmatic generic qualitative approach (Kahlke, 2014) utilizing a recruitment questionnaire and central semi-structured interviews accompanied by theoretical thematic analysis (Braun & Clarke, 2006; Percy et al., 2015) can offer the crucial philosophical and methodological flexibility that I feel like I need to acquire a broader understanding of the factors I seek to study and their interaction while also meaningfully grounding conclusions in the lived context of those I seek to help (Creswell & Poth, 2018; Shannon-Baker, 2016).

Qualitative Research Design

Given the unique and largely unexplored convergence of factors that this study sought to comprehend, qualitative methodology was considered most appropriate for capturing the

richness of authentic, first-hand teacher stories that convey a deeper understanding of how they understand NBL and what it is like to provide learning experiences using nature for their young students with ESN. A qualitative approach that uses a questionnaire to recruit participants for semi-structured interviews allowed for the kind of investigation that could answer the questions I had about what encourages and what obstructs NBL use for teachers. The capacity of this methodology to both give context to patterns of experience along with elaborate and precise detail to factors that influence NBL use, enables a close and careful examination of this complex phenomenon (Creswell & Poth, 2018). Qualitative research is not used “for purposes of generalization but rather to produce evidence based on the exploration of specific contexts and particular individuals” (Brantlinger et al., 2005, p. 203). The use of a qualitative approach here serves to bring needed alignment and coherence to the scattered teacher stories of the benefits and barriers to NBL.

The Original Design: Grounded Theory

This study was originally designed to employ a grounded theory approach with qualitative group comparison using a recruitment questionnaire as a source for participant participation in semi-structured interviews as the primary data collection strategy. Grounded theory would allow for the iterative collection and analysis of data using constant comparison of data to construct a substantive theory grounded in the data (Birks & Mills, 2015; Charmaz, 2006; Creswell & Poth, 2018). Use of grounded theory was intended to be an advantageous approach for the present situation where “little is known about a phenomenon; the aim being to produce or construct an explanatory theory that uncovers a process inherent to the substantive area of inquiry” (Chun Tie et al., 2019, pp. 1–2). Using grounded theory, a researcher does not start with a pre-conceived theory in mind, rather the researcher begins with an area of study and allows the

theory to build from the data (Ezzy, 2002). Instead of a linear process, grounded theory applies recursive processes of data collection and analysis (Chun Tie et al., 2019).

For the original design of this study, after an initial set of interview participants were randomly sampled from the recruitment questionnaire participants, all subsequent participant sampling for the core semi-structured interview phase was to be conducted using a central feature of grounded theory design, a theoretical sampling strategy. Theoretical sampling is the identification of participants based on the emerging gaps in the data and what relevant information those selected participants can provide to fill those gaps (Chun Tie et al., 2019; Creswell & Poth, 2018). A constant comparison of newly collected data to previously analyzed data could progressively funnel understanding toward an integrated explanation of the phenomena where theoretical saturation is reached. Theoretical saturation is the point where the categories of understanding that have coalesced through constant comparative analysis are sufficiently explained, with new data analysis no longer increasing understanding of the category (Birks & Mills, 2015; Creswell & Plano Clark, 2018). Within this original grounded theory design, qualitative comparison groups were supposed to be used to contrast the stories of Low NBL users and High NBL users. These user groups were to be determined by the frequency of NBL use which participants reported in the participant recruitment questionnaire. What constituted the categorical designation of “high” and “low” use comparison groups could not be anticipated until sufficient potential participants were identified. However, what also was not anticipated was a dramatic shortfall in participant engagement, necessitating significant revisions to the design of the research methods.

Point of Divergence

Much like when Marty McFly's purchase of a future Grays Sports Almanac set off a chain of events that created an altered 1985 timeline in the film *Back to the Future II*, a lack of recruitment questionnaire participation became a similar point of divergence, creating an altered research study (Appendix N: Methods to Analysis Timeline). A total questionnaire participant population of 1000+, with 200 participants affirmative for ongoing participation through interviews, was considered achievable and suitable for the purposes of a grounded theory study (Creswell & Plano Clark, 2018). A participant pool of 200 for possible interviews would have made for a robust foundation for the initial random sampling phase and the subsequent theoretical sampling essential for a grounded theory design. Out of that prospective 200, a goal of 20 (one-tenth of potential participant population) interview participants was the sample size target set as the minimum amount required to reach theoretical saturation for a grounded theory study (Creswell & Poth, 2018).

A minimum interview sample size in the range of approximately 20 to 30 participants was also generally consistent with identified research likewise applying a grounded theory design and/or qualitative comparison groups (Bailey et al., 2016; Heberlein et al., 2016; Lindsay et al., 2013; Schraeder et al., 2018; Townsend et al., 2008). Unfortunately, after sending the questionnaire link to tens of thousands of contacts (teachers and administrators across the United States), with reminders, and over a month of the questionnaire being open for responses, only 100 finished questionnaires were recorded. Then out of those 100 finished questionnaires, only 43 individuals also indicated continued interest in participation in the study. The specific details of this process are thoroughly described below in the full "Questionnaire Sampling and Recruitment Procedures" section.

I was optimistically hoping for over a thousand responses, was realistically expecting that participation could be in the hundreds, but I only ended up getting completed questionnaires numbering in the tens. The design of this study hinged upon having a sufficient pool of potential participants to draw from to enable many key features of a grounded theory study. Having a mere 43 possible interview participants meant that I: (1) had lost much of the ability to be strategically selective for participants and was not able to use theoretical sampling with any expectation of efficacy, (2) was not able to conduct constant comparison analysis concurrently with new data that was intentionally sought to fill in gaps in understanding, and (3) was in all likelihood not going to interview enough participants to make claims of theoretical saturation within generally established parameters.

The diminutive participant pool from the recruitment questionnaire also sparked the impetus to change the timing of the development of qualitative comparison groups and how those groups were going to be used for this study. This comparison groups feature was still useful for identifying convergences and differences (i.e., RQ 3) in the questionnaire data (Lindsay, 2019). Originally, the population of questionnaire participants was intended to generate enough context to establish a high and low use group demarcation before interviews began (potentially even a moderate use group if enough participants were present). However, by the time the recruitment questionnaire was closed, I understood that I needed to essentially talk to any teacher that I could. Missing such key features of a grounded theory approach meant that it was necessary to change course from the methods I had planned. I needed to proceed in a manner that would best help answer the research questions and work toward the goals of this study. I could no longer call what I had done a grounded theory qualitative comparison group study. So, what was it that I could do under these circumstances?

The Modified Design: A Generic Qualitative Approach

In response to a limited participant population that resulted in an incongruence with grounded theory qualitative comparison group design, a new research approach needed to be devised that could salvage sustainable elements of the original design while remaining a viable method for addressing the research question within the constraints of the existing state of the study. The research questions guiding this study presented an incompatibility with selecting other established qualitative approaches: ethnography (not investigating a distinct culture-sharing group), case study (not probing a unique bounded system/case), and phenomenology (not exploring the essence of a precise experience) (Creswell & Poth, 2018; Percy et al., 2015). My interest in a flexible research design approach now extended beyond personal inclination to a necessity.

After consultation with my dissertation committee, a generic qualitative approach emerged as a surprisingly good fit for maintaining an alignment between researcher theoretical perspective, research questions, and methods. As more and more was learned about a generic qualitative approach, it increasingly appeared to be a remarkably ideal match for what could be done to keep moving toward the purpose of the study (Appendix N: Methods to Analysis Timeline). Generic qualitative approaches are practical and useful for novice qualitative researchers, can draw on various theoretical perspectives, has established application in education practice settings, and is particularly useful for practice oriented research questions intended to bridge a theory-practice divide and provide sound evidence ideally useful to practitioners (Kahlke, 2014), all of which apply to this study. It can be applied when research questions compel the use of a qualitative, multiple, or mixed-methods methodology. While I am not attempting a thorough integration of data sufficient to claim a mixing of methods, the design

of this study does use a recruitment questionnaire to obtain contextual information allowing for the development of a more comprehensive grasp of the phenomenon and use multiple data sources for triangulation with the core qualitative data collected from semi-structured interviews (Percy et al., 2015).

A generic qualitative approach has some utility for a “small, non-representative, but highly informed sample” (Percy et al., 2015, p. 79) that can provide thick and rich information. Generic qual is useful when the “researcher has a body of pre-knowledge/pre-understandings (categories or sub-categories of information) about the topic that he or she wants to be able to more fully describe from the participants’ perspective” (Percy et al., 2015, p. 78). The focus of a generic qualitative approach is “outward”, on the content of perceptions, life experiences themselves, and real-world conditions (Percy et al., 2015). A generic qualitative approach allows researchers to deviate and borrow from other approaches in the ways that are most beneficial for addressing research questions, a very pragmatic stance. For example, “researchers could strive to examine a process similar to what might be expected in grounded theory, but without attempting to derive a substantive theory” (Kahlke, 2014, p. 13), a good fit for a study that set out as grounded theory but could not achieve a substantive theory. Even selecting a generic qualitative approach as a design adaptation, after the research had already started, appears to be appropriate as advocates of a generic qualitative approach “have argued that research choices, including that of methodology and methods, should be informed by the research questions, and not the other way around” (Kahlke, 2014). For data collection and analysis, interviews and questionnaires are often used as primary sources for gathering data, thematic analysis and the use of multiple data sources for triangulation are preferred techniques for analysis of findings (Kahlke, 2014; Percy et al., 2015). This generic qualitative design is a backup course of action. However, after attaining a

better understanding of the strengths of this design as well as what it takes to lead a research study, then perhaps generic qual should have been the approach I used from the beginning.

Group Comparison. From a currently suspended account, @BillMurray once posted: “Every Olympic event should include one average person for reference.” This statement proved almost prophetic when this understanding through comparison was made real. A completely untrained sprinter, a relative of the chairwoman of the Somali national track and field federation, represented Somalia at the World University Games, finishing a sprint in an agonizingly distant last place (Faruk, 2023). Not every comparison is made so obvious, but this viral and vivid example demonstrates the power of comparison.

Incorporated to leverage this power, comparison grouping as an enhancing design feature of this generic qualitative research study allows data collection and analysis to discern patterns of similarity and differences for more and less frequent users of NBL (Lindsay, 2019). It is through this analytical approach that the comparative RQ 3 was addressed: How do early EC-SA teachers demographics, teaching characteristics, and nature experiences/perceptions converge or differ according to their level of NBL use? Use of comparison groups is not intended to be confused with formal qualitative comparative analysis, a technique of study that uses a set theory to examine the causal relationships between select cases in complex conditions (Ragin, 1999; Rihoux & Marx, 2013).

These comparison groups were constructed to differ in one key trait, frequency of NBL use, so that the impact of that trait can be better understood (Lindsay, 2019; Ritchie et al., 2014). Without the capacity to be selective and choose interview participants through theoretical sampling, it became important not generate the qualitative comparison groups based upon the recruitment questionnaire population. Defining the groups without knowing who might be

interviewed could lead to dramatically uneven representation of use groups in the central qualitative portion of the study and make for incongruous comparisons. Instead, the sample of participants who were interviewed formed the basis for the demarcation for the NBL use groups. Only after I knew the characteristics of exactly who I would get to look at deeply, did I use that as the framework for making comparisons based on use (Appendix N: Methods to Analysis Timeline). Opportunely, this was also done in a way that achieved a symmetry between the two groups. The High NBL use group, to be used for quantitative questionnaire data comparison, was designated to include six participants that identified their NBL use frequency as: Daily ($n = 3$), 2-3 times a week ($n = 0$), Once a week ($n = 1$), and 2-3 times a month ($n = 2$). As the foundation of this study, the Low NBL use group was designated to include six participants that identified their NBL use frequency as: Once a month ($n = 4$), 2-3 times a year ($n = 2$), and Never ($n = 0$) (See Table 1 later in this chapter). The grouping configuration ended up being a reasonable line of demarcation because with seven categories of use frequency and two use groups being created, one group would need to have four categories and the other just three. This grouping configuration is also a somewhat logical grouping, providing a reasonable distinction between NBL as a routine practice (High: Daily to multiple times monthly) and NBL as a rare practice (Low: No more than 10 times in a year to almost never). Once comparison groups based on frequency of NBL use were established after all participants were interviewed, this enabled the comparison analysis of the descriptive quantitative questionnaire data.

Data Collection Methods

The data collected for this study were derived from the use of two methods, an initial recruitment questionnaire and central semi-structured interviews. These methods were well aligned with a generic qualitative approach (Kahlke, 2014; Percy et al., 2015). The development

and implementation of the recruitment questionnaire and semi-structured interviews are described in detail in the following sections.

Recruitment Questionnaire. To recruit participants and begin descriptive data collection, the questionnaire was developed through Qualtrics. The terminology of “questionnaire” is being used for this study to suggest a distinction that this data collection was not done through a formally validated “survey” instrument. After the prerequisite consent to participate section (the only forced response of the questionnaire) a two-part, 18 question questionnaire was developed (Appendix D: Informed Consent and Qualtrics Questionnaire). Using a largely multiple-choice format throughout, the 11 question Part 1: Demographics sought to gather conventional demographic information from participants including: age, gender, race/ethnicity, primary instructional role, grade levels taught (choose all that apply), school location, years teaching, level of student support, personal education level, teacher certification area(s) (choose all that apply), and path to certification. Informed by the literature review, the seven question Part 2: Nature-Based Learning questions were developed to substantiate literature review interpretations, provide a quantitative data source to address the third research question, and as an ancillary source for data triangulation with the central interview data (Anfara Jr et al., 2002; Stahl & King, 2020). Part 2 opened with the first of three open-ended questions asking participants for their own definitions of “nature-based” learning. The Part 2 questionnaire questions that followed were guided by the research questions of this study. The Nature-Based Part 2 sought to gather information from participants related to the stories they have developed surrounding NBL including: perception of nature importance, NBL use frequency, most common approach to NBL used, most common place NBL used, most important benefit of NBL use (open-ended), most restrictive barrier to NBL use (open-ended). The questionnaire concluded

with an option for participants to voluntarily provide their email address, acknowledging their willingness to continue their engagement in the study through an interview. No participant was compensated for completing the questionnaire or for further participation in an interview.

Recruitment Questionnaire Sampling and Recruitment Procedures. Participant recruitment for the questionnaire phase of the study commenced with a search of all 50 state departments of public education, plus Washington D.C., for any publicly published teacher and principal directory information. Direct teacher email addresses were found for three states: one Midwest: West North Central state, one Northeast: New England state, and one South: West South Central state. All teacher directories were available in Excel spreadsheet .xlsx file format. An additional 24 state directories were found for principal contact information. While teachers are the focus of this study, administrator contacts were much more accessible, and were collected as a secondary means for connecting teachers with the questionnaire. For administrators, 18 of the 24 directories were downloaded as .xlsx files, however, two of those directories contained no email contact information. The other six principal directories were available as PDF files, only one of which was easily converted to an Excel format (i.e., columns and rows easily copied from PDF and transferred to a new excel document). In total, 17 principal directories were used.

Participant sampling for the questionnaire was done through a non-probabilistic purposeful sampling strategy (Creswell & Poth, 2018). In purposeful sampling potential participants are deliberately targeted for their strong likelihood of possessing the experiences and perceptions relevant to the purpose of the study (Creswell & Plano Clark, 2018; Teddlie & Yu, 2007). To generate a sample that was expected to address the research questions of this study Excel data filtering was used on the directory information to target potential participants with the greatest specificity possible. Data filters were used to: (1) remove entries with blank contact

information (2) identify only elementary level teachers and principals using relevant header information (e.g., grade span containing anywhere PK-5 or school name containing “elementary”) and, (3) remove instructional and support roles outside that of primary classroom teacher (e.g. paraprofessional or counselor) and administrators outside of the building principals who would have the most direct contact with teachers (e.g., superintendents or program coordinators). Email addresses for elementary teachers and principals were copied from their filtered state department of public education directory files and combined into their own master lists, one for elementary teachers and one for elementary administrators. Email contact master lists for both teachers and administrators were then filtered for duplicates email addresses. After master lists reflected the most concise and targeted contact information available, the .xlsx files were saved as .csv files and uploaded to the web-based survey tool Qualtrics to be used as questionnaire distribution lists.

After Institutional Review Board (IRB) approval was obtained through the University of Oklahoma Office of Human Research Participant Protection (HRPP), active recruitment began (Appendix B: IRB Outcome Letter). Email invitations to participate in the study were sent via the Qualtrics mailer using the master elementary teacher distribution list developed through the search of public, published, state department of education databases. The elementary teacher distribution sent this recruitment contact to 35,944 teacher email addresses representing three states. This recruitment contact conveyed information about the study’s purpose, what participants could expect from participation, encouragement to participate, and a link to the questionnaire (Appendix G: Recruitment Contact – Questionnaire_Teachers). All respondents following the emailed Qualtrics link were first asked to affirm their informed consent to

participate (Appendix D: Informed Consent and Qualtrics Questionnaire) before demographic (Part 1) and nature-based learning (Part 2) data were collected.

In the first week, the nearly 36,000 emails resulted in a meager 54 finished questionnaires (0.15% completed response to contacts sent ratio). After another week of the questionnaire active, just one additional completed response had been submitted for a two-week total of 55 finished questionnaires. After 2 weeks of the questionnaire active, a reminder email was sent to teachers (Appendix F: Recruitment Contact – Questionnaire_Teachers_Reminder) using the Qualtrics Reminder and Thank You Emails distribution feature sending another 32,766 reminder emails to only participants who have not yet completed their questionnaire (excluding emails that previously failed or bounced).

In addition to nudging teachers at this two-week mark, to enrich this initial pool of questionnaire participants and consequently the number of potential interview participants, the elementary principal distribution list was used in a separate Qualtrics distribution to send out an additional 14,154 emails representing 17 states. This contact was a solicitation to elementary principals for their help in connecting their teachers to the questionnaire (Appendix G: Recruitment Contact – Questionnaire_Principals). Who ultimately responds to the questionnaire cannot be controlled, however these efforts to generate a diverse and expansive sample by reaching out to teachers in the largest variety of states possible was designed to bolster the credibility and transferability of any future findings (Anfara Jr et al., 2002; Stahl & King, 2020). This reminder/admin recruitment wave (representing almost 47,000 email contacts) produced an additional 22 finished questionnaires in the week that followed. After 5 weeks, only 100 finished questionnaires were recorded, and the questionnaire was closed. From the 100 finished

questionnaires, 43 individuals also provided their email contact information indicating interest in possible interview participation.

Semi-structured interviews. A semi-structured interview process was utilized as the central instrument of data collection. A semi-structured interview originates with pre-developed essential questions and some options for follow-up probing, but ultimately the interviewer adapts the order and structure of questions to the flow of conversation, following the lead of the interviewee (Creswell & Poth, 2018; Esterberg, 2002). Commonly used in conjunction with thematic analysis, semi-structured interviews are an efficacious tool for qualitative research, capable of comprehensive exploration, and eliciting the depth and detail sought by this study (Creswell & Poth, 2018; Percy et al., 2015).

All interviews for this study were conducted by a single interviewer trained in qualitative research methods. Interview sessions were conducted and digitally recorded via the Zoom video conferencing platform. The interview question (IQ) protocol (Appendix K: Interview Protocol) was developed to expand upon the first two exploratory research questions, while the comparative RQ 3 question was addressed at the stage of analysis using the quantitative questionnaire data. Interview question design was targeted first to explore the overarching themes of Benefits (why NBL is used) and Barriers (why NBL is not used) identified through the literature review. Some subtheme related questions were developed for IQ 3 through IQ 7 (e.g., RQ 5: *Tell me about the benefits you've observed from using nature in your instruction. What are the things you've seen your students gain from experiences with nature?* With potential follow-up for Improved Outcomes - *Describe benefits to student knowledge and skills?*). At RQ 8, interview questions were specifically written to probe the Barrier sub-themes identified in the literature review: (IQ 8) nature not considered, (IQ 9) preparation, resources, and support, (IQ

10) constraints of time and expectations, (IQ 11) confidence, and (IQ 12) outdoor spaces and safety. Data collected for these questions exploring teacher perspectives on what is needed to overcome these barriers to NBL will not be included as a part of this study.

Interview Sampling and Recruitment Procedures. While the questionnaire provided an important complementary source of data that was leveraged to address the third comparative research question, the central purpose of the questionnaire was as a recruitment tool for semi-structured interviews. An effective approach to sampling participants is especially important for this core of data collection “because if you do not have a good sample of the phenomena of interest, then your inferences related to the research questions will lack clarity or be inadequate” (Teddlie & Yu, 2007, p. 97). From the questionnaire participants maintained for analysis, 43 participants volunteered their email contact.

With these 43 potential participants, multiple purposeful sampling techniques were used (Teddlie & Yu, 2007). Sampling primarily took place through a criterion sampling procedure. Purposeful criterion sampling seeks cases that meet criteria fundamental to answering the research questions (Creswell & Poth, 2018). The relevant inclusion criteria were: (1) Role – that teachers targeted for interviews need to be (a) special education teachers and (b) general education teachers that provide instruction to students receiving special education services, (2) Grade(s) – that teachers targeted for interviews provide some form of instruction for students in the early elementary span that the study has defined as Pre-K to 3rd grade, and (3) Support – that teachers targeted for interviews provide instruction for students with extensive support needs as defined by the study. Because the participant pool was so modest, not allowing for the theoretical sampling of a grounded theory study or even guaranteeing a laser focus on the inclusion criteria, a coding matrix was developed to classify a “good” fit for the criterion sampling (Appendix I:

Inclusion Fit Matrix). This coding matrix strategy, constructed from questionnaire data exported to Excel, allowed for a more objective and deliberate tactic to recruit participants minimizing compromises to participant capacity to support the answering of research questions.

Good fit for inclusion was determined through the coding of inclusion criteria by the assignment of code points for characteristics closest to the ideal participant: a special education or general education teacher, teaching EC-SA students, any of which require extensive support. A principal emphasis of this study are the NBL stories of teachers for students with extensive support needs. This would most readily be relevant to the knowledge and practices of special education teachers. However, because of the diffusion of inclusive practices, general educators also have valuable experiences with students that receive all levels of special education services and were weighted equally for inclusion fit. Code points were assigned using the following weighted scoring for key study variables: Role – GenEd/SPED = 1 or Other = 0.5, Grade – PreK - 3 = 1 or 4th and greater = 0, Support – Extensive = 1, Moderate = 0.5, or Minimal/No = 0. Flexibility induced by need allowed for some variance for instructional role (Other = 0.5) and level of support (Moderate = 0.5). Frequency_Use_Nature (i.e., how often teachers report using NBL) was not used as a factor for inclusion as all levels of NBL use were sought in order to develop comparison groups. A coded score of 3 to 2.5 was established as a “good” fit for inclusion in the study, 2 was designated as a “fair” fit, and less than 2 a “poor” fit.

Using this inclusion fit matrix the 43 potential interview participants were given identification codes (for organization after deidentification) then sorted in the matrix by code points. Of the 43 original questionnaire participants that indicated interest in interview participation, coding for research inclusion fit identified 24 as a “good” fit with the inclusion

criteria (Appendix J: Inclusion Fit Participant Summary Table – Good Fit). This good fit group of 24 fortuitously demonstrated a generally balanced distribution of NBL use frequency.

With the determination of good fit group set, the questionnaire was officially closed and initial recruitment contacts (Appendix H: Recruitment Contacts – Interview) for interviews were sent to all 24 teachers identified as a “good” fit for inclusion. Much like the response to the questionnaire, the call for participation for the semi-structured interview phase of the study was underwhelming (i.e., only one interview was scheduled out of the 24 contacts sent after the initial recruitment email). Ultimately, only 10 of the 24 potential participants that were contacted responded after a series of three contact attempts, one of which responded to indicate that they would no longer be able to participate. Having a background in scheduling IEP meetings feels like it now served as preparation for scheduling and tracking interviews, much in the same way I found that having lived in a fraternity house in college prepared me for having children. Even with minimal response, criterion sampling did not utilize next “fair” inclusion fit tier of potential participants due to concern over fundamentally shifting the specific instructional roles, grade levels, and/or levels of support that were set out to be explored by this research.

Because only nine of interviews were scheduled, the second in the multiple purposeful sampling techniques was used. In response to poor interview response rate some snowball sampling was employed. Snowball sampling is used to identify participants “of interest from people who know people who know what cases are information-rich” (Creswell & Poth, 2017, p. 159). Three additional participants that matched the inclusion criteria with a good fit were recruited through snowball sampling totaling 12 interview semi-structured interview participants. Interviews took place over the course of five weeks. Deidentified with use of pseudonyms participants characteristics for the focal Low NBL users are listed in Table 1. High NBL user

interview data was collected but falls outside the scope of this current study. Once interviews were scheduled, prior to the interview taking place, the IRB approved oral consent to participate script was sent as a PDF for participant review before the interview commenced. All interview participants provided verbal consent at the time of the interview specifying their consent to be audio and/or video recorded prior to any recording or questions asked. All but one participant provided verbal consent to be video recorded.

Table 1

Low NBL Use Interview Participant Characteristics

Interview Time	Pseudonym (Study ID)	Participant Characteristics						
		Role	Grade	Region	School type	Years teaching	Level of student support	NBL use frequency
36:48	Ashley (MCK01)	Special Education	K-8	South: West South Central	Suburban	9	Extensive	2-3 times a year
56:12	Jennifer (MCK03)	Special Education	K-5	South: West South Central	Suburban	19	Extensive	Once a month
52:18	Heather (MCK04)	General Education	2	Midwest: West North Central	Suburban	20	Extensive	Once a month
37:57	Rachel* (MCK05)	Special Education	PK-2	South: West South Central	Suburban	2	Extensive	Once a month
01:03:11	Sharon* (MCK07)	Other: Art Education	K-5	Midwest: West North Central	Urban	16	Extensive	2-3 times a year
38:00	Melissa (MCK12)	General Education	2	South: West South Central	Urban	3	Moderate	Once a month

Note. Use frequency: Low NBL use includes – Once a month, 2-3 times a year, and Never. Grade levels taught for Sharon reflect last classroom instructional role.

* Participants recruited through snowball sampling.

Data Analysis

Data analysis commenced with the close of the questionnaire. Analysis of questionnaire quantitative and qualitative data began alongside the recruitment of interview participants and

continued concurrently with the progress of the semi-structured interview phase (Appendix N: Methods to Analysis Timeline). As use groups were not delineated until the end of attempting to gather interview data, qualitative questionnaire data was not analyzed using the comparison of NBL use frequency groups due to time constraints. Detailed explanations of the analysis procedures for the questionnaire and interview data are provided in the following sections.

Questionnaire analysis

At the closure of the questionnaire, response data was exported from Qualtrics to Excel in the .xlsx file format for analysis. In Excel, raw data first underwent listwise deletion, where participant responses were removed before analysis because those responses did not contain one or more key features of data sought for analysis (Newman, 2014). While removing any participant responses with so few to begin with may not be a highly recommended method of dealing with missing data in all contexts (Newman, 2014), the questionnaire was primarily intended as a tool for interview participant recruitment. Obtaining a clear understanding of potential participants with all variables for inclusion present justified the use of listwise deletion.

Out of the 100 finished responses (finished defined as “Progress” = 100, “Finished” = True), three were removed as the “Recorded Date” indicated that these entries were a part of the preliminary testing of the questionnaire that preceded widespread distribution. Another three participant responses were removed because they opted out of participation at the initial consent to participate prompt (i.e., “Decline to consent”). A final 22 partial participant responses were removed due to a lack of response to one or more of the following key variable questions: Role, Grade, Support, Frequency_Use_Nature. However, seven other incomplete questionnaire submissions were retained. Even though these seven participants did not provide answers to one or more of the three open-ended response questions (definition of NBL, perception of benefits,

and perception of barriers), their responses were retained because they did respond to all key variable questions. This resulted in a final count of 72 questionnaire responses to be analyzed. No participant that voluntarily provided their email contact information for potential interview participation was removed from analysis through listwise deletion.

Analysis of the questionnaire data next required the (re)coding and consolidation of written responses for the seven questions that featured multiple choices but also included an additional write-in response option (e.g., Other, please specify). (1) For the *Gender* question response option “Gender not listed. My gender is (please specify)” 10 respondents replied either “woman” or “female”. These 10 responses were recoded to match the analogous existing questionnaire response “Cis-Gender Woman”. (2) The Role question response option “Other, please specify” yielded nine responses outside the Special Education / General Education choice dichotomy. These responses were grouped and recoded into three new categories according to best fit (if more than one role was listed then the first listed was used to code): (a) Administration - educational leadership / management role (e.g., director, coordinator), (b) Specials - teacher provides instruction that is not part of the conventional core academic curriculum (e.g., PE, Art, Music), (c) Student support - teacher provides additional support services within specialized programs for students who may have diverse needs requiring additional assistance (may or may not overlap with SPED) (e.g., reading interventionist, English Language Development teacher). (3) The Grade question response option “Other, please specify” generated two responders adding “Other” responses. The first listed “adjunct” in addition to selecting “Pre-Kindergarten”. This response was judged to be inconsequential to this study and was removed so that the participant was listed only as “Pre-Kindergarten”. The second participant added “Transitional First”, this was recoded as “First” matching existing questionnaire responses. (4) The Location question

response “Other, please specify” elicited two write-in responses. The first “Other” response was “virtual”. This was coded with the new code “Virtual” because virtual charter schools are a sufficiently distinct entity and approach. The second response was “inner city” which was recoded to match existing location choice “Urban”. (5) For the Certification question, among their selection of the default choices: Early Childhood, Elementary, Secondary, Special Education, and/or None, Working Toward, 14 participants added other additional areas of certification using the open response “Specific Content Area, please specify.” These 14 responses were either coded as one of the default response options or as one of four additional categories created to encompass the additional responses: (a) Administration (e.g., Principal), (b) Student support (i.e., counseling), (c) Subject-Specific Areas (e.g., English Language Arts), (d) Teaching English to Speakers of Other Languages (e.g., English as a Second Language).

Not including the three open-ended response questions in the second part of the questionnaire, there were two multiple choice questions that contained a final “other” write-in response option. (6) In the Natur_Exp_Method (i.e., most common approach to NBL use) question a single participant selected “Other, please specify”. This participant indicated that they had no windows in their classroom, so they used technology to show nature videos and/or play nature sounds. This other response was recoded with new code response as “Use of technology for nature media”. (7) The Natur_Exp_Locatn (i.e., most common place NBL used) question produced two “Other, please specify” responses. Both responses were recoded with existing codes. One participant responded, “Turtle sanctuary/courtyard”. This was recoded as “Outdoor classroom or learning space” as the response denotes the use of a student accessible outdoor venue. The second response was from a teacher at a virtual school, indicating that the most likely

setting for nature experiences in this instance would be “at a park with their teacher”. This response was recoded as “Nearby park, forested area, or wetland”.

Questionnaire Data: Quantitative Analysis Procedures

Sample size was inadequate for quantitative data analysis techniques (e.g., inferential or correlational analysis). Minimal questionnaire participation (N=72) made evaluation of the data outside of descriptive analysis likely prone to statistical error and consequently not worth the endeavor. All computation for descriptive analysis was done within Excel. Formulas were developed to calculate frequency counts and percentages for all non-open ended questionnaire questions. Mean (=AVERAGE) and standard deviation (=STDEV.S) were calculated for teacher participant age and years of teaching experience. Once comparison groups were established, all quantitative data analysis was amended to include the breakdown of data by use group. The products of this analysis are included in the Chapter 4: Questionnaire Demographics by Level of NBL Use (Table 2), Questionnaire Teaching Characteristics by Level of NBL Use (Table 3), Questionnaire Nature Experiences and Perceptions by Level of NBL Use (Table 4).

Questionnaire Data: Qualitative Analysis Procedures

The questionnaire offered participating teachers three open-ended questions: (1) OpenResponse_Nature: How would you define "nature-based" learning in your own words? (2) Perception_Benefits: What do you believe is the single most important benefit of using nature-based learning approaches for student instruction? (3) Perception_Barriers: What do you believe is the single most restrictive barrier to the use of nature-based learning approaches for student instruction? Open response data was exported from Qualtrics through the “Results” tab of the questionnaire where the individual questions were selected using the “Page Options” button to then export all responses as a .docx Word document. The three separate Word documents were

then imported to the NVivo (Release 1.7.1) qualitative analysis software program. Using NVivo, examination of the open-response questionnaire data was conducted through a thematic analysis processes (Braun & Clarke, 2006; Shank, 2005).

Thematic Analysis. A thematic analysis approach provides a deliberate but flexible process for generic qualitative data analysis that can be utilized with efficacy by novice researchers (Braun & Clarke, 2006). It empowers qualitative researchers to focus on the data in numerous different ways; with breadth across the whole set of data and/or with depth in targeted features of the phenomenon under study (Braun & Clarke, 2012). Thematic analysis as an analysis strategy is well aligned for use with a generic qualitative research design (Percy et al., 2015). Like Neo, in 1999 sci-fi film *The Matrix*, awakening to see into the very code that composed the world he was immersed within, thematic analysis encapsulates a technique for the researcher to recognize the alignment of stories, to see patterns in the cacophony of truths that work, and find meaning through the all the static (Braun & Clarke, 2006; Shank, 2005).

Thematic analysis supports the progressive identification and categorization of patterns of meaning, i.e., the themes of thematic analysis (Braun & Clarke, 2006; Shank, 2005). Similar in scheme to the data analysis spiral model offered by Creswell and Poth (2018), Braun and Clarke (2006, 2012) scaffold the process of thematic analysis in a progressive but not prescriptive six phases used for all qualitative analysis of this study: (1) Familiarization with the data, (2) Generating initial codes, (3) Classifying codes and searching for themes, (4) Examining themes, (5) Naming and defining themes, (6) Producing an account of the findings.

Coding for Thematic Analysis. The qualitative coding of thematic analysis is an analytical process where short descriptive labels are assigned to excerpts from the data collected to find patterns and themes in the data that enable the researcher to distill meaning related to the

focus of the research (Creswell & Poth, 2018). To achieve the exploratory and descriptive approach of this research, codes were generated directly from the sematic level of data, as opposed to intuiting latent meanings, in an effort to remain close to the data. This present focus on the sematic level of what is explicitly stated, identifying patterns of surface / literal meaning, attempts to describe while leaving initial interpretations up to the participants themselves (Braun & Clarke, 2006, 2012; Xu & Zammit, 2020). Braun and Clark (2012) again offer a structure utilized for this research, outlining a set of useful criteria for quality thematic analysis coding: (1) even attention for coding of each item, (2) a few vivid examples is not enough for a theme, coding should be thorough and comprehensive, (3) all codes for themes/subthemes are systematically organized, (4) confirm all themes/subthemes accurately reflect the data, are nonoverlapping with each other, and consistently applied, (5) themes are internally coherent, consistent, and distinctive. These steps served as a guide throughout the coding process of both the qualitative questionnaire data and the interview transcripts.

Thematic analysis of the *OpenResponse_Nature* definition questionnaire question focused on the inductive development of themes from open-ended responses. After initial familiarization with response data, an initial coding pass, and then an organizing and consolidating pass that encompassed all data, key thematic features of participant definitions were recognized and defined (Chapter 4, Table 5). In contrast to participant definitions of nature-based learning, analysis for *Perception_Benefits* and *Perception_Barriers* responses used a theoretical thematic analysis strategy that started with specific themes established by the review of literature for this study.

A theoretical thematic analysis strategy is “employed in a situation in which the research has some predetermined categories (themes) to examine during the data analysis” however the

research is also able to stay “open to the possibilities of new themes emerging from the thematic analysis” (Percy et al., 2015, p. 81). This type of analysis is driven by a-priori themes, identified from existing literature, that can become fundamental features of the research question(s) for further inquiry (Percy et al., 2015). The analysis of qualitative data for this study was reliant on the themes of Benefits and Barriers derived from the literature review.

Research questions, and consequently questionnaire and interview questions were all structured with these concepts as the top-level themes. These main themes of Benefits and Barriers and their sub-themes provided a starting point and framework for organizing and interpreting this open-response questionnaire data.

Through a carefully iterative shifting of data, the questionnaire enriched understanding beyond the review of literature alone to provide a more meticulous interpretation of the main themes being explored; the benefits and barriers teachers encounter in their attempts to use nature-based learning for their early childhood-school age students with extensive support needs. The additional information and additional time for reflection offered a richer place for the theoretical thematic analysis of the interview data to start.

Interview Analysis

The six semi-structured interviews conducted using the Zoom web conferencing platform ranged in length from 00:36:48 to 01:03:11. Interview MP4 audio files recorded through Zoom and approved by participants were uploaded to the Temi online AI transcription service. The Temi service and I were the only transcribers for all recordings. Each transcript generated using Temi’s automatic speech recognition technology was checked manually until verbatim transcripts were accurately captured. This transcript review and revision process also aided in the development of a strong familiarization with each participant’s data. Transcript revision also

allowed for the full removal and replacement of all identifiable information with pseudonyms and generic descriptors, for example: participant names (pseudonyms e.g., “Kevin” or “Scott”), names of schools (e.g., “the elementary school”), names of other specific locations (e.g., “west south central state”), names of organizations mentioned (e.g., “state department of education” or “nature-based teacher training organization”). One practical feature added into transcripts alongside participant pseudonyms is what I will call “characteristics keys”. Like a key or legend on a map uses symbols to quickly convey information about the features to be found on the map, the characteristics key was added as a way to quickly convey key characteristics of the interview participants and keep those features front and center during analysis. The characteristics key is a series of three letters added to the end of each participant’s pseudonym with each letter representing one of the focal characteristics of: (1) Role: S – Special Education, G – General Education, or O – Other Educator, (2) Level of student support: E – Extensive, M – Moderate, (3) NBL use group frequency: H – High, L – Low. For example, a pseudonym with a characteristics key of (S-E-H) would be a (1) special education teacher of student(s) with (2) extensive support needs that uses NBL at a (3) high frequency. These characteristics keys were added to all transcripts and are carried over to the reporting of findings in Chapter 4 so that their utility for interpretation will also carry over to any reader of this study.

Once participant protected transcripts were achieved, only those transcripts were retained for analysis. All memos generated from interview analysis used the assigned participant pseudonyms. Video recordings made through Zoom were not used for transcription. During the transcript review and revision process, however, the correction of some transcript inaccuracies were aided by going back to the original video to achieve the best possible interpretation of unintelligible audio and misinterpreted Temi transcription.

Verbatim transcripts were exported from the online Temi site as .docx output file format with in-line presentation, inclusion of speaker names (i.e., pseudonyms), inclusion of timestamps, and filler words ("um", "uh", etc.) removed. The six Low NBL use transcripts were imported into a single NVivo project for analysis. While NVivo does not fully scaffold analysis (Maher et al., 2018), using NVivo provides efficient management, retrieval, and data connection capabilities which support the examination of semi-structured interview data through a theoretical thematic analysis processes (Braun & Clarke, 2006; Shank, 2005).

The thematic analysis of the core semi-structured interview qualitative data for this study started with a familiarization with the data through the review and revision of interview transcripts. Memos were generated with this familiarization pass through of the transcripts, adding on to notes taken at the time of each interview. Memos documented thoughts and impressions from this first pass through of each transcript along with notation of exemplary quotes (Chun Tie et al., 2019; Creswell & Poth, 2018). Before a second pass through the transcripts to start generating codes, the a-priori framework for themes/subthemes established by literature review and revised through questionnaire analysis (Chapter 4, Table 7 and Table 8) were added into NVivo.

Then the raw transcripts were reviewed again carefully, line-by-line, working to identify responses that appear to be meaningful to the research questions while remaining open to any new patterns of understanding (i.e., new themes/subthemes). All data unrelated to the research questions was ignored, remained uncoded, and was useful only at times when going back to the complete transcript was useful to provide context for better understanding the relevant data. Each data fragment of significance was labeled with a descriptive code word or a short sequence of words that attempted to preserve the essential meaning (Braun & Clarke, 2006; Percy et al.,

2015). Some more complex segments of data were identified with multiple coded labels. These descriptive codes were then sorted into the a-priori framework of codes to begin to describe in detail the known factors or to illuminate previously unidentified factors establishing new types of subthemes. As each subsequent transcript was reviewed thoroughly to label the discrete units of analysis, meaningful data was compared to existing codes, and either labeled with an existing code or given a new descriptive label and then sorted into the growing thematic framework (i.e., a map of the thematic hierarchy of the data) (Percy et al., 2015).

As NVivo facilitated this identification of codes across the data set, any number of patterns are possible, it is the purpose of thematic analysis to identify those patterns meaningful for answering my research questions (Braun & Clarke, 2006). What I am calling *subthemes* became the principal pattern for identification and description because the main themes of *Benefits* and *Barriers* were structured to be the two largest overarching themes explored and no data relevant to the research questions falls completely outside of this conceptualization of the data. NVivo was used to review all coded data making sure the subtheme and their constituent coding makes sense as coded and that the data coded provided a rich and distinct description of the subtheme such that the pattern in the data was clearly understood. Redundancies and overlap of subthemes/codes were consolidated if data shared meaning with other codes. Codes were recoded or eliminated if data was insufficient to justify a separate code or was found to be unconnected to patterns of data relevant to the research questions (Braun & Clarke, 2012). While it is not the focus of thematic analysis to identify unique or outlier experiences that occur within a single data item (Percy et al., 2015), this study will call attention to some singular experiences or perspectives in the findings when they have notable relevance or implications for the research questions.

After this examination of the content and relationship of the subthemes and coding, the nodes on this thematic framework, the codes of subthemes and secondary subthemes were fully defined and or further refined, as in the case of a-priori subthemes and codes (Braun & Clarke, 2006). This phase of analysis encompasses the deep work achieving a “a clear focus, scope, and purpose; each in turn builds on and develops the previous theme(s)” (Braun & Clarke, 2012, p. 66). Themes at each level were organized until they were unique and specific, capturing the essence of data, and demonstrated their relation to connected coding while at the same time not overlapping. Exemplar quotes from the data were identified to illustrate the themes at each level of the framework (Percy et al., 2015).

Trustworthiness

Lincoln and Guba (1985) conceptualized the rigor and quality of qualitative research as a “trustworthiness” of the research. Establishing trustworthiness through an honest transparency in the processes of research, adherence to standards of ethical treatment of participants and their stories, along with a commitment to respect for participants' rights and wellbeing confers a confidence in soundness of research findings (Brantlinger et al., 2005; Creswell & Poth, 2018). The use of these trustworthiness tactics in this study is not so that you, the reader, places your trust in any of these methods alone, but to build trust in me, the person using the methods. Trustworthiness is composed of four dimensions in qualitative research that correspond to generally analogous concepts found in quantitative research: credibility (internal validity), transferability (external validity), dependability (reliability), and confirmability (objectivity) (Anfara Jr et al., 2002; Lincoln & Guba, 1985; Stahl & King, 2020). A set of strategies for strengthening these attributes of trustworthiness were employed to enhance the rigor and quality of this study.

In a qualitative study credibility is the faithful documentation and portrayal of the experiences and perceptions of the participants (Stahl & King, 2020). Purposeful attention was devoted to bias minimizing question design for both the questionnaire and interview questions. To capture an accurate reflection of participant experiences and perceptions, questions for the questionnaire and semi-structured interview protocol were crafted with careful attention to credibility (i.e., on limiting researcher bias). Questions were developed with a focus on the elimination, or at a minimum the limitation of weighted wording and leading questions / answer choices (Creswell & Plano Clark, 2018). Another credibility strategy is member checking. Member checking returns the findings to the participants that were the source of data to confirm precision of the interpretations. Using an email highlighting key findings, this study offered all six Low NBL use participants an opportunity to provide feedback on researcher analyses. Despite receiving only one member check response, which confirmed and endorsed all findings shared, the process itself serves to establish a transparency and accountability with participants. By affording participants an additional opportunity to co-create meaning, the credibility of the research findings is enhanced (Anfara Jr et al., 2002).

Transferability is the degree to which the findings of this study can be applied beyond the unique contexts examined for this study (Stahl & King, 2020). While true generalizability, making predictions or drawing conclusions about a larger population, is not possible for a generic qualitative comparison study, this research can establish value for analogous context and offer implications for policymakers and practitioners through the use of strategies for transferability (Brantlinger et al., 2005). One of the key pathways to achieving transferability in qualitative research is through the collection of thick and rich data followed by the use of thick and rich description to provide a sufficiently comprehensive portrayal of the phenomenon

studied to facilitate the utilization of the insights gleaned in alternative contexts (Creswell & Poth, 2018; Stahl & King, 2020). If a picture is worth a thousand words, when a picture is not an option, thick and rich description paints the picture needed. This study set out to use detailed, comprehensive descriptions that capture the nuances of the participants' stories. A vivid rendering that is complex without being complicated. Another route to transferability is through the use of purposeful sampling (Anfara Jr et al., 2002). As detailed above in the description of sampling and recruitment procedures, the use of purposeful sampling (i.e., criterion and snowball), helps identify useful participants for their capacity to provide needed thick and data specifically related to the central phenomenon being studied (Creswell & Poth, 2018). Purposeful sampling bolsters the transferability of the findings by increasing the likelihood that the finding derived from the data collected are indeed highly relevant to the specific research context studied.

Dependability in qualitative research relates to the provision of a detailed and transparent accounting of the research process, as well as the employment of strategies that can display a consistency for the interpretation of the data (Maher et al., 2018; Stahl & King, 2020). An audit trail is an approach to documentation of the study, a research lineage, that allows the researcher to recount the processes of investigation and interpretation to assert that the findings are dependable (Brantlinger et al., 2005; Creswell & Poth, 2018). The practice of memoing was included in the creation of the audit trail for this study. Memos were used to capture an ongoing snapshot of the researchers' understanding, thoughts, and feelings about the data (Creswell & Poth, 2018). Memos functions much like a research diary. Memoing can help researchers see the big picture, process all the information being collected, make connections that might not otherwise have been made, and aid in pointing out where to go next (Chun Tie et al., 2019).

Having these comprehensive records provides for the dependability of the findings. While any qualitative findings are only one interpretation of possible others, when backed by extensive documentation, these findings are more convincingly seen as the plausible interpretation of participants' data. Data triangulation is another key technique for establishing dependability through directly demonstrating a consistency across multiple sources of data from different methods of data collection to corroborate the findings (Anfara Jr et al., 2002; Stahl & King, 2020). Triangulation also supports the credibility and confirmability of a study (Anfara Jr et al., 2002). As a design feature of this study, data analysis used the cross-referencing of semi-structured interview data with questionnaire data for data triangulation (Anfara Jr et al., 2002).

Confirmability is comparable to objectivity in quantitative research. Strategies to enhance confirmability are devised to minimize bias of the research methods and findings by acknowledging researcher subjectivities. This transparency of predispositions is meant to assure readers that the findings presented are firmly grounded in the data and, at a minimum, not subversively manipulated by the researcher's own motivations or interests. Though we can never wholly remove ourselves because "we truly are the instruments" (Brantlinger et al., 2005, p. 197) for our research; especially in qualitative work, but even in quantitative as well. Attempting an open and impartial stance while leveraging precision and accuracy across the research process bolsters the confidence that others would make the same interpretations with the same data (Stahl & King, 2020).

Consequently, it is critical that I as the researcher attend to my own constructions of meaning and the experiences from which they are derived (Creswell & Poth, 2018). In doing so, interpretation can stay as close to the original data as possible while acknowledging and embracing the reflexivity. To support the confirmability of this study a Reflexivity Statement

(Appendix A: Reflexivity Statement) was developed to reflect upon potentially impactful personal biases, bringing them into consciousness to be moderated throughout the process of gathering data and analysis (Lincoln & Guba, 1985). By consciously bracketing subjectivity to the greatest extent possible, while also acknowledging the specific biases and assumptions that are always present with the researcher as an instrument of research, I hope to enhance the trustworthiness of my analytical interpretations and findings (Creswell & Poth, 2018).

Ethical Considerations

Throughout the research sequence, but particularly when it came time for data collection and interaction with participants, it was important to the trustworthiness of the study to demonstrate not only meticulous, high quality methods, but a comprehensively ethical research endeavor (Anfara Jr et al., 2002; Creswell & Poth, 2018). Ongoing safeguards were designed into the research process to ensure issues of informed consent, confidentiality, and mitigation of potential risks to participants were addressed. The recruitment questionnaire opened with the IRB approved informed consent script where potential participants could not proceed to any questions until their acknowledgement of informed consent was submitted (Appendix B: Institutional Review Board Outcome Letter). No recruitment questionnaire participant was contacted for the interview phase of the study that did not affirm their interest in continued participation through the interview request response item at the end of the questionnaire. Some participants that did not complete the recruitment questionnaire were contacted based on participant referral.

All interviews were conducted through the Zoom web conferencing platform allowing for participant involvement in the comfort of a setting of their choosing. Prior to the agreed upon interview meeting time, interview participants received an email containing the oral consent to

participate script to examine at their convenience. Each interview session opened by addressing the ethical issues associated with participation in this research study. As the researcher, I guided each participant through the IRB approved oral consent to participate script detailing data management, confidentiality and privacy practices, data documentation format, data use, and rights of participation with an estimation of timing (approximately 45-60 minutes). Participants confirmed their understanding that as a research participant they do not have to answer any question that they do not want to answer and that they can discontinue their participation at any time without penalty. Only after oral consent to participate was affirmed and conditions of participation documented did any audio/video recording begin (e.g., one participant approved of audio recording but did not approve of video recording).

Participant confidentiality was safeguarded through de-identification of all personally identifiable information in the collection of data and reporting of findings. Participant data was protected using secure data storage practices. Nonetheless, because online platforms were used for the recording, analysis, and storage of the research data, an accidental data release is within the realm of possibility, though improbable. The online platforms selected for use do have established, robust security measures to protect data, although human error or unanticipated cyber intrusion vulnerabilities can still occur. The severity of risk for accidental disclosure of personal information is expected to be exceedingly low and is attenuated by the IRB approved data management practices developed for this study.

This research was judged as presenting no more than minimal risk of harm to participants and offered no benefits of significance for participation in this research. All emails collected via the questionnaire and interview files will be permanently deleted upon defense of this

dissertation. Any copies of the de-identified interview transcripts and de-identified questionnaire data will be retained indefinitely for potential use in future studies.

Chapter 4: Findings

A lack of participation in the recruitment questionnaire snowballed to an inability to use the original grounded theory qualitative group comparison research design (Creswell & Poth, 2018; Glaser & Strauss, 1967; Lindsay, 2019). A design adaptation was necessary to identify a new approach, better suited to address the unexpected challenges with recruitment, while also being aligned with a pragmatic framework (Biesta, 2010; Shannon-Baker, 2016) and a set of research questions seeking to explore and describe the experiences and perspectives of Low NBL use teachers. A generic qualitative approach (Kahlke, 2014; Percy et al., 2015) provided a strong alignment with both the purpose and challenges of this study, offering a dynamic and flexible orientation to address the research questions of this study:

- RQ 1: What are the stories that EC-SA teachers, with Low NBL use, tell about the benefits to using NBL for students with ESN?
- RQ 2: What are the stories that EC-SA teachers, with Low NBL use, tell about the barriers to using NBL for students with ESN?
- RQ 3: How do early EC-SA teachers demographics, teaching characteristics, and nature experiences/perceptions converge or differ according to their level of NBL use?

Comparison groups, originally designed as qualitative groups (Lindsay, 2019), were retained and incorporated into the design of this study through RQ 3 to contrast groups of teachers that shared similar instructional responsibilities but differ in their frequency of NBL use. This contrast was achieved using the ancillary quantitative data collected through the recruitment questionnaire providing another layer to enhance the capacity of this study to add to a meager base of evidence.

A theoretical thematic analysis approach was used to analyze and develop all the qualitative findings of the data collected (Braun & Clarke, 2006; Percy et al., 2015). While this process can be compared to piecing together a jigsaw puzzle (LeCompte, 2000), a more symbolic metaphor for discerning the findings of this research would be raking leaves. My qualitative theoretical thematic analysis used here functioned much like a gardener raking leaves together and trying to understand how to put them back on the tree they came from. As the gardener, it is my duty to rake together these leaves of data into piles, sorting them by the characteristics that make the most sense. Piles based on both the descriptive patterns of common characteristics observed in the leaves as well as what I already understand about leaves and the known trees from which they originate. Finally, to the best of my understanding these sorted piles of leaves are organized so that the tree that they came from, never seen before all at once, can be restored. What follows is my attempt to put the leaves back on the tree.

Demographics, Teaching Characteristics, and Nature Experiences/Perceptions (RQ 3)

Before presenting the findings explicitly related to the exploratory research questions, RQ 1 and RQ 2, it will be meaningful to first present contextual and comparative findings derived from the questionnaire. In addition to functioning as a recruitment tool for semi-structured interview participation, the questionnaire provided some important background data that helps establish a narrow snapshot of current NBL practice for EC-SA teachers of students with ESN. Findings from this snapshot compose a response to RQ 3 along with assisting in the development of findings from the stories of benefits and barriers. Along with contact information, the questionnaire first gathered participant demographic information, teaching characteristics, and some discrete information on nature experiences and perceptions. This nature-related experience and perception data is particularly useful for data triangulation (Brantlinger et al., 2005). For

each segment of questionnaire data, findings are first presented for all participants before the findings from comparison of NBL use groups.

Questionnaire Quantitative Findings

Descriptive statistical methods of analysis were used to summarize, portray, and interpret basic features of the quantitative data collected through the recruitment questionnaire.

“Participant demographics” capture the general characteristics of individuals who participated in this initial portion of the study (Table 2). “Participant teaching characteristics” summarizes traits related to teaching experience (Table 3). “Participant NBL experiences and perceptions” reports some broader educator values and practices related to instructional use of nature (Table 4). These data provide contextual evidence about a slightly broader population of teachers, this study’s targeted group of Low NBL use teachers, and some early insight into potential future investigation of High NBL use teachers.

Demographics: All Participants. The ages of the questionnaire participants ($N = 72$) appears to skew toward middle-aged and older, with the average age of the questionnaire population being 45.4 years ($SD = 12.6$) and a full quarter of respondents falling within the age range of 50-59 years of age (Table 2). Very little variation in the gender of respondents was observed. Nearly 90% of participants reported their gender as “cis-gender woman” ($n = 64$; 88.9%). Participants were also mostly white ($n = 57$; 79.2%) with a majority ($n = 39$; 54.2%) holding master's degrees.

Demographics: High / Low NBL Use Comparison. Distribution of age in the High NBL and Low NBL use groups were comparable to the distribution of overall respondents and each other (Table 2). The average age of high users was 45.9 ($SD = 12.6$) and the low users was 44.5 ($SD = 13.1$). Though the age range with the highest percentage of participation was slightly younger for

the Low NBL use group, 25.0% were 40-49, whereas 27.1% of respondents from the high use group were 50-59 years old. Whether high (87.5%) or low (91.7%) NBL use, respondents were almost entirely cis-gender women. Low NBL use respondents were more ethnically heterogeneous when compared to High NBL users. While most respondents identified as white for both use groups, the percentage of respondents that identified as Asian, Black, Latino/a, Native American, or two or more races and using high levels of NBL did reach a full quarter of the questionnaire population. Education attainment in the comparison of use groups breaks down relatively similarly where the largest response category was the same for each use group. The majority of high and Low NBL users had attained a master's degree. Though, participants reporting higher use of NBL also reported a slightly higher percentage of master's degrees (56.3%) as compared to low users (50.0%). The lone "Ed.D. or Ph.D." also fell within the High NBL use group.

Table 2

Questionnaire Demographics by Level of NBL Use

Variable	Frequency (percentage)		
	All respondents (N = 72)	High NBL use (n = 48)	Low NBL use (n = 24)
Age			
20 - 29	7 (9.7%)	5 (10.4%)	2 (8.3%)
30 - 39	12 (16.7%)	7 (14.6%)	5 (20.8%)
40 - 49	16 (22.2%)	10 (20.8%)	6 (25.0%)
50 - 59	18 (25.0%)	13 (27.1%)	5 (20.8%)
60+	9 (12.5%)	6 (12.5%)	3 (12.5%)
No response	10 (13.9%)	7 (14.6%)	3 (12.5%)
Gender			
Cis-Gender man	4 (5.6%)	2 (4.2%)	2 (8.3%)
Cis-Gender woman	64 (88.9%)	42 (87.5%)	22 (91.7%)
Non-Binary	1 (1.4%)	1 (2.1%)	0 (0.0%)
Transgender woman	1 (1.4%)	1 (2.1%)	0 (0.0%)
Prefer not to answer	1 (1.4%)	1 (2.1%)	0 (0.0%)
No response	1 (1.4%)	1 (2.1%)	0 (0.0%)
Ethnicity			
Asian	1 (1.4%)	1 (2.1%)	0 (0.0%)
Black or African American	3 (4.2%)	2 (4.2%)	1 (4.2%)
Latino/a	2 (2.8%)	1 (2.1%)	1 (4.2%)

Native American or Alaska Native	1 (1.4%)	1 (2.1%)	0 (0.0%)
Two or more races	4 (5.6%)	4 (8.3%)	0 (0.0%)
White	57 (79.2%)	36 (75.0%)	21 (87.5%)
Prefer not to answer	2 (2.8%)	1 (2.1%)	1 (4.2%)
No response	2 (2.8%)	2 (4.2%)	0 (0.0%)
Highest degree			
Bachelor's degree	31 (43.1%)	20 (41.7%)	11 (45.8%)
Master's degree	39 (54.2%)	27 (56.3%)	12 (50.0%)
Ed.S. degree	1 (1.4%)	0 (0.0%)	1 (4.2%)
Ed.D. or Ph.D.	1 (1.4%)	1 (2.1%)	0 (0.0%)

Note. Use frequency: High includes – Daily, 2-3 times a week, Once a week, 2-3 times a month, Low includes – Once a month, 2-3 times a year, Never.

Teaching Characteristics: All Participants. Participant teaching characteristics capture a snapshot of the professional attributes of those teachers who participated in the recruitment questionnaire (Table 3) adding valuable insight into the job-specific backgrounds of participants. The distribution of grade levels taught by all participants ($N = 72$) indicates that the questionnaire was well targeted toward elementary teachers. The selection of middle and/or high school comprises a notably smaller proportion of the population of all participants than elementary grade levels (12.5% teaching any middle grade and 1.4% teaching any high school). Most respondents were teaching in self-described Urban settings ($n = 33$; 45.8%) followed closely by Suburban settings ($n = 29$; 40.3%). Approaching one-third of all participants had 0–5 years of experience ($n = 21$; 29.2%). This was somewhat counterbalanced by the next largest range of response of 21–30 years ($n = 12$; 16.7%). This contributed to an average years of experience for participants of 14.6 years ($SD = 10.8$).

In what is conceivably a small reflection of our modern emphasis on inclusive practices, very few teachers reported that they provide instruction for students that received no specialized support ($n = 1$; 1.4%) or minimal support ($n = 12$; 16.7%). Over 80% of teachers indicated that they provide some instruction for students with moderate ($n = 30$; 41.7%) to extensive support needs ($n = 29$; 40.3%). In another indicator that the questionnaire was well targeted, the three largest response categories for participant teaching certification were: Elementary Education ($n =$

53; 73.6%), Early Childhood ($n = 36$; 50.0%), and Special Education ($n = 22$; 30.6%). Over two-thirds ($n = 50$; 69.4%) of all respondents reported having received their certification through a traditional pathway, earning a degree in an accredited education program and completing teacher certification requirements prior to first year of teaching. Close to a fifth of all respondents were alternatively certified ($n = 14$; 19.4%). Most questionnaire participants reported classifying themselves as general education teachers ($n = 46$; 63.9%), with nearly a quarter of participants identifying as special education teachers ($n = 17$; 23.6%). The remaining participants ($n = 9$; 12.5%) were classified as a collection of “other” roles: administrators, specials teachers (e.g., art educators), and student support personnel (e.g., reading specialists).

Teaching Characteristics: High / Low NBL Use Comparison. High NBL users have a strong presence in the earliest of early elementary. Of the 41 total respondents that indicated that they provided any instruction for students in pre-School, pre-Kindergarten, and Kindergarten, 34 out of those 41 (82.9%) were High NBL users. Then specifically at the kindergarten level, a full 43.8% of High NBL users taught some kindergarten students while only a quarter of Low NBL users taught some kindergarten (Table 3). This trend for the percentages of teachers teaching at specific grade levels flips at Kindergarten. At first grade it is now the Low NBL users that have the stronger prevalence at each grade level first through fifth, with approximately 40 to 50% of Low NBL users teaching some students at each grade level (e.g., First = 41.7%, Second = 50.0%, Third = 45.8%). Additionally, there does not appear to be much of a difference in the average grade levels taught per respondent between high and low use of NBL. High NBL users on average taught 2.3 grade levels while Low NBL users on average taught 2.7 grade levels per respondent.

Outside of the added category “virtual” for Geographic School Type, Rural respondents somewhat surprisingly made up the smallest group of participants, composing the same percentage (12.5%) of both high and Low NBL use. Teachers that reported teaching in urban school settings made up half (50.0%) of the High NBL users group compared to 37.5% for suburban and 12.5% for rural. Looking across school type, a higher percentage of urban teachers are High NBL users than suburban or rural with 72.7% of participants in urban settings reporting high use of NBL compared 62.1% of suburban teachers and 66.7% of rural teachers.

Average years of experience for participating High NBL users (14.2 years) is only slightly lower than the total questionnaire sample (14.6 years) and just over one year less experience than Low NBL users (15.3 years). For years of teaching experience, the 0-5 years range constituted the largest percentage of the High NBL use group with a full third (33.3%) of the participants falling into this range. This was largest percentage for any range of experience for either use group. Compared to the High NBL use group, just 20.8% of Low NBL users had 0-5 years of experience, a percentage that was identical for 6–10 years and 21-30 years categories. The High NBL use group appears front loaded for experience with the largest percentage being those with the least experience (i.e., 0-5 years = 33.3%) and then the other two-thirds of high use teachers are evenly distributed among the subsequent experience categories. The Low NBL use group appears more clustered, with the group being divided between the 0–5 years (20.8%) and 6–10 years (20.8%) categories along with the 16–20 years (25.0%) and 21–30 years (20.8%) categories. Oddly, all respondents who did not provide an answer to the years of experience question reported use that sorted them into the High NBL use group ($n = 4$; 8.3% of High NBL use).

Findings for “highest level of student support provided” revealed that most Low NBL users (41.7%) provide instruction for students with ESN, which is consistent with assumptions. Though interestingly, the lone participant in the whole study who indicated that they provide instruction for no students that receive any level of specialized support did fall within the Low NBL use group. Most High NBL users provided instruction of students with moderate support needs (43.8%), then for ESN trailing closely behind (39.6%). Teacher certification results show that for both High NBL users and Low NBL users the highest percentages of teachers were certified in early childhood and elementary education. The High NBL use group reported a slightly higher percentage of early childhood certification, 52.1%, compared to 45.8% for Low NBL use. Conversely, Low NBL use demonstrated a considerably higher percentage of elementary education certification, 87.5%, compared to 66.7% for High NBL use. Special education certification accounted for relatively similar proportions of high (29.2%) and low (33.3%) NBL use groups. Path to certification tracked similarly across the breakdown of responses for the whole questionnaire population, High NBL use, and Low NBL use. The largest percentages of each group were found first in traditional certification (All = 69.4%, High = 62.5%, Low = 83.3%), followed by alternative (All = 19.4%, High = 22.9%, Low = 12.5%), then non-traditional (All = 8.3%, High = 10.4%, Low = 4.2%), and down to emergency certification (All = 2.8%, High = 4.2%, Low = 0.0%). General educators as the majority carried over to the use group breakdown. General educators comprised 68.8% of High NBL users and 54.2% of Low NBL users. Special educators made up only 20.8% of High NBL users and then 29.2% of Low NBL users. Most special educators that participated in the questionnaire, 58.8% (10 of 17), did fall into the High NBL use category. However, this was conspicuously lower than the 71.7% (33 of 46) of all general educators in the High NBL use group.

Table 3*Questionnaire Teaching Characteristics by Level of NBL Use*

Variable	Frequency (percentage)		
	All respondents (N = 72)	High NBL use (n = 48)	Low NBL use (n = 24)
Grade level(s) taught ^a			
Pre-School	7 (9.7%)	6 (12.5%)	1 (4.2%)
Pre-Kindergarten	7 (9.7%)	7 (14.6%)	0 (0.0%)
Kindergarten	27 (37.5%)	21 (43.8%)	6 (25.0%)
First	23 (31.9%)	13 (27.1%)	10 (41.7%)
Second	25 (34.7%)	13 (27.1%)	12 (50.0%)
Third	26 (36.1%)	15 (31.3%)	11 (45.8%)
Fourth	25 (34.7%)	14 (29.2%)	11 (45.8%)
Fifth	23 (31.9%)	13 (27.1%)	10 (41.7%)
Middle grades (any 6-8)	9 (12.5%)	5 (10.4%)	4 (16.7%)
High school (any 9-12)	1 (1.4%)	1 (2.1%)	0 (0.0%)
Geographic school type			
Urban	33 (45.8%)	24 (50.0%)	9 (37.5%)
Suburban	29 (40.3%)	18 (37.5%)	11 (45.8%)
Rural	9 (12.5%)	6 (12.5%)	3 (12.5%)
Virtual	1 (1.4%)	0 (0.0%)	1 (4.2%)
Years of experience			
0–5 year	21 (29.2%)	16 (33.3%)	5 (20.8%)
6–10 years	10 (13.9%)	5 (10.4%)	5 (20.8%)
11–15 years	8 (11.1%)	6 (12.5%)	2 (8.3%)
16–20 years	11 (15.3%)	5 (10.4%)	6 (25.0%)
21–30 years	12 (16.7%)	7 (14.6%)	5 (20.8%)
+30 years	6 (8.3%)	5 (10.4%)	1 (4.2%)
No response	4 (5.6%)	4 (8.3%)	0 (0.0%)
Highest level of student support provided			
No specialized support	1 (1.4%)	0 (0.0%)	1 (4.2%)
Minimal	12 (16.7%)	8 (16.7%)	4 (16.7%)
Moderate	30 (41.7%)	21 (43.8%)	9 (37.5%)
Extensive	29 (40.3%)	19 (39.6%)	10 (41.7%)
Certification(s) ^a			
Early childhood	36 (50.0%)	25 (52.1%)	11 (45.8%)
Elementary education	53 (73.6%)	32 (66.7%)	21 (87.5%)
Secondary education	10 (13.9%)	6 (12.5%)	4 (16.7%)
Special education	22 (30.6%)	14 (29.2%)	8 (33.3%)
Administration	2 (2.8%)	2 (4.2%)	0 (0.0%)
Student support	2 (2.8%)	1 (2.1%)	1 (4.2%)
Subject-specific area(s)	5 (6.9%)	1 (2.1%)	1 (4.2%)
TESOL	4 (5.6%)	4 (8.3%)	1 (4.2%)
None, working toward	2 (2.8%)	2 (4.2%)	2 (8.3%)
Path to certification			
Traditional	50 (69.4%)	30 (62.5%)	20 (83.3%)
Alternative	14 (19.4%)	11 (22.9%)	3 (12.5%)
Non-traditional	6 (8.3%)	5 (10.4%)	1 (4.2%)
Emergency	2 (2.8%)	2 (4.2%)	0 (0.0%)
Instructional role			
General education	46 (63.9%)	33 (68.8%)	13 (54.2%)
Special education	17 (23.6%)	10 (20.8%)	7 (29.2%)
Other: Administration, specials, student support	9 (12.5%)	5 (10.4%)	4 (16.7%)

Note. TESOL = Teaching English to Speakers of Other Languages (TESOL)

^aParticipants could choose multiple options for Grade level(s) taught and Certification(s); the percentages provided represent the proportion of respondents who selected each option relative to the total number of respondents.

Nature Experiences and Perceptions: All Respondents. Of all questionnaire participants ($N = 72$), 87.5% acknowledged that nature was either “very important” ($n = 35$; 48.6%) or “somewhat important” ($n = 28$; 38.9%) to connect their students to experiences with nature through their instruction (Table 4). No respondents indicated that nature was “not at all important”. Frequency of nature use is the pivotal variable for identification of the Low NBL use group and for the comparison used in this study. Out of all the questions of the questionnaire, frequency of nature use resulted in the most balanced distribution of responses across the spectrum of answer choices, outside of “Never” using NBL (4.2%; $n = 3$). From “Daily” NBL use ($n = 13$; 18.1%) on through to “2-3 times a year” ($n = 11$; 15.3%) the maximum difference between categories was just a matter of three responses. The most common ways that all participants incorporate nature into the learning experiences of their students was “bring natural objects into the classroom” ($n = 20$, 27.8%) (though it is High NBL users that make up the vast majority), “outdoor free play / recess” ($n = 16$; 22.2%), and “nature as project theme” ($n = 11$; 15.3%). The most common place that all participants reported their students getting to intentionally experience and learn with nature was by far the “playground / schoolyard” ($n = 35$; 48.6%). The next most frequently reported places were the “classroom (indoors)” ($n = 9$; 12.5%) and “school garden” ($n = 8$; 11.1%).

Nature Experiences and Perceptions: High / Low NBL Use Comparison. As would be expected, a full 95.9% of participants in the High NBL use group replied that use of nature was “very important” (64.6%) or “somewhat important” (31.3%). Whereas only 16.7% of teachers in the Low NBL use group stated that nature use was “very important” (Table 4). However, over half (54.2%) of Low NBL users did recognize the importance of nature use by

indicating that it was “somewhat important”. Because NBL use groups were established through the symmetrical partitioning of interview participants, when looking at the questionnaire responses, frequency of nature use is divided in totality by the first four “high” use response options and the remaining three “low” use response options. What was interesting was that, again, outside of the few that responded with “Never”, that each response option had roughly the same number of responses: High NBL Use – Daily = 13 (27.1%), 2-3times a week = 11 (22.9%), Once a week = 13 (27.1%), 2-3 times a month = 11 (22.9%) and Low NBL Use – Once a month = 10 (41.7%), 2-3 times a year = 11 (45.8%).

The most common way that High NBL users reported incorporating nature into the learning experiences of their students was through “Brining natural objects into the classroom” (35.4%), an approach used by only 12.5% of those in the Low NBL use group. Low NBL users use nature most through “Outdoor free play / recess” (33.3%), this was followed by “Field trips to natural settings” (20.8%). High NBL users use “Outdoor free play / recess” (16.7%), the second largest proportion for this group, but this is closely followed by both “nature as project theme” and “schoolyard spaces designed for learning” both accounting for 14.6% of high use responses each. Every type of use response option was selected by at least one High NBL user, oddly also including “nature not used”. What can be just as important as the ways teachers use NBL are the ways that they do not use NBL. For Low NBL users, environmental education curriculum, schoolyard spaces designed for learning, and use of technology for nature media were not selected by any participant as the most common way nature was used in their instruction.

Overall, there are not especially substantial differences between High and Low NBL use groups for where nature is most frequently encountered at school. The largest percentages for

place use of both High and Low use were for “Playground / schoolyard”, at 45.8% and 54.2% respectively. The one area that even begins to approach a discrepancy between the levels of use is for “School Garden” with 14.6% of the High use group selecting this as the most common place where students encounter nature compared to just 4.2% of the Low use group (i.e., a single respondent). What becomes interesting about these most common place responses is how teachers selected “classroom (indoors)” for this question (all respondents – 12.5%, High NBL use – 12.5%, Low NBL use – 12.5%) in contrast to the previous questionnaire question where “bring natural objects into the classroom” was selected by 35.4% of High NBL users. An identical 12.5% of Low NBL users selected both “bring natural objects into the classroom” and “classroom (indoors)”.

Table 4

Questionnaire Nature Experiences and Perceptions by Level of NBL Use

Variable	Frequency (percentage)		
	All respondents (N = 72)	High NBL use (n = 48)	Low NBL use (n = 24)
Nature importance in instruction			
Very important	35 (48.6%)	31 (64.6%)	4 (16.7%)
Somewhat important	28 (38.9%)	15 (31.3%)	13 (54.2%)
Neutral	7 (9.7%)	2 (4.2%)	5 (20.8%)
Not very important	2 (2.8%)	0 (0.0%)	2 (8.3%)
Not at all important	0 (0.0%)	0 (0.0%)	0 (0.0%)
Frequency of nature use*			
Daily - (high use)	13 (18.1%)	13 (27.1%)	0 (0.0%)
2-3 times a week - (high use)	11 (15.3%)	11 (22.9%)	0 (0.0%)
Once a week - (high use)	13 (18.1%)	13 (27.1%)	0 (0.0%)
2-3 times a month - (high use)	11 (15.3%)	11 (22.9%)	0 (0.0%)
Once a month - (low use)	10 (13.9%)	0 (0.0%)	10 (41.7%)
2-3 times a year - (low use)	11 (15.3%)	0 (0.0%)	11 (45.8%)
Never - (low use)	3 (4.2%)	0 (0.0%)	3 (12.5%)
Most common way nature used in instruction			
Bring natural objects into the classroom	20 (27.8%)	17 (35.4%)	3 (12.5%)
Environmental education curriculum	4 (5.6%)	4 (8.3%)	0 (0.0%)
Field trips to natural settings	6 (8.3%)	1 (2.1%)	5 (20.8%)
Hands-on schoolyard activities	5 (6.9%)	2 (4.2%)	3 (12.5%)
Nature as project theme	11 (15.3%)	7 (14.6%)	4 (16.7%)
Outdoor free play / recess	16 (22.2%)	8 (16.7%)	8 (33.3%)
Schoolyard spaces designed for learning	7 (9.7%)	7 (14.6%)	0 (0.0%)
Use of technology for nature media	1 (1.4%)	1 (2.1%)	0 (0.0%)

Nature not used	2 (2.8%)	1 (2.1%)	1 (4.2%)
Most common place nature encountered at school			
Athletic fields	1 (1.4%)	1 (2.1%)	0 (0.0%)
Classroom (indoors)	9 (12.5%)	6 (12.5%)	3 (12.5%)
School garden	8 (11.1%)	7 (14.6%)	1 (4.2%)
Outdoor classroom or learning space	7 (9.7%)	5 (10.4%)	2 (8.3%)
Playground / schoolyard	35 (48.6%)	22 (45.8%)	13 (54.2%)
Nature trail	3 (4.2%)	1 (2.1%)	2 (8.3%)
Nearby park, forested area, or wetland	7 (9.7%)	5 (10.4%)	2 (8.3%)
Science lab	2 (2.8%)	1 (2.1%)	1 (4.2%)

Note. *Frequency of nature use questionnaire results reflect the generation of High NBL and Low NBL use criteria established through the symmetrical partitioning of interview participants.

Questionnaire Qualitative Findings

A thematic analysis approach (Braun & Clarke, 2006) was used to develop the findings for the qualitative data collected through the three open-ended response questions of the recruitment questionnaire: OpenResponse_Nature: How would you define "nature-based" learning in your own words? (Table 5), (2) Perception_Benefits: What do you believe is the single most important benefit of using nature-based learning approaches for student instruction? (Table 11) and (3) Perception_Barriers: What do you believe is the single most restrictive barrier to the use of nature-based learning approaches for student instruction? (Table 12). Because of their direct contribution to the first two research questions Perception_Benefits and Perception_Barriers findings are presented in detail in the sections that follow.

Group comparison was employed for quantitative analysis of questionnaire data. Group comparisons were made for only this portion of the questionnaire data collected because: (1) Analysis of questionnaire data was conducted before the High NBL and Low NBL use groups were defined at the completion of the interview data collection and (2) Reanalysis of the qualitative was not as feasible as the quantitative questionnaire data due to how the qualitative questionnaire data was exported without any connection to participant characteristics that could then provide a method for sorting responses for comparison.

Questionnaire: Definitions of Nature-Based Learning. One of the features of the questionnaire design was that teachers were asked for their own definition of nature-based learning before the definition used by this research was presented and any other nature-related questions were asked. This created an opportunity to see how teachers interpret this terminology without any undue influence from information presented by the questionnaire itself. The thematic analysis of this NBL definition questionnaire question (OpenResponse_Nature) focused on the inductive development of themes from the 72 retained questionnaire responses. Themes recognized in the teacher definition responses were nature as: (1) the content of learning, (2) the context of learning, (3) a catalyst for learning experiences, (4) inherently connected to learning, (5) the child's intrinsic disposition, and (6) unsure of what was meant by nature-based learning.

Definitions for "Nature as the content" of learning centered upon natural elements as the target of the learning (e.g., weather, plants, insects). Students learning about nature was a theme evident in 12.5% of the open-ended responses. Definitions for "Nature as the context of learning" focused on the outdoors as the setting / environment in which learning occurs (e.g., use of natural environments, the outdoors, schoolyards). Half of the respondents (50.4%) defined NBL by its use of the outdoors as the learning environment., i.e., students learning in nature. This comports with expectations and was the single most used defining theme. Definitions for "Nature as a catalyst for learning experiences" emphasized the use of nature as an instrument (material or method) to facilitate learning experiences, where hands-on and immersive encounters with the natural world spark a variety of learning processes (e.g., observation, exploration, curiosity, discovery, making connections). Students learning through nature was a theme evident in a third (33.3%) of the open-ended responses. Definitions for "Nature as inherently connected to learning" concentrated on the versatility and value of nature as readily adaptable to learning in

any domain and the portability of nature for use in any setting (e.g., nature for any content area, can be used outdoors or in the classroom). Just under a third (29.2%) of responses were coded as containing this concept, where NBL leverages the instructive value of nature's connectedness to all types of instruction and its usefulness across curriculums and classrooms.

Definitions for "Nature as the child's intrinsic disposition" revolved around a child-centered approach grounded in the natural growth and personal traits of children utilizing individualized, self-paced, student-led experiential learning. This way of defining NBL was not how "nature-based" is conceptualized for the purposes of this research, however such concepts are not wholly outside the umbrella of understanding related to nature and learning. Participant definitions containing the theme that NBL was learning focused on the individual child's needs, interests, and development were present in 14 of 72 (19.4%) open-ended responses. Additionally, a handful of responses accounted for "Unsure of NBL" as a distinct category where no definition was provided, or a definition was prefaced with uncertainty. Those unsure of what was meant by NBL or who did not offer any response accounted for 5 of 72 (6.9%) open-ended responses.

Conversely, a set of participants provided definitions that combined several of the themes found in other responses. A "combined" theme definition was designated as including 3 or more identified definition themes. Just over one tenth of the educators (11.1%) provided open-ended responses that used more nuanced combinations of definition themes. Definitions for combined themes captured the complexity of NBL by combining the core definition components of: context, content, catalyst, and/or connector. These definitions were strikingly analogous to the definition of NBL developed for this study. Table 5 presents example participant definitions for each theme recognized.

Table 5*Questionnaire Participant Definitions of Nature-Based Learning*

Core theme of participant definition (%)	Example quotes
Nature as the content of learning (12.5%): Definitions centered upon natural elements as the target of the learning.	“Nature based learning to me means that the content is grounded in nature.” “Using elements of nature to increase student learning and understand of the world/environment around them.” “Nature-based learning means learning about where our food, clothing and goods come from. Teaching students about farms. Taking kids outside during different seasons to sit on the ground and see what kinds of bugs are crawling around and which animals/plants are native to our area.”
Nature as the context of learning (50.4%): Definitions focused on the outdoors as the setting / environment in which learning occurs.	“Using the outside (natural) environment as part of teaching and learning.” “Learning that involves the use of natural settings and the use of outdoors and natural entities to learn.” “Learning experiences outside.”
Nature as a catalyst for learning experiences (33.3%): Definitions emphasized the use of nature as an instrument (material or method) to facilitate learning experiences, where hands-on and immersive encounters with the natural world spark a variety of learning processes: e.g., observation, exploration, curiosity, discovery, making connections.	“Using materials and supplies that are as natural as possible. Examples: Painting using pinecones, using wood blocks instead of foam, use small stones instead of counters. Learn outside whenever possible, pointing out shadows, things growing, insects, encouraging curiosity.” “Learning through the lens of nature - using examples from nature, going outdoors to explore as a means of learning, etc.” “Learning rooted in the natural phenomena of the earth. Teaching students through hands-on activities both indoors and outdoors using natural elements, processes, life cycles, and observations.”
Nature as inherently connected to learning (29.2%): Definitions concentrated on the versatility and value of nature as readily adaptable to learning in any domain and the	“Incorporating nature into all subjects, not just science.”

portability of nature for use in any setting.	“Nature based learning can be anything from taking lessons outdoors, incorporating real aspects of nature in academics to bringing nature within the classroom itself. I believe children can learn a lot from the impact they have on nature and vice versa.” “I believe nature-based learning uses nature-plants, animals, outside, air, water, sun-those things that man did not make-to teach all types of information. It can use the outside setting, or teach with the natural materials inside. The focus is on incorporating nature as much as possible in teaching all curriculum.”
Nature as the child’s intrinsic disposition (19.4%): Definitions revolved around a child-centered approach grounded in the natural growth and personal traits of children utilizing individualized, self-paced, student-led experiential learning. (<i>not the focus of this research</i>)	“Learning at their own pace in a way that is natural to the student.” “Learning in a way that is most natural to that student and how they process, perceive and relate to information in the world.” “Nature based learning, as I understand it is allowing the child to explore and drive their learning experience through play and experiences.”
Unsure of NBL (6.9%): No definition was provided, or definition was prefaced with uncertainty.	“I do not know what nature-based learning is.” “I am unfamiliar with this term.” “Not sure.”
Combined themes* (11.1%): Definitions provided by teachers capture the complexity of NBL by combining the core definition components of: context, content, catalyst, and/or connector. These definitions broadly approximate the definition of NBL generated for this study, developed from a review of literature.	“It’s learning that occurs in a natural setting, or elements of nature brought in to say like a classroom to help students learn about the natural world, and to engage in specific skills in any aspect of learning.” “Nature based learning involves learning in non-formal ways via natural settings and exposure to nature based settings. Nature based learning can occur during play time outside, making observations about the environment around them, or by bringing in parts of the natural world into the classroom for student interaction. Nature based learning is basically learning about the natural world which will, in turn, help students develop a better understanding of their environment and the world around them.” “Nature-based would be learning that begins/ends/incorporates nature. It could be a theme or the actual learning environment. Learning that occurs outside of the classroom in a natural setting; outdoor classroom, garden

space, park, or wilderness area. Conversely it might be bringing natural objects into a classroom space. Ultimately it's discovery and learning experiences connected to nature."

Note. Because responses can be identified with multiple codes, percentages reported are the ratio of a given theme to the total number of segments coded, not the number definitions collected by the questionnaire (N = 72).

*A "combined theme" definition is designated as including 3 or more identified definition themes.

The Stories of Benefits (RQ 1)

What are the stories that EC-SA teachers, with Low NBL use, tell about the benefits to using NBL for students with ESN? This descriptive and exploratory question was designed to establish a snapshot of current Low NBL use teacher understanding of the benefits of NBL. Findings are reported through the direct words of the participants to the greatest extent possible. The main theme of Benefits was enriched through the thorough refinement of the subtheme framework, followed by the cultivation of rich detail for each subtheme – secondary subtheme: (a) Outcomes – Connection, Knowledge and Skills, Well-being and (b) Experiences - Captivating Engagement, Creative Exploration, Practical experience.

Questionnaire: Most Important Benefit of NBL

The literature review originally contributed to an understanding of a central, overarching, theme of the Benefits of NBL across three subtheme dimensions: (1) Well-being, (2) Only by Nature, and (3) Improved Outcomes (Table 6). *Well-being* reflected the understanding that nature contributes to improvements for social, emotional, cognitive, and/or physical health. *Only by Nature* encompassed the concept that nature is the pathway to immersive experiences that capture students' attention, inspire curiosity, and facilitate hands-on learning in real-world conditions. Finally, *Improved Outcomes* represented the positive impact of nature on student knowledge, behavior, functional skills, and social skills. However, analysis of participant

responses to the questionnaire question directly identifying the single most important benefit of NBL, evolved my way of thinking about the theme of NBL Benefits.

Table 6

Benefits Coding Framework

Coding Set	Main Theme	Subtheme / Code	Definition
Original			
	Benefits		Why NBL is used.
	(1)	Well-being	Improvements provided for social, emotional, cognitive, and/or physical health.
	(2)	Only by Nature	Nature is the pathway to immersive experiences that capture students' attention, inspire curiosity, and facilitate hands-on learning in real-world conditions.
	(3)	Improved Outcomes	The positive impact of nature on student knowledge, behavior, functional skills, and social skills.

Participant responses from the questionnaire began to point to a more complex and precise interpretation of Benefits. The code of well-being was substantiated and upheld through participant quotes like: “Positive health and cognitive growth has been proven to increase if there is at least daily interaction with nature.” Improved outcomes as a pattern of significance was still present in responses such as:

Nature based instruction benefits students through the use of natural objects or natural experiences to help build curiosity, motivation, problem solving skills, collaboration empathy and a respect for the world around them.

Something that was present in the literature review, but was emphatically brought into focus with this additional data, was the idea of a connection grown from nature:

As humans, we need to understand and connect with nature and how the natural systems work within our planet to be able to live in a way where we can continue to exist in a

harmonious way with the planet we live on. If you do not experience, connect, and learn about nature, you are not going to care about it much.

These kinds of responses were particularly focused on what is gained from NBL. With the addition of the questionnaire, I began to see these patterns of data in a new light, the prior Benefit subthemes from the literature review of Well-Being and Improved Outcomes were restructured under a superseding concept of (A) Outcomes. The new *Outcomes* subtheme for NBL Benefits was consequently more expansively defined as the useful enhancements retained through participation in learning with nature.

The original subtheme of Improved Outcomes was distributed into the two more specific secondary subthemes of *Knowledge and Skills* and *Connection*. Knowledge and Skills is the outcome where some advancement of problem solving, social skills, and/or a more concrete understanding of abstract concepts is gained. Connection is the outcome of a reciprocal relationship with nature, where individuals develop a lasting appreciation and a sense of responsibility to care for the environment. (A1) Connection, (A2) Knowledge and Skills, and (A3) Well-being provide a more nuanced portrayal of what can be attained through nature (Table 7).

Questionnaire data also helped to better conceptualize the other subtheme, Only by Nature, which was somewhat nebulous as originally framed. Participants' most important benefits began to indicate more discrete categories for the kinds of experiences uniquely achieved through interaction with nature. Participants described the intensely absorbing interaction with nature that harnesses attention and interest: "The most beneficial part is the immersive learning that takes place." They cited the tangible activities directly involving real things: "The biggest benefit is the feeling and experiences that kids have when they touch and

interact with nature.” Educators also zeroed-in on the authentic practice of discovery and use of imagination: “It provides a way to use students’ natural curiosity about their surroundings to facilitate critical thinking.”

In relation to the Outcomes subtheme that some questionnaire participants focused on, these responses centered around the experiences of NBL, the practice of the activity, the cognitive processes, and the emotions in the moment. I determined that the original Benefits subtheme Only by Nature was better modeled using the broader concept of (B) Experiences. *Experiences* as a new Benefits subtheme is defined as the intrinsic value to involvement in learning with nature. Experiences was then given needed detail and structure through the identification of explicit secondary sub-subthemes of (B1) Captivating Engagement, (B2) Creative Exploration, and (B3) Practical Experience (Table 7). *Captivating Engagement* is the experience with nature that is immersive, capturing students’ attention, activates the senses, and inspires interest, promoting a narrowing of focus in the experience. *Practical Exposure* is the experience of hands-on activities in real-world situations which offer direct contact with the elements of learning. *Creative Exploration* is the experience of a motivated search for understanding, where nature facilitates the exercise of deliberate observation, careful investigation, and practice in the application of knowledge and skills.

Responses coded for Outcomes were more prevalent (63.6%) than responses coded as containing Experience oriented secondary subthemes (43.9%). Of the outcomes, Connection (42.2%) followed by Knowledge and Skills (33.3%) were far more salient benefits for educators compared to Well-being (7.6%). For experiences, the importance of Practical Experience (25.8%) took slight precedence over both Captivating Engagement (16.7%) and Creative exploration (15.2%). As questionnaire responses may receive multiple codes related to the theme

of Benefits, the reported percentages represent the proportion of a specific subtheme compared to the total segments coded, rather than the total Benefits statements collected ($N = 66$). For this question (and for the description of findings for questionnaire Barriers subthemes), participants that did not respond were unable to be coded into any theme by not responding. The revised (A) Outcomes and (B) Experiences oriented coding framework for NBL Benefits is presented in Table 7. The table presenting the complete revised Benefits coding hierarchy, which served as the starting point for analysis and interpretation of interview data, includes additional exemplar quotes and is located in Appendix L: Questionnaire Single Most Important Benefit of NBL (Table 11). It is this revised framework that was then used as the a-priori coding scaffold for the theoretical thematic analysis of the Low NBL use group interview data.

Table 7

Benefits Coding Framework – Questionnaire Revisions

Coding Set	Main Theme	Subtheme / Code (%)	Secondary Subtheme / Code (%)	Definition
Revised	Benefits			Why NBL is used.
	(A) Outcomes (63.6%)			Useful enhancements are retained through participation in learning with nature. Responses focus on what is gained from the NBL experience.
		(A1) Connection (42.4%)		Cultivation of a reciprocal relationship with nature, where individuals develop a lasting appreciation and a sense of responsibility to care for the environment.
		(A2) Knowledge and skills (33.3%)		Advancement of problem solving, social skills, and/or a more concrete understanding of abstract concepts.
		(A3) Well-being (7.6%)		Improvements provided for social, emotional, cognitive, and/or physical health.
	(B) Experiences (43.9%)			Value is intrinsic to involvement in learning with nature. Responses focus on the NBL experience itself, the practice of the activity, the cognitive processes, and the emotions in the moment.

(B1)	Captivating engagement (16.7%)	Participation is immersive, capturing students' attention, activating senses, and inspiring interest, a narrowing of focus in the experience.
(B2)	Creative exploration (15.2%)	Motivated by a search for understanding, nature facilitates the exercise of deliberate observation, careful investigation, and practice in the application of knowledge and skills.
(B3)	Practical experience (25.8%)	Involvement in hands-on activities in real-world situations offers direct contact with elements of learning.

Note. Because responses can be identified with multiple codes, percentages reported are the ratio of a given theme to the total number of segments coded, not the number Benefits statements gathered (N = 66).

Interviews: Low NBL Use Benefits Story Themes

The anticipated themes of the a-priori coding scaffold developed through the literature review and analysis of questionnaire data were extremely helpful in providing a structure of established concepts for the interpretation of the interview data (Percy et al., 2015). In fact, this revised structure for the Benefits theme (Table 7) was crafted in a manner where even while remaining open to new patterns of understanding (Braun & Clarke, 2012), no new subthemes or secondary subthemes were added for the Low NBL use group through interview analysis. While the breadth of understanding for NBL benefit experiences was not stretched further by the interview data, the depth of the detail was substantially enhanced.

Outcomes: Connection. Benefits are the reasons why NBL is used by teachers for their EC-SA students with ESN. Improved outcomes were the aspect of benefits that teachers in the questionnaire focused on most, and of those outcomes, it was a connection with nature that educators pointed to most frequently. Low NBL users only sporadically mentioned this connection, with just three of the six participants making any mention of their students benefitting from a nature connection. When discussing the secondary subtheme of Connection, Sharon (O-E-L) talked about a personal connection, “if students don't see the why and they don't

have a personal connection to it (nature), we're not helping them learn for life. We're giving them a moment to learn for a test.” Sharon (O-E-L) went on to talk about a more spiritual connection that can be achieved, “taking students out into spaces and doing plain air painting and drawing in those outdoor learning environments, we've created another level of connection for the human spirit”. While Heather (G-E-L) discussed connection in terms of a human-environment relationship,

Well, you know, I want them to see the relationships, you know, the connections. I want 'em to start seeing that the things that we learn in class are the things that are happening right outside their windows. You know, I want them to recognize what should be common sense for people that isn't, because they just don't think about it. You know, like, how a seed gets from one place to another, or that seeds grow our food. ... Just helping them to, to understand the connections between plants and animals and humans. And also, like where things come from and how we get those things.

Outcomes: Knowledge and Skills. Low NBL users (all six participants) recounted their experience with the benefits of NBL for the subtheme of Knowledge and Skills most prominently though the learning outcomes they have witnessed. From imagining shapes in the clouds to using found materials as musical instruments, finding creative and/or experimental ways of teaching with nature that simultaneously address academic skills appeared consistently. Jennifer (S-E-L) commented, “Finding rocks and other things out there that we can count or make into letters. I mean, there's so many things we can do out there that I think would be beneficial for them.” Science content was a shared conduit to learning for several teachers. Melissa (G-M-L) stated,

I think that they learn, they get such a, a deeper awareness of the world around them, which I see a lot of students at our school like really lacking, not understanding things like Why does it rain? and like, like nature/science content, but also comfortability being, like interacting with things outside. And I've noticed that the kids who got to do that take more interest in learning about those things, and they show a little bit more curiosity about nature and about the world around them.

Ashley (S-E-L) on noticing differences when she is able to directly use nature in science-related lessons with her students,

For some of my higher functioning kids I do (notice a difference) because they're like, Oh yeah, when we did that. Yeah, my seed grew! or anything, but it's usually my higher kiddos. For my lower kiddos that have trouble expressing things, we don't really see that much. ...And so, it's easier for them to remember, Oh yeah, my plant did have roots. or Yeah, my plant did have leaves, but it needed water and it needed sun. And so, they can kind of, so the higher functioning ones can process that and remember that. And I think it's easier for them to remember since we did it in person.

Low NBL use teachers have observed gains in the development of interpersonal skills, i.e., improved sociability, relationships, collaboration, and communication. Rachel (S-E-L) focused on social skills outcomes,

They are gaining social skills, mainly. They are, they're seeking out social interaction because they wanna share what they're doing with others. And, you know, like I said earlier, they, some of my students who would just play alone, now they're playing with other kids. They may not be talking to each other, but they're actively playing together, not just by each other. They're together, they're playing together.

Melissa (G-M-L) talked about the teamwork that developed when a project-based non-profit organization brought gardening to her school,

I think they also learned a lot of teamwork and, you know, they had to cooperate ... and so they would talk with each other, like, you know, you might have these four kids that are in charge of these plants and those five kids are in charge of those plants. And they would talk with each other in their groups and kind of figure that out as a team. And then the teams would come together and talk about like, oh, well, here's how we did this.

Okay, that's interesting. Here's how we did it. And teaching each other and learning from each other in a way that you don't see as often.

A more subtle (three of six participants) but noteworthy feature of the secondary subtheme of Knowledge and Skills were the skills for life gained. Teachers shared stories of growth in appropriate behavior, personal safety and responsibility, work discipline, and the learning of helpful life lessons. Heather (G-E-L) recounted lessons learned with her students from the vandalism of their school garden,

And we talked about, you know, why were they back there and, you know, maybe they did take some of our food because they were hungry, you know? And so, we talked about if they had ever made a mistake before, you know, if you know, so we, we talked it through.

Outcomes: Well-being. In somewhat an inverse of the secondary subtheme Connection, Well-being was not a strong emphasis of questionnaire data, but was considerably more prevalent among interview participants with all six participants mentioning improvements in physical health, cognitive health, and/or social/emotional health. Ashley (S-E-L) addressed the renewing benefits to well-being that can come from interaction in and with nature,

But they do enjoy being outside. I feel like it does regulate them behavior-wise. Like just makes them more calm and gives them a break from everything. It's a good reset. ... And then they come in and then we're ready to go. And so, we're ready to start the second half of our day. And that kind of helps get us back in the groove of learning. But so yes, I do see a difference in their behaviors being outside and they do enjoy running around having the freedom. 'Cause inside we usually have to sit in a chair. We don't have very much room 'cause we're in the classroom.

Student experience in and with nature is viewed as comforting for students, and school may be one of the few places that it is available to them. Rachel (S-E-L) "... being out in nature, it's very calming. And, you know, while it's calming, it is also an experience a lot of the special ed kids have not had." These experiences can bring students together in ways that impact their social/emotional health. Melissa (G-M-L) observed the belonging and pride that sprouted from a school gardening project,

I do, I think that they, the ownership that they could take over their gardening project last year, like they were so proud of themselves and I think they saw that they were able to do these things independently and it made them feel really proud. And it was really nice to see them, like, excited about the things that they were able to do. ... I think it helps and I think it gives them something positive to look forward to at school, which is something that we need.

Experiences: Captivating Engagement. The other subtheme for Benefits, Experiences, was enriched with much-needed depth and detail. Five of the six participants of the Low NBL use group commented on their students experiencing a captivating engagement with NBL experiences. Ashley (S-E-L) speaks directly to this engagement experience, while also echoing

Rachel's comment referenced earlier that these experiences in school are important because students with ESN may not get them elsewhere, "They're more engaged because I don't think they get to go outside as much." Jennifer (S-E-L) detailed the immersive enjoyment and excitement of the experiences while also calling attention to a critical consideration for teachers when using NBL, that it is not immediately or inherently captivating for all students,

... there's some kids that they could play in the dirt all day long and I think if we had class out there half a day, they would be in heaven. So, it does kind of, it, it kind of makes it hard 'cause I know that there's kids that love to go out there and then, then when there's ones in the class that could care less

Rachel (S-E-L) talked about the benefits possible when students are engaged with their learning and how the novel activity and enjoyment of NBL experiences are not just things valued by students, "Kids are gonna learn more when they're having a good time and not sitting at a desk doing worksheets. I don't wanna learn that way."

Experiences: Creative Exploration. A couple of teachers went on to share their thoughts on the experience of creative exploration. Sharon (O-E-L) captured the beneficial experiences for her student of physical play for their bodies and wonder for their minds,

I had kids who just needed to run, and I needed to learn through that, those experiences, how much time I needed to just let them move and express themselves and get the wiggles out, and then come down to creating something. ... But I really noticed that that a sense of play and wonder started to come back in students that we didn't see all the time.

Experiences: Practical Exposure. Practical exposure to hands-on interaction in real-life settings was touched on briefly by half of the Low NBL users. Ashley (S-E-L) recounted the

value that direct contact with learning has, “So the kids love the materials and they love, they love being able to be hands-on with everything.” Heather (G-E-L) briefly referred to the connecting learning to the real-world, “So trying to circle back around and, and bring back to real life what they're learning in the books.” Sharon (O-E-L) articulated well the beneficial impact of NBL has on students when it is experienced firsthand to shape their perceptions of the value of the spaces themselves,

So, I think that anytime that we can create a space where students are in a space to learn from the things that are in that space is a valuable learning experience. ... if we can create a space where we have an opportunity for students to go outside and do math by looking at the segments in a leaf, or how many steps is it, how many feet is it to the next rock? I think that we are creating the ability for students to see learning can happen in all different types of environments and can be a valuable space for them to learn.

The Stories of Barriers (RQ 2)

What are the stories that EC-SA teachers with Low NBL use tell about the barriers to using NBL for students with ESN? This companion research question was crafted to establish a snapshot of current Low NBL use teacher understanding of the all-important barriers to NBL use. The main theme/subtheme framework of “Barriers” was initially affirmed and retained in its original conceptualization prior to the enhancement and enrichment brought about by the analysis of the interview data. Barrier subthemes recognized in the data were: (a) Nature Not Considered, (b) Constraints of Time and Expectations, (c) Preparation, Resources, and Support, (d) Confidence, (e) Outdoor Spaces and Safety, (f) Student Behavior and Readiness, and (g) Educational Climate

Questionnaire: Most Restrictive Barrier to NBL

Unlike the analysis for Benefits, the Barriers subthemes identified in the literature review mapped exceptionally well onto the theoretical thematic analysis of participant's Barrier-related questionnaire responses (theme framework revision would take place with interview analysis). Analysis of questionnaire response data produced no new subthemes from open-ended responses on the single most restrictive barrier to NBL use. Open-ended responses for barriers corresponded neatly to existing Barrier subthemes of: (1) Nature Not Considered, (2) Constraints of Time and Expectations, (3) Preparation, Resources, and Support, (4) Confidence, (5) Outdoor Spaces and Safety (Table 8). As questionnaire responses may receive multiple codes related to the theme of Barriers, the reported percentages represent the proportion of a specific subtheme compared to the total segments coded, rather than the total barriers statements collected (N = 67).

The most prevalent and prominent Barriers subtheme was *Constraints of Time and Expectations* (50.7%), which came to be defined as the state where instructional use of nature cannot break through the supremacy of scripted lessons, prescribed curriculum, and pacing guidance brought on by pervasive high-stakes assessments and performance standards (for both students and teachers). Educators lamented this obstacle to nature use:

The most restrictive barrier would have to be lack of flexibility in provided curriculum in the district. We are required to teach on a very specific schedule with no room for deviation/variation. I must follow the curriculum and for the most part, cannot bring unique touches into the classroom.

The second most common Barriers subtheme recognized in the questionnaire data was *Outdoor Spaces and Safety* (41.8%) is characterized as the deterrence of NBL by apprehensions over lack of access to natural spaces, hazardous environmental conditions, safety concerns, and

limitations in the design of built environments. Educators gave examples like: “Not everyone has the same access to nature-based learning, weather, environment both natural and man-made can all impact teachers ability to use nature based learning.” *Preparation, Resources, and Support* or when the use of nature for learning is made formidable without additional funding, materials, training, and/or administrative backing was coded in nearly a quarter (22.4%) of open-ended responses for educators’ most restrictive barrier to NBL use. Participants concerned with this barrier were focused on things like “The lack opportunities and funding provided to teachers. Administration pushback can also be a big barrier.”

Table 8*Barriers Coding Framework*

Coding Set	Main Theme	Subtheme / Code (%)	Secondary Subtheme / Code	Definition
Original	Barriers			Why NBL is not used.
	(1)	Nature not considered (3.0%)		Nature is a diminishing part of modern life resulting in a barrier where nature is excluded from educational use by being overlooked and/or misunderstood.
	(2)	Constraints of time and expectations (50.7%)		Instructional use of nature cannot break through the supremacy of scripted lessons, prescribed curriculum, and pacing guidance brought on by pervasive high-stakes assessments and performance standards (for both students and teachers).
	(3)	Preparation, resources, and support (22.4%)		Use of nature for learning is made formidable without additional funding, materials, training, and/or administrative backing.
	(4)	Confidence (6.0%)		Development of sufficient knowledge, skills, resilience, and networks of support become an obstacle to teachers assertively attempting the integration of nature into their instruction with consistency.
	(5)	Outdoor spaces and safety (41.8%)		Nature-based learning is deterred by apprehensions over lack of access to natural spaces, hazardous environmental conditions, safety concerns, and limitations in the design of built environments.

Note. Because responses can be identified with multiple codes, percentages reported are the ratio of a given theme to the total number of segments coded, not the number Barrier statements gathered through the questionnaire (N = 67).

The final two Barriers subthemes of *Confidence* (6.0%) and *Nature Not Considered* (3.0%) were technically present but just barely. Nature Not Considered as a subtheme is the state where nature is a diminishing part of modern life resulting in a barrier where nature is excluded from educational use by being overlooked and/or misunderstood. One of the few responses that focused on this subtheme explained: “Traditional education does not prioritize environmental knowledge -- primarily because it used to be so ingrained into everyday life. The current lifestyle of most Americans does not include nature in any way.” Confidence as a subtheme for this study can be thought of as the inability to develop sufficient knowledge, skills, resilience, and networks of support becomes an obstacle to teachers assertively attempting the integration of nature into their instruction with consistency. The few responses pointed in this direction were directed at the repercussions of a lack of confident instruction: “The space can be very large and engagement could get lost without good management.” The Barriers to NBL coding framework is presented in Table 8. A full table laying out the Barriers coding hierarchy used as the starting point for analysis and interpretation of interview data with additional exemplar quotes can be found in Appendix M: Questionnaire Single Most Restrictive Barrier to NBL (Table 12). This reaffirmed framework then became the a-priori scaffold for the theoretical thematic analysis of the Barrier-related use group interview data.

Interviews: Low NBL Use Barriers Story Themes

During this analysis of semi-structured interview data the anticipated themes were again extraordinarily helpful in providing a starting point for the interpretation with concepts established through the theoretical analysis of this study (Percy et al., 2015). But this time it was the turn for the Barriers theme to expand beyond the a-priori coding scaffold. In the

interpretation of the largely semantic meaning of participant stories while continuing to look for fresh patterns of insight (Braun & Clarke, 2012), some new Barriers subthemes were added for Low NBL users (Table 9). Here the thick and rich data from the interviews expanded and deepened understanding of NBL Barriers. These new subthemes, “Student Behavior and Readiness” and “Educational Climate” will be described following the reporting of the anticipated subthemes: (a) Nature not considered, (b) Constraints of time and expectations, (c) Preparation, resources, and support, (d) Confidence, (e) Outdoor spaces and safety.

Table 9

Barriers Coding Framework – Interview Revisions

Coding Set	Main Theme	Subtheme / Code	Secondary Subthemes / Codes	Definition
Revised	Barriers			Why NBL is not used.
	(1)	Nature not considered	Present-locked Routine-bound	Nature is a diminishing part of modern life resulting in a barrier where nature is excluded from educational use by being overlooked and/or misunderstood.
	(2)	Constraints of time and expectations	Full plate Stick to the program	Instructional use of nature cannot break through the supremacy of scripted lessons, prescribed curriculum, and pacing guidance brought on by pervasive high-stakes assessments and performance standards (for both students and teachers).
	(3)	Preparation, resources, and support	Material and organizational challenges Teaching support and buy-in	Use of nature for learning is made formidable without additional funding, materials, training, and/or administrative backing.
	(4)	Confidence	Teacher Autonomy	Development of sufficient knowledge, skills, resilience, and networks of support become an obstacle to teachers assertively attempting the integration of nature into their instruction with consistency.

		Uncomfortable in uncharted terrain	
(5)	Outdoor spaces and safety	Environmental safety	Nature-based learning is deterred by apprehensions over lack of access to natural spaces, hazardous environmental conditions, safety concerns, and limitations in the design of built environments.
		Health concerns	
		Physical safety measures	
(6)	Student Behavior and Readiness*	Conduct and supervision	The need understood teachers that they must constantly manage student behavior and provide intensive academic supports preventing the time and energy necessary to attempt NBL instruction with any substantial frequency.
		Developmental challenges	
		Environmental sensitivity	
(7)	Educational Climate*	Digital dependence	The array of factors situated in the broader sphere of society that collectively shape the overall atmosphere of education and consequently extend into classrooms affecting the ability of teachers to use NBL.
		Operational upheaval	
		Post pandemic landscape	
		Special education dilemmas	
		Strain of urban education	

Note. *Subthemes added to coding framework with the analysis of Low NBL use participant interviews.

Barriers: Nature Not Considered. Low NBL users did not seem to consider Nature Not Considered all that much. Only three of the six participants of the Low NBL use group had comments coded for this subtheme. While somewhat modest in frequency, what was mentioned is worthy of attention. The Low NBL users that did share their thoughts on nature being overlooked in the instruction for EC-SA student with ESN talked about this oversight being tied

to two experiences, teachers are present-locked and routine-bound. Sharon (O-E-L) shared impressions built upon observations of other teachers being immobilized by the day-to-day difficulties,

They have students who are really, really challenging, who are disrespectful to the extreme. And by the end of the day, all of that, all of those pieces are really wearing them down and they don't have enough bandwidth to continue.

Heather (G-E-L) challenged framing it as an ignorance of understanding but an inability to look beyond the immediate challenges,

I, it's not, I don't think that it's teachers don't think of the benefits. I think they're probably just bogged down with the everyday things we're required to do and not being able to think of what other things can I do outside of the box, you know.

Sharon (O-E-L) then arrived at the idea that some other teachers can get trapped by the comfort of their existing routines and won't endeavor to expand their practices to include NBL,

We have a number of teachers who are like, all right, because of my contract, I have to do seven hours of professional learning. I'm gonna check that box off and I'm gonna do it at this time of year, and then I can forget it and I can go back into my classroom and do the things that I do.

Barriers: Constraints of Time and Expectations. Constraints of time and expectations was a universally recognized barrier by the Low NBL use group. All participants offered their experience with this obstruction. Teachers described having a “full plate” of responsibilities, where any new things that are put on, must pile on top of everything else. And when everything already on their plates is what is considered the priority, there is no room for adding anything different that they think could work better for their students. Heather (G-E-L) said, “I feel like

teachers are constantly getting one more thing, one more thing, <laugh> one more thing, but nothing ever taken off of their plate.” Finding the time for Low NBL users dominated much of the narrative. In response to an interview question exploring this subtheme, Sharon (O-E-L) stated,

I think for me the biggest challenge was not enough time, right? We have a 50-minute class period, by the time you get the kids into the art room and then you get them ready to go with all of their materials and go out into the space, you have very little time to actually be in the space, which is very frustrating.

Rachel (S-E-L) supported this idea when responding to the same question, “For me, it would be, time is definitely one. ... because my kids are all on different schedules, so finding that time to get them to all go outside at the same time is difficult.” Rachel (S-E-L) added, “I wish I had more time in a day.” Melissa (G-M-L) explained the trade-off considerations that go into juggling time and expectations,

... we don't get to do it (NBL) as much as I wish we could. The first one (barrier) is probably time constraints. There's so much packed into the day that we're expected to get through and that we're expected to get done. In terms of like, we have all these subjects we need to teach, there's no transition time built into our daily schedule. And so, for example, like recess ends at the time that math begins. And so, if we want to start math on time, we have to end recess early. Or if we want to have the full recess, we lose part of our math time. And, you know, then it becomes up to the individual teacher to make that call of, What do I think is more important right now? Do I think it's more important to give them that time to be outside and to have a break and, you know, whatever, or is it more important for me to get them inside and drill the math?

Ashley (S-E-L) also referenced the time-intensive challenges unique to special education, “And then if you're special education, you also have IEPs, progress reports, progress monitoring, all the fun <sarcastically> things.”

Three participants each voiced views that indicated their perception that many teachers are operating in a “survival mode”, limiting them from venturing into any kind of unconventional approaches. Ashley (S-E-L) stated that, “But some first-year teachers also are just trying to survive. And so, they're afraid to try anything new.” Jennifer (S-E-L) shared, “all the teachers are trying to, some of them, are just trying to doggy paddle in the water and keep their head above the water”.

Low NBL teachers, predominantly the general education teachers, feel the pressure of expectations to stick the program, that is, to stay on pace and use only the curriculum. Heather (G-E-L) told the story of a time where her use of NBL was at odds with the expectations of her performance,

I would say some of the challenges would come from, from the administration. Like if they couldn't see the benefit of you going out there often and watering, you know, and, and pulling the weeds there were, you know, some admin were like, kind of like, looking at you. Like, Again! You're going out there to the garden. And I'm like, Yep, we gotta go water it. And, you know, because it's like, you have a pacing guide, you have a curriculum you're supposed to be following, you're not, you know, where are you getting this time from? So, depending on your administration, that that could be a barrier.

Fidelity to the curriculum, that does not contain explicit opportunities to use NBL, has become the prevailing norm for some schools. Melissa (G-M-L) described the conflict created in the attempt to include NBL for her students and navigate expectations,

... there's such a huge focus on fidelity to curriculum. You're using the script, you're only using this program. Nothing outside of that is acceptable for some people in charge. And so, it can be really hard to find ways to integrate anything that's not a part of like the math curriculum, the reading curriculum.

Heather (G-E-L) reflected on how this strict adherence to curriculum and pacing was not always the case,

And the pressure to stick to what the district has outlined, you know, 'cause, we're a little bit more stringent here recently with pacing guides and curriculum guides that you're supposed to follow along with timeframes. And so, it's like what page you should be on, on what day of which curriculum, you know? Um versus, you know, I think back when I first started, it was more like themes. You know, we had a lot of themes and we could build upon that with all of the subjects, you know, built around that theme. So, it's a little bit that, that could be difficult.

Barriers: Preparation, Resources, and Support. Preparation, Resources, and Support was a subtheme coded for four out of the six Low NBL use group participants. Low NBL use teachers told stories of how a lack materials, organization, buy-in, skilled support, and preparation can be significant barriers to NBL use. Lack of needed material is a notable challenge for any endeavor, but a lack of organization even when materials might be available is exasperating and can be the undoing of NBL initiatives. Ashley (S-E-L) recounted her challenges with getting the things needed for NBL,

I think the biggest one is just locating the material. Having access to it. Like I know I can rent some things from the (local) museum that like we did a lesson on animal furs. And so, we had the whole kit come in and we got to feel the animal furs. Look at the different

creatures inside the glasses that they brought for us and try to identify which one went to which animal. And so that was fun. But it's hard to find like, things in our everyday life that is accessible to us. But I think that's the biggest challenge.

Ashley went on to discuss the added challenges that teachers of EC-SA students with ESN face when not only materials but the curriculum itself take work to arrange,

And so, some of it's the curriculum, but we still have to go locate the materials and others of it is just finding things that our kids are interested in. ... I have to modify and adjust the curriculum to meet the diverse needs of the learners. Make sure that they have a communication board available so they can communicate to me about what they're learning. And so, there's just lots of things that you have to do before you can present a lesson.

Yet, even when conditions are right, it takes much more than having the right things on hand. At Jennifer's (S-E-L) new school, they had received a grant to get an outdoor classroom up and running but things haven't workout as planned,

And this school, they have an outdoor classroom. They're, they just had written a grant last year, and so they have gotten materials, but they haven't finished setting up kind of the outdoor classroom really to use very well yet. Um so hopefully this year that'll get to be put together more so we can actually kind of use it with our classes.

Jennifer then recounted her experience with the kind of disorganization and confusion that can spell doom for NBL efforts,

But then the outdoor classroom area is locked. I don't even know who all has a key to get in it ... I don't really feel like anything has really gotten done this year. It's just, it's like there, but we haven't set up to have any days where we can go out and help put the

classroom together ... But it's just kind of like, okay, some things have gotten bought, but then I don't know if it's, okay, well when are we, we need to set up a time to get together and work on it. Or her husband's helping to build some things and we're waiting, you know, I, it's kind of in a limbo at the moment. ... And so having one more thing to worry about at the moment, I'm wondering if maybe that's part of it. They just, that's, we'll do that maybe next week, maybe next week. And it just has kind of gotten put on the back burner.

It is often said that good help is hard to find. Without sufficient and skilled support Low NBL use participants found that they encountered adversity. Ashley (S-E-L) stated, “I have two brand new paras this year to my classroom and have never worked with my kiddos with more significant needs. And so, it's been challenge, a big challenge to try to train them” Sharon (O-E-L) had to look outside of the schools where she has been for the kind of help she thought it would take, “And I really worked with trying to find different people in our community that would come in and support collaborative integrated learning”.

Preparation that could open the door for NBL use was especially significant for Ashley. Ashley (S-E-L) discussed the inadequate preparation of other teachers,

But we also want to provide the kiddos the experience (of NBL). So, first year teachers generally do not, until they have a more, a better understanding of how to handle meltdowns in situations and redirection. And so, get a better handle on behaviors before they can venture out further or get a better handle on how to run their classroom. Because they're still learning usually. And most, most of the teachers that I know that are functional teachers or special ed teachers have been emergency certified. So, they don't have all of the academic (background).

Ashely then shared how the lack of support for her own preparation was a barrier,

Because right now we have, for (school district), we have three days before school (first starts). Which most of those three days are consisting of just meetings. Like we have all day meetings for the first two days, then we have a half day to work in our classroom before we had to welcome parents back. And so, we don't have the resources to be able to get the knowledge that we need. So, we have those three days and then all the kids are there, and then we're like, "Oh, no, what do I do with these behaviors? Oh no, what do I, how, how do I teach them this? How do I teach a nonverbal student how to speak or communicate with me?"

In a story that encapsulates the perils of the preparation, resources and support barrier, Heather (G-E-L) shared a significant and compelling account of the victories and struggles of achieving the use of NBL.

... we had a community garden at my previous school. And so, we had a grant that somebody else had put in for it, but then they ended up leaving. Nobody wanted the ten raised garden beds. And so, I said I would be happy to take a garden bed. Well, all ten of them became my responsibility. <Laugh> ... We took it on, my class took it on, and then of course my parents came and helped with like, the tilling of all of it, you know, and planting. And so, we were able to produce a lot of food, a lot of vegetables. ... We would create different little snacks for the kids because they were food insecure. And then at the end of the day, I would take, the kids would help me carry out, we would have five-gallon buckets of all of the tomatoes and the peppers and the okra and everything. And so, we'd take it out front with plastic bags and we would just say, you know, Vegetables come and get it! And so, parents would park and then come up and grab some of the vegetables to

take home that evening. So, it worked out really well doing that. It was a lot of extra work, especially like in the summer. You know when we would be off of school, I had like a summer rotation, watering schedule, and so some of the parents would come and help me water the gardens and pick it and weed it and everything. And so, then I got a closer relationship, of course, with those families.

Yet, even with such a successful demonstration of NBL use, when Heather left that school with all the needed materials and (literal) groundwork in place, without the right support and preparation of others it fell apart in Heather's absence,

And since I've left, unfortunately it has been empty. I've driven by a couple times to be like, Who took it over? And no one's taken it over. So, it's just a big weedy mess back there. Um so, that's a little disheartening to see that.

Barriers: Confidence. Most participants (five of the six) offered their perspective on this the Barrier subtheme of Confidence. Low NBL users asserted that the teacher autonomy advantageous in achieving NBL use stems from a confidence from others (e.g., administrators). Heather (G-E-L) shared her experience with this dynamic,

So, I'm a nationally board-certified teacher, and so I think that title helps as well <laugh> that they know that I'm considered you know, distinguished and so there's more trust there. And then when they see test scores coming back and they're, you know, higher than maybe what's expected, there's more trust there. So, they can allow me the, a little bit more flexibility maybe to do some of those some of the, the ways that I might go off of or switch things around from our timeframes and our pacing guides.

Expertise and achievement develop a confidence that results in opportunity to diverge from conventional methods and utilize NBL activities. Without this external confidence, teachers may

feel like they do not have the freedom and flexibility to attempt NBL. Additionally, half of the Low NBL use group teachers pointed toward the consequences of a lack of personal confidence where they see teachers afraid to try anything new. Teachers observed how it can be very uncomfortable in uncharted instructional terrain. Jennifer (S-E-L) confided,

I haven't done too much stuff with this type of class, only because I guess I've been a little nervous about how it's gonna go. Is it gonna be more like herding cats, <laugh> when we take 'em out there, are they gonna, and so I guess I haven't been as brave as I need to be trying to, to do things with them as much as I should.

Jennifer went on to discuss this concept more generally,

So just, you know, there's, I think a lot of times teachers don't take their kids out just because okay, now we have to get the clipboard, you know, you have to get all the materials and then you gotta line 'em all up and stop talking in the hallway and, you know, and then are they gonna run off and not listen to you while you're outside? I think a lot of teachers kind of have that in the back of their head, like, is this going to be more work, taking 'em outside? Or which really it needs to be, let's get them outside!

This reluctance when there is a lack of confidence and knowing attempts at using NBL are going to be difficult can go beyond the teachers themselves. Rachel (S-E-L) made this observation about parents,

I feel like they (students with ESN) do not get the opportunities to be outside, like kids who do not have disabilities because it is more work for the parents. And I could be wrong. It's just something I've noticed over the past couple years working with kids with special needs.

Sharon (O-E-L) described a culture of comfort in teaching that also extends throughout our society, leaving us insecure about pushing beyond typical routines,

We don't know how to go through hard things and to know that our body is built for that, and that by pushing ourselves through those, we start to feel better about ourselves emotionally and physically and what that can do for us as a whole society, and depression and fatigue and in our own physical wellbeing and mental wellbeing. So, I think those are pieces that we have to bring back.

Sharon went on to explore her idea that this lack of confidence has left us risk-adverse and too comfortable in conventional practice, which then produces a need for permission. Without permission to try NBL, many teachers won't. Sharon (O-E-L) saw "that we have to give permissions to teachers now to say, where do you think it'll work? You know, what are your ideas? And you have permission to bring those in."

Barrier: Outdoor Spaces and Safety. Outdoor Spaces and Safety was another Barrier theme where all participants of the Low NBL use group have something to say about the safety of schoolyard environments, concerns for student health, and measures they perceive are needed to keep students physically safe when experiencing NBL outdoors. Sharon (O-E-L) addressed the environmental safety concerns of teachers related to the weather in her region,

... when I was at (elementary school) classroom, teachers would be like, Man, it's too hot out there! that it's like the surface of the sun. I'm not taking kids out there. I don't wanna sweat. I'm not gonna do that. So that comfort piece was a huge piece of that teacher making that decision of not taking their students out to learn something in a space where it's tangible versus using a PowerPoint or a book to do it. And that, I don't know how to

get past that because it's an individual thing, but it's also a societal thing that we're dealing with right now.

Jennifer (S-E-L) corroborated this this perspective when she said,

And I know when it's so hot, you know, a hundred degrees, taking them out there is not very helpful at all. But I think once it cools off, this would, it would be a great place to go take them out there and do a math lesson or a reading lesson with them, or, I mean, or even a social emotional lesson.

Another concern that can be a significant schoolyard barrier specifically for students with ESN, is that the built environments of schoolyards can require adaptations for students to access them.

Rachel (S-E-L) spoke about the needed schoolyard adaptations her students, but felt her school had them, “No, (no barriers) because even the students who do have more of the handicap, physical handicap, there are adaptations to the equipment. So, every student is able to use it all”.

Sharon (O-E-L) provided an additional illustration demonstrating that adaptations can be a barrier, but through another situation where they were successfully provided in the construction of an outdoor garden,

But the pathway that we created for our students was gravel that was not compacted enough for our wheelchair students. And so, they got stuck. And so, we had to come in and think about, How do we create a path that can stay no matter what type of weather accessible to all students all the time? And so, there were some adjustments there that we had to create. And then we created wider paths around our garden beds so students could get in and around. And we created those beds as narrow pathways or narrow spaces rather than a really large gardens bed that we had originally. So, we were moving it so that students could reach in no matter what space or time, you know, they were at or what

capabilities they had. So, all of those pieces were things that we developed over the years of, I think I was there for about eight years. And that was really the end goal.

Concerns over student health and physical safety came almost exclusively from special education teachers. Ashley, a functional classroom teacher, was deeply attentive to injuries and allergies (i.e., blood and bug bites). Ashley (S-E-L) stated, “The other challenge is having to worry about insect bites and things like that. We don't want the kids to experience any adverse reactions.” Ashley (S-E-L) went on to share,

And we don't wanna eat rocks and things like that. <Laugh> Yeah. We've had to pull rocks out of kids' mouths before in, and wood chips and sand and dirt. ... Just trying to keep everybody safe and go home without bleeding.

Another Barrier factor that teachers addressed were the measures that were needed to ensure the physical safety of their students. Melissa (G-M-L) noted about class size, “it becomes a safety concern to take, you know, 28 kids all outside where they could, in theory, like run away, like run to their house.” Then even what might typically be considered a manageable number of students, without enough eyes and hands, teachers in high needs settings have a very difficult using their schoolyards. Rachel (S-E-L) stated, “The other one (barrier) is safety, because we are short staffed and taking them all out and being able to keep eyes on all of them is a safety (issue).” In high need settings capacity for supervision is strained not just by student numbers but by the extremely broad ranges of age and ability. Ashley (S-E-L) stated, “I'm, I've seen how it's been in the past. I kind, I enjoyed having the smaller, like the third through six students ... And not the K through six, just because it is such a hard range.” Rachel (S-E-L) went on to detail one of her students that exemplifies the challenges of providing NBL for students with ESN safely,

But we also have a student who requires a one-on-one. And I would say this student is my most challenging student just because her safety is very important. Um 'cause she doesn't recognize any kind of danger or anything like that. And for a while we did not have a one-on-one for her. So just that did put limits on what we could do. But she loves, the student, she loves being outside. ... But yeah, just the short staff, it does make it difficult. Jennifer and Rachel each talked about the importance of fences. Jennifer (S-E-L) conveyed, "So having, at least we have a fence around the school and you know, it's semi safe and a controlled environment for you to, to take them out and do activities with them outside." Rachel (S-E-L) added,

I do have a few runners and our fence around our school is, there's holes in the fence and they can easily get out. A bond was just passed the other day, so we will be getting a big metal fence around the whole property. So, I think that will make it easier or make me more comfortable to take the kids outside because they won't be able to run off on us, especially, we're short staffed. And I mean, that's a safety issue.

Barrier: Student Behavior and Readiness. *Student Behavior and Readiness* is the need understood by EC-SA teachers that they must constantly manage student behavior and provide intensive academic supports preventing the time and energy necessary to attempt NBL instruction with any substantial frequency. Student Behavior and Readiness was added as a subtheme (Table 9) because it first stands out clearly as a pattern of significance for Barriers in the interview responses of Low NBL users. It was also accentuated by its scarcity (but not absence) as a concept in the prior work developing the Barriers theme in both the literature review and questionnaire analysis. This barrier was a topic where all six participants contributed their experiences and perceptions. Their responses focused on the challenges of the

developmental delay of academic and social skills, the special environmental sensitivities of their students with ESN, and the more intense supervision required to manage extreme conduct.

Melissa (G-M-L) very succinctly put it, "... we have so many students who are, you know, two, three, four grade levels behind so many students who have those behavioral challenges". Many young students are not prepared for school academically or behaviorally. Being at this EC-SA level of instruction Ashley (S-E-L) shared her experience with these distinct barriers,

Because like I said, some of our children have never been to school, especially with COVID. Some of them have been homeschooled due to COVID and now they're coming back and they haven't had any socialization with anybody because of the pandemic. And so that brings its whole new challenges.

Low NBL use special education teachers referenced the complexity added to attempting NBL due to the sensitivity some of their students have with change and sensory environments outside of their typical classroom space. Ashley (S-E-L) stated, "Some of my kiddos are very anti-people and so they just don't want to be around anybody. Too much sensory overload." Jennifer (S-E-L) detailed some of the challenging dynamics of her class,

... the main thing is just some of the behavior and some of the, is just getting them outside so we can do an activity and some of them it's, you know, some of them are so obsessed with like our schedule. ... Like if we, if we don't, if we try to do something and it's not the way we usually do it, that can set 'em off. ... it doesn't matter what <laugh>, how much a warning I give them, how many visual schedules I give 'em, it, you know, it still kind of freaks them out. And but I, it's not anything that I feel like should be something that wouldn't let us go. Like, I'm just gonna have to get over it, if we throw a

fit going outside, we throw fit going outside, or one of the paras can stay in with those couple of kids and two of us can take the rest of the class out and we can tell 'em when we get back what fun they missed <laugh> with what we did. '

While Jennifer concluded such sensitivities should not wholly deter the attempt of NBL experiences for her class, other teachers are stymied in their use of NBL by the conduct of their students and the supervision that it requires. Ashley (S-E-L) explained, "I personally don't have any live animals in my classroom because my kids are not always the gentlest. ... We don't know our own strength. So, they do not live in my classroom, but they come and visit." Ashley continued to elaborate,

like with my kiddos, they require more significant attention. And so, an adult always has to be with them. And, and where a typical child might be able to go outside and play without an adult, my kiddos always need the supervision. And so, I don't think they get to go outside as much.

More than other areas of Student Behavior and Readiness, it was the behavior aspect that Low NBL use teachers focused on. Three of the participants detailed their encounters with conduct prohibitive to NBL. Melissa (G-M-L) stated,

Another big constraint is behavior, because especially in the past couple years, we have just had more students who are dysregulated, not able to express their emotions in a productive way. Especially like frustration, anger. Somebody sits in the spot I wanna sit in, I'm kicking the chair out from underneath you. Things like that happening on a pretty regular basis.

Ashley (S-E-L) shared the experience she had with her class last year, "students had some more behavioral needs where they would pose a danger to other students because they scratch others

or pinch others. We had too many with higher needs and it was harder to keep an eye on them". Heather (G-E-L) recounted the myriad of behavior-related factors that must be consider if she wants to take her current class out to the walking path that her school has access to,

Let's see, another barrier that I'm seeing, like with this class, my current class of, you know, leaving the property, like I said, is the impulsivity that I have with especially my student with (diagnosis). He, he's still having some severe behaviors. ... So, leaving the school grounds with a, a student who struggles. And then also my other student that has the alternative curriculum program who's not potty trained and nonverbal. So, just trying to you know, keep her safe. And her family doesn't allow her to leave school grounds. Like she wasn't allowed to go on the, to (field trip) because she wanders off and her family has lost her before when they've gone on the family vacation. So just trying to figure out how to best support them but not take away the experiences from the other kids.

Similarly, Melissa (G-M-L) vividly described her difficult dance of decision making and how that can impact where her instruction can take place,

And so now I have, you know, 28 students, three or four of whom will just, you know, they get mad at something that happens, they don't get their way, and then they start running around punching people in the face. And you can't get them to stop unless you like, call their parents to come get them. And it's really unfortunate that that's happening. But we have to make, you know, day-to-day instructional decisions and decisions about where we're doing things and what we're doing and how we transition. We have to make decisions with all of that in mind.

Barrier: Educational Climate. *Educational Climate* is the array of factors situated in the broader sphere of society that collectively shape the overall atmosphere of education and consequently extend into classrooms affecting the ability of teachers to use NBL. These are the current larger cultural attitudes, institutional conditions, and population-level landmark events that teachers perceive permeating how schools and teachers function. Educational Climate was added as a Barrier subtheme because this was the data that did not fit well in other subthemes, but constituted an interesting pattern present across the discussion of NBL barriers for all six Low NBL interview participants. Their responses focused on the operational upheaval their schools and districts were experiencing, the post-pandemic landscape of education, dilemmas related to special education, the strains that are a product of urban educational settings, and our increasing digital dependence.

Low NBL use teachers described the school and district level disruptions that are impacting the ways schools operate. Teachers described the obstacles of having to navigate short staffing as well as both school and classroom closings. Melissa (G-M-L) explored insight into this barrier,

So, (experiencing) a lot of understaffing and under-resourced. ... In a perfect world, you know, there would be three or four second grade classes and we could, you know. More focus on those, like developing those SEL skills and also separating people who, you know, make each other upset. But we don't have the people to do that.

Melissa (G-M-L) went on to share a story of the repercussions of this upheaval,

And because of the behaviors, one of the first-grade teachers quit after the first week of school, and they never replaced her. So, this class had no teacher for an entire school year. All of them got moved up to second grade.

This specific obstacle seemed to be impacting special education teachers in distinctively apparent ways, as all three of the special education teachers in this group of Low NBL users made references to this operational upheaval. Ashley (S-E-L) shared, “We closed one of our functional classrooms and combined it so that functional teacher went to another school.” Jennifer (S-E-L) was on the receiving end of a similar closure, “well, I’m fairly new at this school, so I don’t, this is my second year here. My previous school was shut down, so I got moved.” Rachel (S-E-L) optimistically articulated the impact of essential staff shortfall,

Like we have a lot of outdoor space we’re able to utilize. Just a concern with that is for one, I’m short staffed <laugh>. ... So right now, I have two (paraprofessionals), but one has been out for the past two weeks. And there hasn’t been a sub for her. We all know about the sub shortage <laugh>. Yeah. It’s crazy. But we’ve been making it work.

The consequences of the COVID-19 pandemic are another evolving element in this Educational Climate barrier. Teachers are now teaching in the direct aftermath of COVID and are starting to experience and understand its impact on their teaching in a post pandemic educational landscape. Heather (G-E-L) detailed her account of the effects she has witnessed,

... these are the kids when we had the COVID shutdown, so their daycares and preschool centers were all shut down. Their kindergarten year was no centers, no social activities. They were, had their own baggies and materials. So, the kids aren’t, it’s not second nature to them yet to share and collaborate. Communication can be strained. So, I do a lot of like social emotional type learning with cooperative groups where they’re working alongside at least one other person just to try and build on those skills.

Jennifer (S-E-L) recounted what might be typically hidden but lasting consequences of the disruption of COVID,

... apparently the year COVID hit and we all got sent home, they had written a grant for the outdoor classroom and gotten it, but then because everyone was sent home, I don't think they really got to use the grant to purchase anything and set the, set it up.

Ashley (S-E-L) also mentioned in a story above, related to Student Behavior and Readiness, the barriers from COVID she was experiencing. She explored how “our children have never been to school” because of COVID, leading to where her students “haven't had any socialization with anybody because of the pandemic” placing the burden of “whole new challenges” on herself and others. Another product of COVID is an ongoing utilization of remote learning, adding another thing the full plates of teachers ostensibly crowding out other things that they could do with their finite amount of time. Ashley (S-E-L) shared,

Now not only do we have our in-person class, but we also have to keep up an online platform for, for the virtual days or the weather days. ... we each have (online course pages) that we have to keep up for our students. And so, they have their courses just like we have ours, just their elementary courses instead of college courses.

Another feature of the current educational climate that presents a larger structural hurdle that teachers must face are dilemmas distinctive to the field of special education. Both a special and general education teachers pointed to these issues that can impede their capacity to use NBL with their students with ESN. On the potential for increased NBL use in school Rachel (S-E-L) spoke to the marginalization of some of her students, “Because they (students with ESN) do, they do get left behind in a lot of things in general.” Rachel’s concern that students that experience disabilities will be left out was mirrored in the flaws in the special education process that Melissa observed leaving students out of the support services that they may need. Melissa (G-M-L) noted, “The district is really <emphasis> behind on evaluating students who need to be

evaluated. They, so there's a lot of kids who have disabilities and who would qualify for services that are not receiving them.” Melissa further elaborated, tying together the operational upheaval and problems of special education that become a pervasive obstacle,

There's not enough special ed teachers and paras and TAs and things like that to actually facilitate those classes. So like if the SPED teacher's gone one day, then they just don't get services that day. There's no one that can provide those to them.

Another piece in this pattern of educational climate barriers came from teachers sharing their confrontation of the hazards and challenges of urban life, the trauma that students experience from their home environments. These strains of education in urban environments described by teachers are another brick in this population-wide barrier to connecting students to learning experiences with nature. Heather (G-E-L) having just started at a new school, shared her assessment of the kind of challenges found in the urban environment much of her teaching experience came from, “So and we were, we were in an area with a lot of gang violence, a lot of drug and alcohol use generational poverty.” Melissa (G-M-L) paints a picture of how her students are bound first by a hardship of opportunity and then by geography resulting in the kinds of deficiencies of experience that NBL can be used to mitigate,

Most of them have not really ever had the chance to leave this community. Even like going as far as downtown (city) they have never, or they only really ever go there on field trips or things like that. We go downtown, they say, Oh my gosh, is that (another major city in south central state) <laugh>? Like, no, not quite. So, they have a very limited exposure to the world around them.

Jennifer (S-E-L) lamented the distressing conditions that some students might get a break from only when going to school (and maybe not even there),

... sometimes it wasn't, didn't even feel super safe walking in the building. So, then that can be hard when they go home, for the parents to let them go outside and play, when there's so many kids too that their parents are working late and it's really not safe for them to be outside by themselves. ... I don't know, it's, that's sad. It's sad.

Melissa (G-M-L) shared a powerful and heartbreaking glimpse at the everyday tragedies that students endure, and teachers must navigate,

... another huge part of it is that most of our students have like, experienced a lot of really severe trauma. Just this past week we had a student whose primary caretaker passed away. We had a student whose mother was shot, and the two of the kids that go to the school were in the car with her. We had another student who had a noncustodial parent kidnap them and drive them across the state. Things like that are just happening constantly and we're having to just, you know, say, I know that you're going through all of this stuff, but let's focus on our reading. Let's focus on our math. Like, come on, I need you to stay with me so we can, so we can get your test scores up. And that's really what a lot of people in charge, that's all they really care about. ... And so, we're just ignoring those and instead of, you know, slowing down, taking a beat, working through some of those problems, just saying, well, you're behind. You're behind. We gotta catch you up. We gotta catch you up. Which is just making the problem worse, in my opinion.

Several Low NBL use participants also made mention of the growing impact of digital devices and media on the attention and behavior of their students, each did so several times without this study actively seeking to explore this specific barrier. These teachers concentrated their comments around their experience with the devotion of excessive time to the use of digital

devices, how this digital activity was supplanting physical activity, and that they believe these digital connections leave a very genuine need for connection to the natural world.

The time spent on devices was particularly concerning for Jennifer (S-E-L), “so many kids just play on their tablets or they're watching tv”. Jennifer explained further, “A lot of them, that's kind of what their, their parents, a lot of them, they just kind of put 'em on iPads at home” and was explicitly appreciative of the effort of this research,

I'm really glad you're doing the research on nature and outdoor kind of areas and classrooms and things like that because it is so important nowadays when all the kids seem to be on their electronics and stuff, especially when they get home and they, they need to be out in nature.

Sharon (O-E-L) reinforced this idea and made the connection that this is not just a barrier that impact students but also one that affects teachers,

I think that we as a society spend so much time on devices and learning through a Chromebook or an iPad ... I want you (other teachers) to go outside. You need to connect with something other than your computer, other than your phone, other than your space in your in the four walls that you're in. Go outside. It's an important component of who we are.

As the digital world begins to take up more and more time and attention of kids, the special education teachers of the group talked about what can be lost in this trade-off of natural for digital. Ashley (S-E-L) commented, “Kids these days are always on their tablets or inside”, “they don't go outside and play as much.” Jennifer (S-E-L) expressed her concern,

And even when we've taken the kids out, sometimes they just sit there and it's like they don't know how to play. And it's kind of sad that like, they're not trying to go down the slide, like just simple things outside.

Jennifer (S-E-L) went on to relay a story that was told to her by another teacher who was also concerned about the costs of an increasing digital dependence,

... there was somebody the other day, said they had taken the kids out or something and they're, one of the kids didn't know like how to, oh, the gym teacher was like, the kids don't even know how to like, bounce the ball correctly because like the strength in their hands because all they're doing is swiping and pointing and things. Like, they don't go outside and throw the ball or bounce it or play chase or little things like that. They don't. And it's such a good, just a social thing too, going outside and talking to people and interacting with them and not a video game. And I think we need to do a lot more of it (NBL) and hopefully this (study) will help some.

Just like the climate of a region can help a plant wither or thrive, the educational climate these teachers are immersed within has the capacity to help NBL for EC-SA students with ESN fade or flourish. For Low NBL users, they appear to see their educational environment as one that has held back growth of NBL in their instructional practice.

Chapter 5: Discussion

By generating insight into how basic characteristics of high and Low NBL users compare, and exploring in detail the benefits and barriers of NBL through the eyes of teachers who value it, yet struggle to incorporate it often, we begin to identify ways to help these teachers guide their students to intersections with the parallel world of nature.

RQ 3: Demographics, Teaching Characteristics, and Nature Experiences/Perceptions

Questionnaire Low and High NBL use groups were remarkably similar demographically (Table 2). To characterize the Low NBL group, they were very slightly: younger, more cis-gender women, more white, and less likely to have a graduate degree than the High NBL use group. Interviewed Low NBL users aligned well with these demographics. Yet, because of strong similarities between Low and High NBL users for age, gender, ethnicity, and education, these factors from do not strongly suggest that additional description from this data would meaningfully enhance our understanding of EC-SA teacher use of NBL.

Questionnaire Low NBL users taught in higher percentages at the grade levels first through fifth (i.e., from about 40 to 50%) compared to high users demonstrating a concentration of instruction at preschool through kindergarten (Table 3). In fact, the most frequently taught grade level for questionnaire Low NBL users was 2nd grade (50%). Every single Low NBL use teacher interviewed taught some at least some second grade students, with two teachers, Heather and Melissa, only teaching second grade. Low NBL users on average taught 2.7 grade levels per questionnaire respondent, compared to the 2.3 grade levels for high users. It cannot be automatically assumed that more grade levels taught equates to more of a workload for teachers. But theoretically, if a large discrepancy was found here between low and high NLB use, where low users were responsible for instruction across a much broader range of grade levels, this could

have been tangential evidence for a possible relationship between teaching responsibilities and capacity to use NBL. Interviewed Low NBL users did have a larger average of grade level teaching responsibilities, 4.5 grade levels taught per interviewed teacher. Because of this hint of difference found here, more data might be helpful in clarifying the potential complication of instructional responsibilities from more grade levels taught, an aspect that is more salient for special education teachers.

Questionnaire Low NBL use teachers were most likely to teach in suburban schools (45.8%) when compared to High NBL users who more frequently taught in urban school settings (50.0%) (Table 3). Participants from both groups were least likely to report coming from rural settings (12.5%). This tendency was reflected in the interviewed Low NBL users with four out of the six teachers (66.7%) teaching in self-reported suburban settings, the other two participants teaching at urban schools, and none from rural. When looking at just suburban teachers, 62.1% were High NBL users while 37.9% were Low NBL users, the highest percentage of Low NBL use for any Geographic School Type. Then amongst only urban teachers, just 27.3% reported Low NBL levels compared to 72.7% of urban teachers as High NBL users, the highest percentage of High NBL use for any Geographic School Type. In contrast to assumptions that more access to nature might be associated with increased NBL use, this incidence of High NBL use in urban settings shown in the questionnaire data, raises an interesting question that could not yet be addressed here: Could a lack of access to nature in the home/school environments actually be a motivating factor for urban teachers to use NBL experiences with a higher frequency?

From the questionnaire, Low NBL users averaged more years of experience (15.3 years) than High NBL users (14.2 years). This is a product of a full third of High NBL users having 0-5 years of experience (the largest category for the group) compared to just 20.8% of Low NBL

users for the same range. While these differences are somewhat minimal, these results do run contrary to the expectation that it would be the less experienced, knowledgeable, comfortable, or confident teachers that would be less likely to use NBL (Hotchkiss, 2011). This is another interesting dynamic that would benefit from a closer look for any potential relationship between years of teaching experience and capacity to overcome barriers to use NBL with frequency.

Since the demands upon teachers increase as student needs increase, it could be predicted that when academic and behavioral supports increases that the use of practices that involve special knowledge, planning, materials, and/or spaces (i.e., NBL) would decrease. The pattern of percentages for the Low NBL use group aligns with this assumption. The proportion of Low NBL use respondents increases as the level of support increases: No specialized support = 4.2%, minimal support = 16.7%, moderate support = 37.5%, extensive support = 41.7%. It might then be expected that an inverted distribution would be observed for the High NBL use group, with the proportion of High NBL use respondents decreasing as level of support increases. This, however, is not what is described by the results. The largest percentage of High NBL users report providing instruction for students that experience moderate support needs (43.8%), with instruction for students that experience ESN not far behind (39.6%). Almost twice as many teachers of student(s) with ESN are High NBL users ($n = 19$; 65.5%) compared to those that use NBL with a lower frequency ($n = 10$; 34.5%). This dynamic was not explored through the interview data as interview participants that provide instruction for students with ESN were heavily prioritized through the interview inclusion criteria (e.g., Appendix I – Inclusion Fit Matrix; Appendix J – Inclusion Fit Participant Summary Table – Good Fit).

Interestingly, it was the non-traditional pathways to certification (i.e., Alternative, Non-traditional, and Emergency) together that composed a notably high percentage of the High NBL

use group (37.5%) compared to those same categories for the Low NBL use group (16.7%). For Low NBL users 85.3% were traditionally certified. When looking only at teachers that were traditionally certified, 60.0% were High NBL users and 40.0% were low NBL users. While only 22 participants constitute the combined non-traditional certification categories, a full 81.8% are High NBL users with only 18.2% reporting Low NBL use. This data prompts consideration of the potential for teachers trained non-traditionally to be more likely to use non-traditional methods (i.e., NBL) more frequently. The possibility of this idea resonates with me because I gained my initial teacher certification through an alternative certification program.

The teachers who participated in this study value nature. Out of all questionnaire participants, 87.5% affirmed the importance of connecting their students to nature experiences through instruction. This total positive importance was comprised of the responses of “very important” (48.6%) and “somewhat important” (38.9%). These findings mirror the kind of value that educators had for NBL in Almers et al. (2018) and Hotchkiss (2011). Of course, High NBL users valued NBL use (e.g., 64.6% “very important” alone), but even the Low NBL use teachers demonstrated a total positive importance of 70.8% (17 of 24). When nature importance responses were broken down by role, general educators were more likely to say that nature was “very important” in their instruction (58.7%) compared to special educators (29.4%). Although, this distribution was inverted with over half of special educators (58.8%) and approaching a third of general educators (28.3%) identifying using some form of nature in their instruction was “somewhat important”. So, even between special educators and general educators, the overall positive importance was virtually the same; 88.2% of special educators and 87.0% of general educators. This value was also present for Low NBL use interview participants in the stories they told about the NBL benefits. I do not believe that these teachers would have committed to the

conversations in the first place if it was not something they cared about. Value was unmistakable as these Low NBL use teachers told their stories. This was especially apparent when some admitted that they know they should be using nature more than they are, e.g., Jennifer (S-E-L) “(NBL) Definitely not as much as I should.” Heather (G-E-L), “Let's see. Well, this year I would say it (NBL use) has not been often enough.” Every way this study found to look, EC-SA teachers value NBL. Implicitly conveyed in all this is a problem that is foundational to the purpose of this research, that the Low NBL use teachers are “low” because they do not use NBL with much frequency, despite this apparent value. These findings provide further evidence, in addition to Hotchkiss (2011), Gallegly (2020), and Torquati et al. (2013), of the incongruity between teacher value of learning with nature and only superficial incorporation of nature into instructional practice. This discussion will continue to interpret and explore the features of this disparity, the benefits and the barriers between believing in NBL and using NBL.

Another compelling feature of the findings that may have the future implications was that low and High NBL users from the questionnaire do not just have different levels of NBL use, they also use NBL differently. The most common way Low NBL users reported incorporating nature into the learning experiences of their students was taking their students outside (“Outdoor free play / recess” = 33.3%). The most common way that High NBL users used NBL was brining nature inside (“Brining natural objects into the classroom” = 35.4%). Brining nature into classrooms could be a distinctive differentiating feature between low and high EC-SA NBL users, and deserves more attention. Plausibly, Low NBL users might use nature less in part due to a reliance on the outdoors for NBL. When getting everyone outdoors is not easy, it does not happen that often. Changing the definitions of Low NBL users, shifting thinking about nature as purely a context, to nature as a catalyst for learning that can take place anywhere, could serve as

an incremental first step toward progress. A more classroom-oriented emphasis for NBL initiatives could be exceptionally appealing for EC-SA special education teachers where their classrooms can provide more controlled and safer environments essential for successful instruction for students with ESN. It is the special education teachers, Ashley, Jennifer, and Rachel, that most acutely portray environmental concerns in barriers of Outdoor Spaces and Safety and Student Behavior and Readiness. All Low NBL use interview participants did mention of some examples of nature-related instructional activities they use indoors: animal visit experiences, art activities using natural materials, and especially growing plans. The interviews demonstrate some classroom use of NBL for Low NBL users is happening.

The responses for the most common way nature is used offered another notable observation when compared to responses for the most common place nature is encountered. While both high and Low NBL users reported that the places their students encountered nature most were very similar, the shape of practice for Low NBL users and High NBL users looks very different for the most common way nature is used. When visualized using radar charts (Appendix O: The Shape of Use – NBL Places vs. Practices), the shapes generated by the data for each use group demonstrate prominent high/low differences for this data set. Continuing these efforts to better understand High NBL users can help us start to understand the relationships more clearly between place, practice, and use frequency.

Most questionnaire participants defined NBL by its use of the outdoors as the learning environment (50.4%). This substantiates a common perception that NBL is typically associated with schoolyards as an essential feature, something that may be an influence on the expectations of Low NBL users (e.g., “Outdoor free play / recess” as the groups most used practice). Those that offered a child-centered (i.e., Montessori / play-based) type definition and those that are

largely unfamiliar with NBL constitute approximately a quarter of the respondents to the questionnaire definition question. This suggests that some of the work of expanding the use of NBL will be to first create a broader familiarity with the terminology.

RQ 1: About the Benefits to Using NBL

Our intrinsic response to nature and innate belonging to it (Carson, 1999; Kimmerer, 2015) are strong themes in a great deal of nature writing. This bond is prominent in Almers et al. (2018) highlighting the sense of connectedness that forest garden educators found beneficial, and was the most frequent Outcomes secondary subtheme code (Connection = 42.2%). For Low NBL users, this sense of nature connection was understood, but was not consistently conveyed even among this small group of participants.

Consistent with previous research (Feille, 2017; Guardino et al., 2019; Martin et al., 2015; van Engelen et al., 2021) Low NBL users unanimously identified observing valuable knowledge and skills gained for their students with and without ESN when they were able to try nature-based experiences. Finding fun ways to teach even their core content areas was recognized as a beneficial aspect of the practice for Low NBL use teachers, coinciding with earlier investigations that showed the utility of NBL approaches when including conventional content (e.g., math, language, the arts) traditionally taught indoors (Harper et al., 2021; Hotchkiss, 2011).

From the literature review, the finding that experience with nature contributed to “well-being” was among of the most consistent results (Almers et al., 2018; Dallas, 2021; Guardino et al., 2019; Hotchkiss, 2011). That was why it was very surprising that participant statements in the questionnaire had so few references to well-being. Only 7.6% of all open-ended responses about NBL benefits made any reference to gains in some form of student well-being (e.g.,

physical health, mental health, or social/emotional health). On the strength of the literature review the code “Well-being” was retained when the Benefits framework was revised. This was fortunate, as Low NBL use teachers in the interviews again made more frequent references to well-being as a product of nature. This nature nourishment was viewed as soothing for students and school may be one of the few places that it is readily available to young students with ESN. Additionally, this progress from literature review to questionnaire to interviews of now you see it (i.e., well-being as a prominent subtheme), now you don’t, but now you see it again, emphasizes the advantage using this series of multiple data sources.

RQ 2: About the Barriers to Using NBL

One of the conspicuous initial Barriers subthemes identified from the literature review was that some teachers do not think about using experience with nature in their instruction (Dallas, 2021; Gallegly, 2020; Hotchkiss, 2011). Gallegly (2020) with 69 respondents found that 23.2% taught no lessons outside in a school year. This study found from its questionnaire sample of 72 EC-SA teachers that only 4.2% reported that their frequency of nature use was “never”. Some difference here may be accounted for in the language of the inquiry, Gallegly’s (2020) “lessons taught outside” versus the this study’s frequency of direct use of “nature as a part of your teaching”. In the analysis of the qualitative questionnaire data, not considering NBL was not that common, potentially a product of the fact that most teachers in this sample were using some level of nature during the course of the year. However, a lack of teacher questionnaire responses related to the Nature Not Considered subtheme is not all that surprising given that educators may not consider what they do not consider (much like we do not know what we do not know). When asked about this subtheme in the interviews, the similarities across participant responses point to how day-to-day duties and stresses can leave teachers present-locked and

routine-bound; fully consumed by what they must do in the immediate present, not able to plan or reflect, stuck in their current habits of practice. Heather summarized this impeccably, “I think they're probably just bogged down with the everyday things we're required to do and not being able to think of what other things can I do outside of the box”.

Findings from Harper et al. (2021) signaled the importance of a buy-in commitment from stakeholders to support the success of an NBL initiative (e.g., naturalizing a school playground). With an absence of this kind of support, Heather’s story of a garden space that fell apart after she left and Jennifer’s outdoor learning space in limbo substantiate this importance of buy-in. A good analogy here might be how nobody washes a rental car. That is, we do not typically care much for what we are not invested in. Heather and Jennifer’s experiences show how even with some resources, how fragile these initiatives can be. In education, we have a tendency to start things before they are ready to begin and end things before they are finished. Future investigation will need to look deeper into the barrier of Preparation, Recourses, and Support to understand this breakdown of buy-in and improve the sustainability of NBL efforts that do start to take root.

Perhaps the single most reliable barrier to NBL use is Constraints of Time and Expectations. In this study, from the literature review (Gallegly, 2020; Hotchkiss, 2011) to questionnaire (over half of barrier responses) to interviews, at each point along the way, teachers responded that NBL use is fettered by finding enough time to attempt it while still meeting the expectations of performance they are being held to. Low NBL teachers explored the idea that time constraints inhibit both time to make plans for NBL and time to actually implement any plans. The general education teachers in the group were the ones who felt the tyranny of fidelity, the pressure of expectations to adhere strictly to the curriculum and pacing guides. And for special education teachers, their focus was on as the specialized duties of a special educator (i.e.,

IEPs, progress reports, progress monitoring). This barrier leaves no room for adding anything else or trying anything new, leaving Low NBL teachers with instructional tunnel vision. This myopia brought on by the stresses and strains of time and expectations leaves teachers struggling to see NBL practices as possible.

Student Behavior and Readiness along with Educational Climate were the Barrier subthemes recognized in the data at end of the study's interview data thematic analysis. Much like the main themes of Benefits and Barriers, taken plainly, there is nothing all that groundbreaking in finding that difficult student conduct and lack of readiness for school as well as a hostile educational climate could be acting as barriers to the use of an instructional approach outside commonplace practices the system's design seems to maintain. But it is the present-day issues discussed by Low NBL users that give these added Barrier subthemes the significance of contemporary relevance.

Prior to the interview analysis, my thinking about behavior and NBL for this study was focused on how NBL experiences could benefit behavior, e.g., promoting collaboration, boosting resilience, and enhancing focus (Almers et al., 2018; Dallas, 2021; Guardino et al., 2019). Some signs of student behavior as a barrier were there in the literature too, Gallegly (2020) did find teachers reporting student behavior as an obstacle encountered when attempting outdoor learning. What became clearer through the interview data was a meaningful pattern of a barrier that could supersede all the others. If all the other barriers to NBL were out of the way: that teachers believed in NBL and sought out its benefits (Nature not Considered), that they had time to plan and use nature in their instruction (Constraints of Time and Expectations), that they had access to materials they could use inside or out and felt free to use them (Preparation, Resources, and Support), that they were self-assured in knowing how to use NBL (Confidence), and that

they had a safe and accessible schoolyard for learning (Outdoor Spaces and Safety), if all that was in place, student behavior and readiness would still present an imposing barrier to NBL use.

In today's educational climate teachers are seeing staffing as a significant issue obstructing use of NBL (Gallegly, 2020). Interviewed Low NBL teachers depict a self-reinforcing downward spiral fueled by operational upheaval. A situation where understaffing leads to teachers being asked to do too much, which leads to more teachers leaving, which leads to more classes closing, which means more teachers are being asked to do too much. All of this is happening at the same time when the fallout from COVID is still emerging and teachers are seeing the impact of a digital dependence on their very young students (Griffiths et al., 2012; Kuss & Griffiths, 2012). These much broader conditions will be infinitely harder to do anything about compared to the other barriers to using NBL for students with ESN. However, progress against any barrier will need to understand better our current educational climate.

Limitations

The limitation with the most resounding reverberation throughout this research process was how the lack of questionnaire participation impacted everything that followed. This dissertation is a lot to say about 72 questionnaire participants that resulted in six Low NBL use semi-structured teacher interviews (though much is said in the participants' own words). The decision making in response to this problem is hopefully clear in the above chapters, along with how adjusting to a generic qualitative approach (Kahlke, 2014; Percy et al., 2015) provided a method that had both the theoretical and methodological flexibility to work as a retrofit enhancement. Of the things I could control, my best explanations for how poorly participant recruitment seemed to go were the timing and use of incentives. The timing of the questionnaire may have played a significant role in limiting participation. I had expected that at the very

minimum, responses would be in the hundreds. So, getting just one-hundred completed responses out of tens of thousands of invitations was surprising, but not absolutely shocking given the time of year. Recruiting for participants at the start of a school year was not ideal but was required to reach the development of this document at this time. Also, I did not use any incentives for participation. In hindsight, knowing now how impactful such a small sample can be on the research design, it might have been a good idea to invest in a small financial incentive to try to drive participation.

The use of listwise deletion in preparation for questionnaire data analysis shrank an already small sample of data. This did result in some data being discarded and could have resulted in a loss of some valuable information. That is, removed data could have contributed to better identification of patterns in analysis. Other methods could have been explored, none likely so straightforward and uncomplicated, to retain information and reduce possible bias in analysis (Newman, 2014).

As an essential feature of the study, NBL use frequency was determined through teacher self-reporting. This method may be the best available approach to identify level of use, but it also leaves ample room for interpretation even when given a framework of choices to help estimate use. This is likely a hard characteristic of practice to accurately measure and teacher perceptions color their educated guesses about their NBL use frequency. A more objective measure of NBL use for future research would be valuable. Use frequency groups themselves were inductively developed and defined from all the data of this study after data collection was completed with little other guiding principle than establishing even grouping among the current participants. It might have been interesting to explore the literature on other frequencies of practice common to

education (low and high) to be able to make comparisons or to assist in the development of the Low NBL use group.

In the theoretical thematic analysis (Braun & Clarke, 2006; Percy et al., 2015) use of deductive/a-prior codes for the main themes and select subthemes were very helpful. Having some anchor points to act as starting places for analysis was advantageous on the front end of coding. However, using codes to start with also required revision. As new patterns of significance were identified and applied to the a-priori coding framework, the codes and their hierarchies needed to change for both Benefits and Barriers themes. This kind of iteration is part of this process when it works as it should (Braun & Clarke, 2012). But having to face the uncomfortable challenge of overcoming an attachment to specific coding concepts previously developed to revise the structure left me wondering what it would have been like to have been completely dependent upon data-driven observations of interview data without any predetermined patterns formulated from the literature review and questionnaire.

Since I was the only researcher responsible for the thematic analysis of the data, because of the order that questionnaire data and interviews data were coded, the sequence in which they were analyzed likely had some level of order effect on the coding and interpretation of later interview transcripts. Using a simple semantic level of analysis (Braun & Clarke, 2012) was needed given my modest level of qualitative research experience. But I question the depth of genuine “analysis” when largely looking at the semantic meaning with a strong reliance on predetermined themes/codes. I do find comfort in Braun & Clarke’s advice,

This does not mean that interpretative codes are better—they are just harder to “see” sometimes. What is important for all codes is that they are relevant to answering your

research question. Coding is something we get better at with practice. (Braun & Clarke, 2012, p. 62)

I hope to look back on all that I've written here like I look back at pictures of myself in middle school, wondering "What could I have possibly been thinking with that?!" but in doing so seeing where I was to know how far I've come.

Reflection on Methodology

After a series of obstacles and necessary modifications, I am hopeful that this generic qualitative study was still well crafted to be comprehensive in its design and methods, rigorous in its analysis, insightful in its findings, with meaningful implications for aligning and expanding our understanding of reality. Despite the difficulties, I am optimistic that I have demonstrated sufficient quality by taking this long hike on the audit trail, establishing trustworthiness through honest transparency in the research process, adherence to ethical standards, and a commitment to respect for participants' rights and wellbeing. This study was not designed to make predictions or draw conclusive inferences about any larger population, but instead to make the stories, the experiences and perceptions, of Low NBL use EC-SA teachers of students with ESN visible and legible to provide us with questions and direction. A map with a detailed picture of this phenomenon may not yet be possible, but this work can serve as a compass to provide us orientation for further exploration.

The goal was a process that is more sedimentary than metamorphic. A preservation from the accumulation, compaction, and solidification of the data rather than any alteration through transformation of the data. And like that geologic process, this process was messy and time consuming, but it is what it needed to be. My responsibility to care for the stories shared with me and make them legible to others, meant that I needed to find my own reading level for all the

data collected. I needed to “right-size” this dissertation. Sure, so that I could get it to a finished product, but above all, to do so in a way that as a novice researcher I could wrap my mind around it, to find the right amount to absorb and comprehend in one batch. So, as the gardener of this project, I needed to start with raking in the pile of data that I could handle. It was disappointing to not get to analyze and include half of the interview data (i.e., High NBL use participants) originally collected, not yet at least. I had to remind myself that doing this right is doing it right by the stories I have gathered, that giving them the proper attention they need, means that only some can be addressed right now. Cutting things down for this dissertation is not hacking things out of existence, it can simply be carving some things out for later.

Implications and Future Directions

For NBL to achieve a scale of use for students with ESN commensurate with its potential (Chawla, 2015; Kuo et al., 2019; Mann et al., 2021), it is essential to further explore the experiences of teachers with the benefits and barriers of NBL use. A constellation of studies about playground spaces (Harper et al., 2021; Martin et al., 2015; van Engelen et al., 2021), outdoor classrooms (Guardino et al., 2019), environmental education (Hotchkiss, 2011; Torquati et al., 2013), woodland learning areas (Almers et al., 2018), along with the other kinds of people and places connecting children with nature (Dallas, 2021; Feille, 2017; Gallegly, 2020) have together helped shape a broad framework of benefits and barriers. But a general structure of benefits and barriers alone is not enough, there are benefits and barriers to every practice. This study has worked to further detail and understand this choice space that EC-SA teachers must inhabit if seeking to use nature for their students with ESN. The ongoing importance will be in continuing to fill in all the details behind those themes, to start exploring the relationships

between these benefits and barriers, and to do things in the real-world to test this understanding of NBL with EC-SA teachers and students with ESN.

In Jonathan Swift's novel *Gulliver's Travels* Lemuel Gulliver found himself in the land of Lilliput tied down by the many ropes of the Lilliputians. Low NBL teachers are held in place in much a similar way, by an interconnected web of barriers. The barriers that are identified and described by the teachers themselves are formidable. If they were easy, they would have been solved already. But, if strategies are to be devised for enhancing the instructional use of NBL for EC-SA students with ESN, then it is unwise to attempt to bulldoze these barriers. There are confidence costs to failure. Trying and failing may mean never trying again. Informed by the participants of this study, the path ahead looks like it will need to be a circuitous one, a journey of incremental progress, navigating this tangle of barriers.

NBL was defined at the start of this effort with a focus on the outdoors, but it ends here with a focus on the indoors. This study defined *nature-based learning* in Chapter 1 as learning through the experience of nature strategically added as content or context of instruction for an array of objectives made accessible to all children (Broda, 2007; Chawla, 2018; Jordan et al., 2017; Stevenson et al., 2020). This definition was purposefully inclusive of all students and importantly also inclusive of all contexts. Outside is the goal. Norman cannot have quite the same liberating, empowering, and awe-inspiring experience inside his teachers' classrooms as he could in the wilds of a schoolyard, but the practical place to start for students with ESN is indoors. Nature-rich learning is information-rich and experience-rich whether inside or out. This is not a radical idea to science educators for older students. I believe that progress for EC-SA students with ESN is going to be a push for outside with an understanding that outside is not the only way. Open minds are going to be just as important as open doors. The inertia of traditional

instruction is going to be difficult to overcome, but setting things in motion for Low NBL use teachers by focusing on bringing nature into classrooms may be the timesaving, accessible, achievable workaround they need.

This is not a whole new model of teaching. This should not be NBL *or* something else. NBL progress should be built on *and*. Just disregarding the outside as an option *or* just fixating on schoolyard use as the exclusive hallmark of success is not what this effort for public school teachers and students should be about. Instead, future efforts can be directed toward opening up access in both directions with a new attention to maintaining existing routines that work for teachers *and* making a habit of inlaying natural elements into those existing routines. Drawing upon a this new attention is important because “attention becomes intention” (Kimmerer, 2015, p. 249). Embedding nature where we can, to create nature-rich environments inside and out is a pursuit of an intersection with the parallel; to learn in the world, with the world, and with each other.

Conclusion

After adding the questionnaire data and the stories of these Low NBL use teachers to my own algorithm of understanding, allow me to roll out my jump to conclusions mat. It is my observation that in most American cities, if you have other means, you do not walk, bike, take a bus or train, because a car is easier. But car travel is easier not because it is inherently “better” than other means of travel. It is easier because we’ve designed all of our places around the car, i.e., we live in a car-centric society. This kind of easy has been a design choice. Easy is a result of decades of investment in the structures that have made us dependent upon car travel (e.g., garages, parking lots, freeways). Schools are classroom-centric just like our cities are car-centric. Easy is a result of decades of investment in the structures that keep everyone boxed into

classrooms (i.e., the web of barriers described in this research). Our design has made both car and classroom mandatory defaults that monopolize the decision-making process and undermine the viability of other alternatives. Our schools have a four walls problem (Feille, 2019; Gallegly, 2020), where many teachers have come to act as if their classrooms are hermetically sealed learning containers. An absence of nature has become the standard practice of class-centric schools (Ernst, 2014; Louv, 2008; Tremblay et al., 2015). However, our defaults have costs we must consider (Duschl et al., 2007; Morningstar et al., 2017; Wilkins et al., 2003; Yantzi et al., 2010). This is illustrated by our preoccupation with speed. When an experience is not pleasant, it is speed that becomes the cherished imperative. It is the destination that becomes all important at the price of the value of the journey. Whether it is a car trip or school day, the goal becomes to get it over with. Just as the experience of car travel in our car-centric places is confining and being to the point where it is a cliché for kids to say, “Are we there yet?!” , class-centric instruction that excludes NBL leaves many students with confining and being “Are we done yet?!” learning experiences.

To begin unravelling this default design and help realign our relationship with the natural world in elementary schools, this study adds its drop of understanding into the rising water of NBL research. This study describes how EC-SA teachers have come to define nature-based learning with nature operating as context, content, catalyst, and/or connector. The findings contribute to a richer insight into Barriers to NBL use: (a) Nature not considered, (b) Constraints of time and expectations, (c) Preparation, resources, and support, (d) Confidence, (e) Outdoor spaces and safety, (f) Student behavior and readiness, and (g) Educational climate. These Low NBL use teachers want to use nature for their EC-SA students with ESN but haven’t reliably found their way through the barriers. Yet from the picture that these teachers have portrayed, the

barriers are now slightly clearer. Continuing to enhance our understanding of these barriers can aid the exploration of new and broader approaches for connecting students like Norman to nature-based learning, thereby enabling them to access the diverse Benefits possible: (a) Outcomes: connection, knowledge and skills, well-being and (b) Experiences: captivating engagement, creative exploration, practical experience.

All people have their splendors, “there are no unworthy bodies” (Ho, 2020, p. 115). Everyone has a right to a life dignified by the exercise of their minds and purpose belongs to every person. EC-SA students with ESN should have opportunities to experience nature, as much or more than their peers, and school is an institution uniquely positioned to realize that. Continued unboxing of our claustrophobic, institutionalized system of education awaits further exploration. My hope is that this work can create more intersections and draw closer our parallel worlds. Persisting in this endeavor to understand nature-based learning can narrow the space between belief in benefits and being blocked by barriers, so that it will be more comfortable for teachers to step over the gap, because it is easier to cross a crack than a chasm.

Every farm woodland, in addition to yielding lumber, fuel, and posts, should provide its owner a liberal education. This crop of wisdom never fails, but is not always harvested (Leopold, 1989, p. 73).

It is time to start harvesting this crop. As educators we can break free from the barriers that tether us, admitting to ourselves that learning can be ‘Nature’ too, lose track of our obsessions and self-concerns, break free and drift for a minute through sojourns in the parallel world, and then get caught up again into our own classrooms, but we and our students have changed, a little.

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Appendix A: Reflexivity Statement

This reflexivity statement exists here because of its importance in situating myself within this study. It serves to capture and convey who I am in relation to this research and to illuminate the factors that moved me to undertake this particular study at this particular time. This study is a product of myself in this moment. I would have absolutely made many different choices throughout if attempting a dissertation at any different moment in my life. In my theoretical perspective above (Chapter 3: Methodology), I described my conceptualization of a process of aligning individual constructions of truth. This reflexivity statement is a truth alignment tool, one that first aids in an articulation of my personal attributes, experiences, and perceptions and how those characteristics *have* affected my research (Creswell & Poth, 2018). Secondly, this statement allows me to communicate these subjectivities to you.

This study was guided by three research questions: What are the stories that EC-SA teachers, with Low NBL use, tell about the benefits to using NBL for students with ESN? What are the stories that EC-SA teachers, with Low NBL use, tell about the barriers to using NBL for students with ESN? How do early EC-SA teachers' NBL characteristics, perspectives, and experiences converge or differ according to their level of NBL use? Through a generic qualitative approach (Kahlke, 2014; Percy et al., 2015) leveraging theoretical thematic analysis (Braun & Clarke, 2006; Percy et al., 2015) this research aims to craft a detailed portrayal of the current state NBL practice and identify patterns of understanding in the decision space teachers generate surrounding the what encourages and what obstructs their use of NBL. It is my hope that this work tills the fertile soil of NBL, nurturing more and richer opportunities for students who experience disabilities to learn with nature.

I am a novice researcher. A generic qualitative approach for this study offers a flexible means to realize this purpose by exploring toward responses to these research questions in a way that is both manageable and makes sense to me (Kahlke, 2014; Percy et al., 2015). I struggle in wrapping my head around the seemingly abstract complexities of quantitative methods. I connect with the tangibility of the complexities of qualitative approaches. I value the direct relationship with participants, the exploration of lived experiences and perceptions, the creativity and flexibility that is required in approaching problems, and engaging directly with practitioners to gain firsthand insight into the phenomena. While my qualitative methods experience is in a formative state, a “greenness” perhaps, I do see a unique strength in my broad experience across my roles as a teacher, a parent, and now as a budding researcher.

This research study utilized a sample of teacher participants that are (or have been) teachers of students with ESN in public school settings to document their knowledge and perspectives in relation to my research questions. It was important to target the exploration of public school settings because, practically, they are the most accessible to research and generally share a broad consistency of experience for teachers and students at large scales. Additionally, public schools are the most interesting to me at this time because I’ve seen what substantial resources can make possible. There are of course very valuable lessons to be learned from the examples of resource-rich outliers. I’ve learned much from experiences in these situations. But just like I’m less intrigued and impressed by someone’s clean house when they can pay for a housekeeper (it is supposed to be clean), I’m not as initially interested in the lessons that can be learned from situations where money can offer a convenient and swift solution. Show me the single parent with three kids that works two jobs that has a clean house. That’s someone who’s

figured something out worth knowing. It is in the limitations found in public school settings that make their study here meaningful.

It was important to target teachers for comprising the units of analysis because they are foremost the gatekeepers of the school experience for children. But again, practically they are relatively straightforward to interview, and particularly relevant here, I was a teacher. I have been a special education teacher for approximately two decades in a spectrum of contexts; in every grade from pre-kindergarten to high school, in both public and private settings. The emphasis of this study on students with ESN comes from the fact that through this diverse career path I have also had the privilege of serving children that experience a broad range of disabilities; mild/moderate to extensive support needs. Teaching with a dedicated focus on those with unique learning needs is my purpose. As a special education teacher, I believe that it is my duty to offer my time and effort to those who do not have the advantages in life that simply the nature of my birth has afforded me. “Our work and our joy is to pass along the gift and to trust that what we put out into the universe will always come back” (Kimmerer, 2015, p. 104).

Over the course of my teaching career, I was fortunate enough to work in schools where nature-based learning was emphasized and embraced. I saw firsthand the potential of nature to foster curiosity, knowledge, and well-being. The experience of teaching students in and with nature taught me the value of these experiences for all children, but especially for my students. The emphasis of this study on EC-SA students stems from taking my last school-aged class I taught (before starting the doctoral program culminating in this work) out in nature as much as I could. Despite the complications of expansive differences in cognition and mobility that I found in those Pre-K students, I loved taking those eager adventurers out into the wilderness schoolyard area our school had constructed. Everything in my experience, everything I had ever

seen in education, showed me how rare an achievement it was for a school to have set out to build and then to succeed in providing an outdoor natural space designed specifically with accessibility in mind. And yet, I was one of only a handful of teachers that would ever use this glorious wild space.

Even under some of the most ideal conditions, with a natural space at the ready for play and learning that so few others had access to in the state or even the nation, teachers seemed reluctant to use it. What was equally troubling was that I developed a very cynical outlook for the kind of educational experiences my students might have once they left this unique place to continue their elementary education elsewhere. Having taught in standard middle and high school classrooms, I feared a fate I'd seen for others; one where benevolent, well-meaning, and skilled teachers exercised the inheritance of "the ways we've always done it". This apprehension resonated deeply not only for the uncertainty I held for my students, but also for my own children (who were around the same age as my Pre-K students at that time).

As a parent of young school age children, I can see the emergence of nature as a parallel world in real-time. I understand that it took me my whole life to reach the level of appreciation I now have for the natural world, so I have wanted to give my children the same kind of foundations I had (hoping they might eventually arrive at a similar place). Therefore, I now try encouraging play outside, helping in the garden, growing food, going on hikes, getting involved with scouts, going on vacations to national parks, noticing small things, and making time for wonder. Despite all my care and energy, I still see a growing disconnect in my children. The pull away from nature and toward technology is so incredibly strong, spanning from the influence of societal norms to chemistry of our brains (Carr, 2020). There are times when it feels like we all are powerless to the lure of our screens.

Alongside these professional and personal experiences, as an adult I progressively developed a profound enthusiasm for gardening. I have come to appreciate gardening as a joyful pursuit that is relaxing, provides an outlet for creativity, is a source for learning, and fosters a sense of connection to the beauty of nature. For me gardening is a meditative practice, a time and space to become lost in the flow of a productive harmony with my lived environment. I enjoy the work of care, and the more I've learned about gardening, the more I see how astoundingly similar gardening is to teaching special education (and parenting); how the tenets for one so easily translate to the other. A teacher is gardener of knowledge, a farmer of skills, a cultivator of behaviors that produce a fruitful life. Success is found in preparing and planning as best as we can, putting in vast amounts of time and strenuous effort as well as working with, not against, nature and the nature of students. Patience is a vital element of success. You are going to have to get your hands "dirty" to do a good job. When a flower does not bloom you try to fix the environment in which the flower grows. You do not try to fix the flower. Growth is a process of synergy and synthesis: For plants it is of earth, light, water, and air. For students it is of learner, parent, teacher, and school. Disability and ability are at many times a matter of perspective, much in the same way that our viewpoint constitutes what we call flower or a weed. Strength comes through just the right amount of adversity, plants and people are more resilient when they have some struggle in their growing process. Too hard/harsh will destroy growth from the start and too easy/mild can make anything incredibly vulnerable to change. Grow good roots and the rest will follow. What takes place above ground starts below, so focus on growing good roots. Observe and react to what is happening rather than what should happen, yet always keep that vision of what the child or garden could one day be, not just what or where they are now. This dualistic wisdom holds illuminating insight toward an inherent connectedness between nature,

people, and learning. Yet, it does not provide guidance for the discrepancy between what is possible when students and teachers experience nature and the disconnect that appears commonplace in our schools.

All of these experiences along with my beliefs and feelings undoubtedly affect this research. However, through graduate coursework and a variety of research collaborations, I have developed some modest competence as a researcher. Having stepped out of the classroom to train as an educational researcher has given me tools to acknowledge and bracket passions and personal investments. I can relate but strive to moderate biases. This unique straddling of insider and outsider allows me to be close to the participants through my experience in the same kinds of duties and decisions I am investigating. My background provides me with a useful framework of understanding to both interview (establishing rapport and credibility) and analyze the stories of other teachers (interpretation filtered through some capacity to relate), but I am also able call upon emerging skills to aid in navigating and regulating my known subjectivities.

Although, it is the same subjectivities that stand to introduce bias that have been the motivating force for all of this effort. I have chosen to study nature-based learning and young students with extensive support needs because connecting teachers, and consequently their students, with nature is what I want to do. I want to understand the benefits and barriers better so that I can personally use nature more and then help other teachers use NBL to engage the minds and bodies of their students, reconnecting them to the natural world. I want NBL to happen for all students.

I believe that my participants were participants in this study because they want the same. This intention most certainly colors the data as it was given by participants and then again through my decisions and interpretations. However, my challenge and my ambition are to take

what my participants have given me and *not* to make more out of it than is there, to collect, synthesize, and report with the greatest transparency and objectivity I am capable of. The quality of this study is contingent on my ability, sensitivity, and integrity as a researcher. Consequently, my duty is to return the gifts given by participants through the worthy use of their truths. For me to act as an instrument of connection, to stitch the threads of meaning between their stories, to make sense of their experience in the context of all of their experiences. And to then make those connections visible for others to see. Doing so, to the greatest extent of my current abilities, both honors the contribution of their stories and upholds my responsibility as a researcher. All that I am has oriented me in the direction of the intersections of this research. Perhaps that's a clichéd and self-indulgent statement to make, but I do believe that I'm doing this right if that is true.

This is our work, to discover what we can give. Isn't this the purpose of education, to learn the nature of your own gifts and how to use them for good in the world?

(Kimmerer, 2015, p. 239)

Appendix B: Institutional Review Board (IRB) Outcome Letter



Institutional Review Board for the Protection of Human Subjects

Approval of Initial Submission – Exempt from IRB Review – AP01

Date: July 05, 2023

IRB#: 15915

Principal Investigator: Andrew Edward Heuer

Approval Date: 07/05/2023

Exempt Category: 2

Study Title: A Grounded Theory Group Comparison of Teachers' Experiences and Perceptions on the Implementation of Nature-Based Learning for Early Elementary Students with Extensive Support Needs

On behalf of the Institutional Review Board (IRB), I have reviewed the above-referenced research study and determined that it meets the criteria for exemption from IRB review. To view the documents approved for this submission, open this study from the *My Studies* option, go to *Submission History*, go to *Completed Submissions* tab and then click the *Details* icon.

As principal investigator of this research study, you are responsible to:

- Conduct the research study in a manner consistent with the requirements of the IRB and federal regulations 45 CFR 46.
- Request approval from the IRB prior to implementing any/all modifications as changes could affect the exempt status determination.
- Maintain accurate and complete study records for evaluation by the HRPP Quality Improvement Program and, if applicable, inspection by regulatory agencies and/or the study sponsor.
- Notify the IRB at the completion of the project.

If you have questions about this notification or using iRIS, contact the IRB @ 405-325-8110 or irb@ou.edu.

Cordially,

Ioana Cionea, Ph.D.
Vice Chair, Institutional Review Board

Appendix C: Literature Review Coding Guide

LITERATURE REVIEW: CODING GUIDE									
Study ID	Title	Design	Detail	TEACHER	Sample Size	Age/Grade of Taught	Setting	Other	STUDENT
					Sample Size	Category	Age		
OTHER STUDY CHARACTERISTICS									
					Goal	Context	Findings		
1	Marti, 2015 Training Teachers to Enhance the Play Skills of Young Children with Developmental Disabilities during Outdoor Time by Embedding Instructional Interactions	Quasi (intervention)	Multiple baseline	SFED	4 preschool	Intellectual and Developmental Disabilities	3-5	Created and evaluated a professional development package for training teachers to embed instructional interactions during outdoor time to enhance the play skills of young children with disabilities	Professional development package was an effective approach for enhancing teacher instructional interactions with children with developmental disabilities during outdoor time
2	Guardino, 2019 Teacher and Student Perceptions of an Outdoor Classroom	Mixed-methods	Online survey / Interviews	Gen Ed (inclusion)	2 kindergarten	Autism, Speech, OHI	5-6	To determine their perceptions of teaching and learning in a traditional indoor classroom compared to a newly constructed outdoor classroom.	Teachers and the students reported an increased perception of wellbeing, pleasure, and interest in the outdoor classroom. Research assistants noted that the children with disabilities were more on-task
3	van Eijgen, 2021 Barriers, facilitators and solutions for active inclusive play for children with a physical disability in the Netherlands: a qualitative study	Qual	Case Study (Interviews / focus groups) - Analysis: inductive thematic approach	SFED > some SFED educators, mostly related service providers, parents also a focus	40 multiple	Physical disabilities (Pulvis) by article implies: Intellectual Disability, Orthopedic Impairment	2-12	Study aims to explore <i>barriers and solutions</i> (filling the gap) The participation of children with physical disabilities (P) in Dutch outdoor classrooms from parents and professionals' perspectives conducted	Six categories emerged from the data. Whilst about teaching in outdoor settings, pedagogy planning for safety, child development and learning resources teachers use to assist
4	Dalla, 2021* The experience of early childhood teachers who work with children with special needs and/or behavioral challenges in nature and outdoor preschools: A phenomenological study	Qual	Phenomenological (Interviews)	Gen Ed / SFED	8 preschool	Autism, Speech, Developmental Delay, OT, PT, VI	2-4	The purpose was to gain insights into the challenges and strengths of the outdoor environment in educating young children whose special needs or behavioral challenges	Results indicate that elementary teachers have positive attitudes toward EE and believe that EE concepts can be integrated into core content subjects. Teachers agree this stewardship is important to
5	Hutchins, 2017* Remedatory teachers' Views of environmental education	Mixed-methods	Closed-ended questionnaire and semi-structured interviews	Gen Ed	201	General education	K-12	To examine teachers' views of environmental education (EE) at the elementary level, the study addresses teachers' attitudes toward the EE at the elementary school level and their self-efficacy	The findings indicated that most teachers lacked adequate outdoor environments often. There is no difference in grade level taught or special education certification and self-efficacy beliefs; however, a few professionals and students rated the curriculum domain of natural/science as the least important for young children in terms of experiences and learning outcomes in comparison to other curricular domains.
6	Gallego, 2021* Teacher's efficacy and attitudes toward learning outside of the four walls	Quasi	Teacher's Sense of Efficacy Scale with modifications to include demographics	Gen Ed / SFED	(91/35 / 51/55 K-12 with SFED certification)	General education and special education (characteristics not reported)	K-12	To examine teachers' sense of efficacy when engaging in outdoor learning experiences, addressing current gaps in research regarding outdoor education opportunities throughout K-12 public schools	This study examined early childhood educators' perceptions about nature, science, and environmental education.
7	Touquati, 2013 Early childhood educators' perceptions of nature, science, and environmental education	Mixed-methods	Survey with open ended questions	Gen Ed	Preservice (n=158) early childhood professionals (n = 102)	General education	0-8	Investigate the professional life histories of upper elementary science teachers who were identified as effective both within the classroom and in the outdoor learning environment (OLE)	The main focus, as articulated by the forest garden educators, is to give the children opportunities to feel a sense of belonging to a whole.
8	Felle, 2017 Teaching in the Field: What Teacher Professional Life Histories Tell about How They Learn to Teach in the Outdoor Learning Environment	Qual	Semi-structured and open-ended interviews; Gen Ed narrative analysis	Gen Ed	5 3rd, 4th, 5th	General education	8-11 (3rd, 4th, 5th grade)	The study explores both the perceived qualities of forest gardens in comparison to other outdoor settings and forest garden educators' ideas, purposes, and experiences of activities in a three	Teachers were identified as critical for maintaining integration of outdoor play into children's daily lives, proactive mental health, opportunity for inclusion, nature as a positive space
9	Almets, 2018 Why forest gardening for children? Swedish forest garden educators' ideas, purposes, and experiences	Qual	Case study: exploratory interviews and participatory observations	Forest garden educators	4 preschool and primary school	NA	NA	To examine the lived experiences of teachers and administrators at two schools (one elementary kindergarten, grades 5-8) following the naturalizing of a	
11	Hoppe, 2021 A case study exploring the real world process of naturalizing school playgrounds	Qual	Case study (Interviews / focus groups)	school naturalization committee (include one elementary and one middle school)	n = 107 and 1 admin from two schools K-5, 6-8	General Education	K-5, 6-8		

Survey Items			
Survey Items	Interview Protocol	Where Published	Conclusions / Implications
NA	NA	Journal of Early Intervention	Few studies have addressed procedures for increasing instructional interactions between teachers and young children with developmental disabilities adding naturalistic teaching opportunities at free play or outdoor time. The results of our study provide compelling evidence supporting the effectiveness of an intervention package (coaching) for "The findings from this study suggest that children with special needs may benefit from exposure to the outdoors."
Of the questions asked, 11 pertained to the teachers' perceptions of the outdoor classroom compared to the indoor classroom. Each participant had five response options using a Likert scale: much worse (1), somewhat worse (2), no difference (3), somewhat better (4), much better (5).	13 of the 37 students (9 boys, 4 girls) were randomly selected to participate in an informal interview conducted in the outdoor classroom. Hi, my name is [researcher], I am a researcher at the University. I am studying how children learn in different places, like inside and outside, or in a library or at home. I would like to ask you a few Topic lists and questions for parents (Appendix 2) and professional (Appendix 3).	Journal of Outdoor and Environmental Education	
Prior to individual interviews and focus group meetings, every participant completed a standardized questionnaire with background information. See Appendix 4 & 5	Parents main questions listed here additional questions in Appendix 2: Current situation of playing outside From Appendix H Interview Protocol What is your experience of teaching preschoolers with special needs or behavioral challenges in an outdoor setting? Follow-up Probes (if needed): 1. Tell me more about your program. Appendix VII Interview Questions (example) In what ways do you address EE concepts in your teaching (types of lessons, activities)? How often, how long? a if you don't, What are the reasons you don't address EE concepts in your teaching? What (if any) teachers do you think should be responsible for teaching EE (grade/subject, etc)?	BMC pediatrics (Boston Medical Center)	To enable participation for children with PD, change is needed in all layers of society , the main reason for children with PD not participating in play in the playground is the emotional barrier that both parents and their children experience, solutions all focus on empowering and coaching both children and parents.
NA	Appendix IV Views of EE Questionnaire (37 questions) A 37 item Likert-type scale questionnaire was created and validated by the researchers for this study. The response categories used in the Likert-type scale were: 1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree, and 5 = strongly agree. The questionnaire measures two constructs: 1) Teachers' Appendix C Survey Instrument TSSES contains three subscales, questions listed by subscales in tables also on p.44-45. TSSES uses 9 response Likert-type scale Demographics ask about gender, current level taught, years in ed, certification held, yes/no school has outdoor learning space, type of space (check all), how many lessons a year outdoor Appendix A Teacher Survey Questions (use of 4 and 5 response Likert scales for 56 questions with 8 open-ended questions)	Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in Infant and Early Child Development A Dissertation Submitted to the Faculty of Old Dominion University in Partial Fulfillment of the Requirements for the Degree of DOCTOR OF PHILOSOPHY CURRICULUM AND INSTRUCTION Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Education	Participants felt teaching children with special needs and/or behavioral challenges in outdoor environments was beneficial to children's well-being, development and learning, and their inclusion in the school community. nature-based preschools offer programmatic and environmental opportunities that inherently seem to support the needs of Results indicate that elementary teachers have positive attitudes toward EE and believe that EE concepts can be integrated into core content subjects. Teachers agree that stewardship is important to teach as part of elementary EE, but expressed caution when dealing with controversial topics and issues. Additionally, although teachers are aware of the importance of increased use of outdoor learning environments through specific lessons did not significantly impact teachers' sense of efficacy - no significant correlation was found between the total sense of efficacy and the number of lessons teachers taught outside.
Appendix C: Survey Instrument TSSES contains three subscales, questions listed by subscales in tables also on p.44-45. TSSES uses 9 response Likert-type scale Demographics ask about gender, current level taught, years in ed, certification held, yes/no school has outdoor learning space, type of space (check all), how many lessons a year outdoor Appendix A Teacher Survey Questions (use of 4 and 5 response Likert scales for 56 questions with 8 open-ended questions)	NA	Survey attached in Zotero. Teachers' Sense of Efficacy Scale in Outdoor Learning Environments included in dissertation appendix C.	Early Education and Development
NA	Interview Questions The first interview with each teacher followed a semi-structured format where I presented them first with the prompt, "Tell me a story about the time when you first decided to become a teacher. Follow-up and probing questions were used throughout the interview as participants narrated their stories of experience to ensure that the Examples of interview questions were: What do you think is the most important aspect of letting children spend time in a forest garden? Why a forest garden? What additional benefits do children derive from working in a forest garden compared to a school garden or going on a woodland excursion? Can you discuss activities that have worked well? How did they go? What happen- ed? Can you talk about Guiding questions asked in both focus group and individual interviews included the following: (1) What were the factors that led you to naturalize your playground? (2) What were the key steps you undertook? (planning, implementation of naturalization) (3) What made it easy to plan and implement the changes to the	Interview questions and subsequent interviews from Appendix copied here.	Research in Science Education
NA	Some example interview questions provided but not all questions.	Journal of Environmental Education	
NA	Interview protocol copied here.	International Journal of Environmental Health Research	

Appendix D: Informed Consent and Qualtrics Questionnaire



Consent

Online Survey Consent to Participate in Research

University of Oklahoma

Would you like to be involved in research at the University of Oklahoma?

I am Andy Heuer from the Department of Educational Psychology at the University of Oklahoma, and I invite you to participate in my research project "Teachers' Experiences and Perceptions on the Implementation of Nature-Based Learning for Early Elementary Students with Extensive Support Needs". This research is being conducted via an online survey. As a classroom teacher, you have been chosen as a potential participant for this study because of the important decisions you make daily regarding the instruction and learning experiences of your students. You must be at least 18 years of age to participate.

Please read this document and contact me to ask any questions you may have BEFORE agreeing to participate in my research.

What is the purpose of this research?

The purpose of this study is to investigate teacher experiences with incorporating nature into instruction, including their perceptions of the factors that facilitate or impede the use of nature-based learning strategies. By identifying barriers and effective solutions, this study will contribute to a better understanding of how to promote the use of nature in education.

How many participants will be in this research?

As part of the survey portion of this research, about 2000 teachers will take part in this research.

What will I be asked to do?

If you agree to be in this research, you will complete this 18-item survey one time.

How long will this take?

Your participation will take approximately 10 minutes.

What are the risks and/or benefits if I participate?

You will be asked to provide demographic information that describes you. We may also gather information about your geographic location in this research. Different combinations of personal and geographic information may make it possible for your identity to be guessed by someone who was given, or gained access, to our research records. To minimize the risk of deductive re-identification, we will not combine identifying variables nor analyze and report results for small groups of people with specific demographic characteristics.

You will be asked to complete an online survey as part of this research. The organization hosting the data collection platform has its own privacy and security policies for keeping your information confidential. There is a risk that the external organization, which is not part of the research team, may gain access to or retain your data or your IP address which could be used to re-identify you. No assurance can be made about their use of the data you provide for purposes other than this research.

There are no direct benefits to you for your participation in this research.

Will I be compensated for participating?

You will not be reimbursed for your time and participation in this research.

Who will see my information?

There will be no information in research reports that will make it possible to identify you without your permission. Research records will be de-identified (i.e, pseudonyms and/or codes will be used), stored securely, and only approved researchers and the OU Institutional Review Board will have access to the records. The de-identified research data may be uploaded to an online data repository platform where it would be publicly available for anyone interested to examine. You have the right to access the research data that has been collected about you as a part of this research. However, you may not access this information until the entire research has finished and you consent to this temporary restriction.

Do I have to participate?

No. If you do not participate, you will not be penalized or lose benefits or services unrelated to the research. If you decide to participate, you don't have to answer any questions and can stop participating at any time.

What will happen to my data in the future?

We might share your de-identified survey response data with other researchers or use it in future research without obtaining additional consent from you. Responses to open-ended survey questions may be quoted directly but anonymously.

Will I be contacted again?

The researcher might contact you to gather additional data or recruit you for new research.

Who do I contact with questions, concerns, or complaints?

If you have questions, concerns, or complaints about the research or have experienced a research-related injury, contact me at 832-687-244 or andrew.heuer@ou.edu, or the faculty primary investigator, Corey Peltier at 405-325-5974 or coreypeltier@ou.edu. You can also contact the University of Oklahoma – Norman Campus Institutional Review Board (OU-NC IRB) at 405-325-8110 or irb@ou.edu if you have questions about your rights as a research participant, concerns, or complaints about the research and wish to talk to someone other than the researcher(s) or if you cannot reach the researcher(s).

This research has been approved by the University of Oklahoma, Norman Campus IRB.

IRB Number: 15915 Approval date: 07/05/2023

Do you consent to participate in this study?

- Please select your choice below. You may print a copy of the consent form above for your record.
- Clicking on the “Agree” button indicates:
 1. You read the consent document above
 2. You voluntarily agree to participate in this survey
 3. You are 18 years of age or older

Agree to consent

Decline to consent

Demographic Information

What is your age?



What is your gender?

Agender

Cis-Gender Man

Cis-Gender Woman

Non-Binary

Transgender Man

Transgender Woman

Prefer not to say

Gender not listed. My gender is (please specify)

Select your race/ethnicity.

Asian

Black or African American

Latino/a

Native American or Alaska Native

Native Hawaiian or Other Pacific Islander

Two or more races

White

I prefer not to answer.

What is your **primary role** as a teacher?

General Education Teacher

Special Education Teacher

Other, please specify:

What grade level(s) do you currently teach? [choose all that apply]

Pre-School

Pre-Kindergarten

Kindergarten

First

Second

Third

Fourth

Fifth

Middle grades (any 6-8)

High school (any 9-12)

Other, please specify:

What best describes the location of the school you primarily work in?

Urban

Suburban

Rural

Other, please specify:

How many years have you been teaching?



What is the **most intensive level** of special education support provided to the any of the students you teach (provided by you and/or by other educators)?

No specialized support - I do not provide instruction for any students that receive special education services.

Minimal support - I provide instruction for one or more students that receive only rare to infrequent additional support for academic task engagement, behavior, communication, and/or personal-care (e.g., support provided once a month to 1-5 times per week).

Moderate support - I provide instruction for one or more students that receive targeted and frequent support for academic task engagement, behavior, communication, and/or personal-care (e.g., support provided 1-5 times per day).

Extensive support - I provide instruction for one or more students that require comprehensive and continual support for academic task engagement, behavior, communication, and/or self-care across the school setting (e.g., support provided 5 or more times per day).

Select your highest level of education completed.

Bachelor's degree

Master's degree

Ed.S. degree

Ed.D. or Ph.D.

What teaching certifications do you currently hold? [choose all that apply]

Early Childhood

Elementary

Secondary

Special Education

None, Working Toward

Specific Content Area, please specify:

Which path did you follow to gain teacher certification?

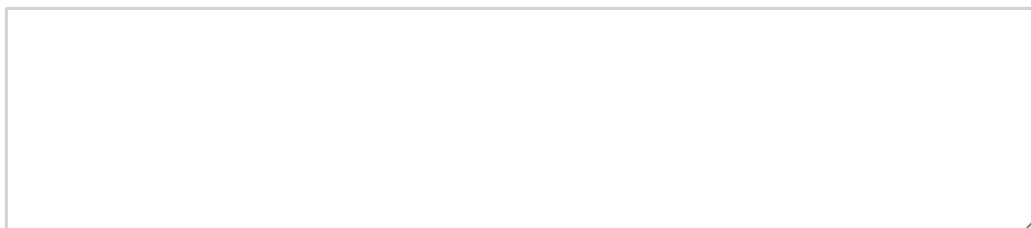
Traditional - earned a degree in an accredited education program and completed teacher certification requirements prior to first year of teaching

Alternative - completed teacher certification requirement during or after first year of teaching

Non-Traditional - American Board for Certification of Teacher Excellence (ABCTE), Teach for America, Paraprofessional
Emergency

Nature-Based

How would you define "**nature-based**" learning in your own words?



This research study defines **nature-based learning** as learning through the experience of nature strategically added as content or context of instruction for an array of educational objectives made accessible to all children.

This construction of nature-based learning encourages teachers to leverage their ingenuity and expertise to actively integrate natural experiences directly into any subject area, for any student, without necessitating the use of specific outdoor settings or materials. The approach emphasizes the use of outdoor spaces readily available to teachers but can also be realized indoors through the purposeful incorporation of natural elements to enrich instruction.

How important do you feel it is to connect your students to experiences with nature through your instruction?

Very important

Somewhat important

Neutral

Not very important

Not at all important

How often do you directly use nature as a part of your teaching?

Daily

2-3 times a week

Once a week

2-3 times a month

Once a month

2-3 times a year

Never

What is the **most common way** that you incorporate nature into the learning experiences of your students?

Bringing natural objects into the classroom

Environmental education curriculum / projects

Field trips to natural settings (e.g., parks, forests, waterways)

Hands-on schoolyard activities

Nature as a theme for classroom assignments / projects

Outdoor free play / recess

Use of schoolyard spaces designed for learning (e.g., school garden, outdoor classroom)

Nature not used

Other, please specify:

At your school, where is the **most common place** that your students get to intentionally experience and learn with nature?

Athletic fields

Classroom (indoors)

School garden

Outdoor classroom or learning space

Playground / schoolyard

Nature trail

Nearby park, forested area, or wetland

Science lab

Other, please specify:

What do you believe is the single **most important benefit** of using nature-based learning approaches for student instruction?

What do you believe is the single **most restrictive barrier** to the use of nature-based learning approaches for student instruction?

Interview Request

If you are willing to be contacted to potentially be interviewed as an extension of this study, please provide your preferred email address here:

Appendix E: Recruitment Contact – Questionnaire_Teachers

Dear Educator,

I am a special education teacher conducting a research study on teacher experiences with incorporating nature into instruction. In response to the growing presence of technology in education and our lives, this study aims to gain insight into the factors that facilitate or impede the use of nature-based learning strategies. By understanding the barriers you have experienced and the effective solutions you may have found, I hope to promote the improved use of nature in education.

Regardless of your level of experience, your knowledge and insight as a teacher are vital to this initial stage of research, and I would greatly appreciate your participation in a short online survey that will take approximately 10 minutes to complete. If you are willing to participate, please click on the following link to access the survey: [insert survey link].

Your contribution, joined with the insights of our peers, will be instrumental in moving this study forward. If you have any questions or concerns about the survey or the study in general, please do not hesitate to contact me. Thank you for your time and consideration.

Sincerely,

Andy Heuer, M.Ed.
Doctoral Candidate
Department of Educational Psychology
Jeannine Rainbolt College of Education
University of Oklahoma
E-mail: andrew.heuer@ou.edu



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Appendix F: Recruitment Contact – Questionnaire_Teachers_Reminder

Subject: Nurturing Instructional Potential: Your Insight Matters (Study Reminder)

Dear Educator,

As this new school year kicks off, the demands on your time are certainly many. At the same time, understanding the unique insights of teachers is crucial to the growth and improvement of our educational practices. Your perspective matters. This email is a reminder inviting you to quickly share your knowledge and experience.

I am a special education teacher conducting a research study on teacher experiences with incorporating nature into instruction for young children. In response to the growing presence of technology in education and our lives, this study aims to gain insight into the factors that facilitate or impede the use of nature-based learning strategies. By understanding the barriers you have experienced and the effective solutions you may have found, I hope to promote the improved use of nature in education.

Regardless of your level of experience, your knowledge and insight as a teacher are vital to this initial stage of research, and I would greatly appreciate your participation in a short online survey that will take approximately 10 minutes to complete. If you are willing to participate, please click on the following link to access the survey: [insert survey link].

Your contribution, joined with the insights of our peers, will be instrumental in moving this study forward. If you have any questions or concerns about the survey or the study in general, please do not hesitate to contact me. Thank you for your time and consideration.

With profound gratitude,

Andy Heuer, M.Ed.
Doctoral Candidate
Department of Educational Psychology
Jeannine Rainbolt College of Education
University of Oklahoma
E-mail: andrew.heuer@ou.edu

This research has been approved by the University of Oklahoma, Norman Campus IRB.
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Appendix G: Recruitment Contact – Questionnaire_Principals

Subject: How Can We Improve Education? Help Teachers Share Their Insights!

Dear Educational Leader,

I am a special education teacher conducting a research study on teacher experiences with incorporating nature into instruction for young children. In response to the growing presence of technology in education and our lives, this study aims to gain insight into the factors that facilitate or impede the use of nature-based learning strategies. By understanding the barriers teachers have experienced and the effective solutions they may have found, I hope to promote the improved use of nature in education.

As this new school year kicks off, demands on the time and attention of teachers is tremendous. At the same time, understanding the unique insights of teachers is crucial to the growth and improvement of our educational practices. If you believe that the advancement of this field of practice would be of interest to any of your teachers, I invite your support by connecting them with a short online survey. The survey will only take approximately 10 minutes to complete and can be accessed through the following link: [insert survey link].

Your help, along with the participation of teachers across the country, will play a vital role in advancing the efforts of this study. Should you or your teachers have any questions or concerns regarding the survey or the study itself, please feel free to reach out to me. Thank you for your time and consideration.

Sincerely,

Andy Heuer, M.Ed.
 Doctoral Candidate
 Department of Educational Psychology
 Jeannine Rainbolt College of Education
 University of Oklahoma
 E-mail: andrew.heuer@ou.edu

**This research has been approved by the University of Oklahoma, Norman Campus IRB.
 IRB Number: 15915 Approval date: 07/05/2023**

Appendix H: Recruitment Contacts – Interview

Interview Recruitment Initial Contact

Dear [Participant Name],

I am reaching out to thank you for taking the time to participate in the recent online survey on teacher experiences with incorporating nature into instruction. Your insights have already been extremely valuable to this research.

You indicated in your survey responses that you would be willing to participate in a follow-up interview. I am excited to extend an invitation to you for this next stage of the study. I would greatly appreciate the opportunity to discuss your ideas and experiences in greater detail.

If you are willing to participate in an interview via Zoom, please let me know what dates and times work best for you in the coming weeks. The interview is expected to take between 45 to 60 minutes, and I am happy to accommodate your availability in scheduling an agreeable meeting time. Thank you for considering this request, and I look forward to hearing back from you soon.

Best regards,

Andy Heuer, M.Ed.
 Doctoral Candidate
 Department of Educational Psychology
 Jeannine Rainbolt College of Education
 University of Oklahoma
 E-mail: andrew.heuer@ou.edu

Follow-Up Interview Recruitment Contact

Hello again [Participant Name],

I'm happy to hear that you're interested in participating in the Zoom interview for my research study and I appreciate your willingness to share your thoughts and experiences. I'm currently working on scheduling the 45 to 60 minute interviews and wanted to see if you had any availability in the coming weeks. Please let me know what dates and times work best for you, and I'll do my best to accommodate your schedule. Thank you again for your participation, and I look forward to hearing from you soon.

Sincerely,

Andy Heuer, M.Ed.
 Doctoral Candidate
 Department of Educational Psychology
 Jeannine Rainbolt College of Education
 University of Oklahoma
 E-mail: andrew.heuer@ou.edu



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Appendix I: Inclusion Fit Matrix

3 - 2.5 Inclusion factor fit: GOOD				
CODE POINTS	ROLE	GRADE(S)	SUPPORT	FREQUENCY
2.5	General Education Teacher	Third	Moderate	2-3 times a week
3	General Education Teacher	Pre-School, Pre-Kindergarten	Extensive	Daily
2.5	General Education Teacher	Second	Moderate	Once a month
3	Special Education Teacher	Kindergarten, First, Second, Third, Fourth, Fifth	Extensive	Once a month
2.5	General Education Teacher	Pre-Kindergarten	Moderate	2-3 times a week
2.5	General Education Teacher	Third	Moderate	2-3 times a week
2.5	Special Education Teacher	Pre-School, Pre-Kindergarten	Moderate	2-3 times a month
3	Special Education Teacher	Kindergarten, First, Second, Third, Fourth, Fifth, Middle grades (any 6-8)	Extensive	2-3 times a year
3	General Education Teacher	Second	Extensive	Once a month
2.5	General Education Teacher	Kindergarten	Moderate	Daily
3	General Education Teacher	Kindergarten	Extensive	2-3 times a month
2.5	General Education Teacher	First, Third	Moderate	2-3 times a year
3	General Education Teacher	Pre-School	Extensive	2-3 times a year
2.5	Special Education Teacher	Kindergarten, First, Second	Moderate	2-3 times a week
2.5	Other, please specify: Art educator	Kindergarten, Third, Fourth, Fifth	Extensive	Once a week
2.5	General Education Teacher	First	Moderate	2-3 times a month
2.5	General Education Teacher	Pre-Kindergarten	Moderate	2-3 times a month
2.5	Other, please specify: ELD specialist	Second, Third, Fourth	Extensive	Daily
3	Special Education Teacher	Kindergarten, First	Extensive	2-3 times a month
2.5	General Education Teacher	Third, Fourth, Fifth	Moderate	Once a week
2.5	General Education Teacher	Third	Moderate	2-3 times a week
2.5	General Education Teacher	Pre-Kindergarten, Other, please specify: Adjunct	Moderate	Daily
3	Special Education Teacher	Kindergarten, First, Second, Third, Fourth, Fifth	Extensive	Once a week
3	General Education Teacher	Pre-School	Extensive	Daily

2 Inclusion factor fit: FAIR				
CODE POINTS	ROLE	GRADE(S)	SUPPORT	FREQUENCY
2	General Education Teacher	Kindergarten	Minimal	Once a week
2	Other, please specify: Reading Interventionist	First, Second, Third	Moderate	Once a month
2	Other, please specify: Interventionist	Kindergarten, First, Second, Third, Fourth, Fifth	Moderate	Once a week
2	General Education Teacher	First	Minimal	2-3 times a month
2	General Education Teacher	Fourth	Extensive	Once a week
2	General Education Teacher	Fifth	Extensive	Once a week
2	General Education Teacher	Second	Minimal	2-3 times a week
2	Other, please specify: Title 1	Kindergarten, First, Second, Third, Fourth, Fifth, Middle grades (any 6-8)	Moderate	Daily
2	General Education Teacher	Fifth	Extensive	Once a week
2	General Education Teacher	Other, please specify: Transitional First	Minimal	Daily

1.5 - 1 Inclusion factor fit: POOR			
CODE POINTS	ROLE	GRADE(S)	SUPPORT
1	Special Education Teacher	Fifth	Minimal
1.5	General Education Teacher	Middle grades (any 6-8)	Moderate
1.5	Other, please specify: PE Teacher	Kindergarten, First, Second, Third, Fourth, Fifth	Minimal
1	General Education Teacher	Fifth	Minimal
1.5	General Education Teacher	Fourth	Moderate
1.5	Other, please specify: Director of Gifted Education	Third, Fourth, Fifth, Middle grades (any 6-8)	Minimal
1.5	General Education Teacher	Middle grades (any 6-8)	Moderate
1	Other, please specify: coordinator/instructional coach	Fourth, Fifth, Middle grades (any 6-8)	Moderate
1.5	General Education Teacher	Middle grades (any 6-8), High school (any 9-12)	Moderate

Appendix J: Inclusion Fit Participant Summary Table – Good Fit

Table 10

Inclusion Fit Participant Summary Table – Good Fit

ID	Pts.	Role	Grade(s)	Support	NBL Frequency
PIP06*	3	Special Education	Kindergarten, First, Second, Third, Fourth, Fifth	Extensive	Once a month
PIP12*	3	Special Education	Kindergarten, First, Second, Third, Fourth, Fifth, Middle grades (any 6-8)	Extensive	2-3 times a year
PIP35*	3	Special Education	Kindergarten, First	Extensive	2-3 times a month
PIP42	3	Special Education	Kindergarten, First, Second, Third, Fourth, Fifth	Extensive	Once a week
PIP02*	3	General Education	Pre-School, Pre-Kindergarten	Extensive	Daily
PIP13*	3	General Education	Second	Extensive	Once a month
PIP16	3	General Education	Kindergarten	Extensive	2-3 times a month
PIP24	3	General Education	Pre-School	Extensive	2-3 times a year
PIP43*	3	General Education	Pre-School	Extensive	Daily
PIP11	2.5	Special Education	Pre-School, Pre-Kindergarten	Moderate	2-3 times a month
PIP25	2.5	Special Education	Kindergarten, First, Second	Moderate	2-3 times a week
PIP26*	2.5	Other, please specify: Art	Kindergarten, First, Second, Third, Fourth, Fifth	Extensive	Once a week
PIP32	2.5	Other, please specify: TESOL	Second, Third, Fourth	Extensive	Daily
PIP01	2.5	General Education	Third	Moderate	2-3 times a week
PIP04*	2.5	General Education	Second	Moderate	Once a month
PIP07	2.5	General Education	Pre-Kindergarten, Kindergarten	Moderate	2-3 times a week
PIP09	2.5	General Education	Third	Moderate	2-3 times a week
PIP14	2.5	General Education	Kindergarten	Moderate	Daily
PIP23	2.5	General Education	First, Third	Moderate	2-3 times a year
PIP29*	2.5	General Education	First	Moderate	2-3 times a month
PIP30	2.5	General Education	Pre-Kindergarten	Moderate	2-3 times a month
PIP36	2.5	General Education	Third, Fourth, Fifth	Moderate	Once a week
PIP38	2.5	General Education	Third	Moderate	2-3 times a week
PIP39	2.5	General Education	Pre-Kindergarten	Moderate	Daily

Note. Good fit for inclusion in interview ranged from 3 to 2.5 code points. * = Potential Interview Participants (PIP) that were interviewed.

Appendix K: Interview Protocol

Teacher Interview Protocol (2c – 5/4)

INTRODUCTION

Thank you for sharing your time and expertise. I appreciate this opportunity to meet with you to learn more about your ideas and experiences with using nature for the instruction of young students (with extensive support needs).

Script - Oral Consent to Participate in Research - University of Oklahoma

I am Andy Heuer from the Department of Educational Psychology at the University of Oklahoma, and I invite you to participate in my research project “Teachers’ Experiences and Perceptions on the Implementation of Nature-Based Learning for Early Elementary Students with Extensive Support Needs”. This research is being conducted via an online video conference interview. As a classroom teacher, you have been chosen as a potential participant for this study because of the important decisions you make daily regarding the instruction and learning experiences of your students. You must be at least 18 years of age to participate.

The purpose of this study is to investigate teacher experiences with incorporating nature into instruction, including their perceptions of the factors that facilitate or impede the use of nature-based learning strategies. By identifying barriers and effective solutions, this study will contribute to a better understanding of how to promote the use of nature in education.

About 30 early elementary teachers will take part in this research.

If you agree to be in this research, you will participate in a recorded video conference interview.

Your participation will take approximately 45 minutes to an hour.

There is a risk of accidental data release if we collect your data using audio and video recordings. If this occurred, your identity and statements you made would become known to people who are not on the research team. To minimize this risk, the researchers will transfer data to, and store your data on, a secure platform approved by the University's Information Technology Office.

You will not be reimbursed for your time and participation in this research.

There will be no information in research reports that will make it possible to identify you without your permission. Research records will be de-identified (i.e, pseudonyms and/or codes will be used), stored securely, and only approved researchers and the OU Institutional Review Board will have access to the records. De-identified research data may be uploaded to an online data repository platform where it would be publicly available for anyone interested to examine.

You have the right to access the research data that has been collected about you as a part of this research. However, you may not access this information until the entire research has finished and you consent to this temporary restriction.

You do not have to participate. If you do not participate, you will not be penalized or lose benefits or services unrelated to the research. If you decide to participate, you don't have to answer any questions and can stop participating at any time.

Your name will not be retained or linked with your responses unless you agree to be identified.



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We might share your de-identified data with other researchers or use it in future research without obtaining additional consent from you.

To assist with accurate recording of your responses, interviews will be recorded on an audio recording device. You have the right to refuse to allow such recording without penalty.

To assist with accurate recording of your responses, interview will be recorded on a video recording device. You have the right to refuse to allow such recording without penalty.

The researcher might contact you to gather additional data or recruit you for new research.

If you have questions, concerns, or complaints about the research or have experienced a research-related injury, contact me at 832-687-244 or andrew.heuer@ou.edu, or the faculty primary investigator, Corey Peltier at 405-325-5974 or coreypeltier@ou.edu. You can also contact the University of Oklahoma – Norman Campus Institutional Review Board (OU-NC IRB) at 405-325-8110 or irb@ou.edu if you have questions about your rights as a research participant, concerns, or complaints about the research and wish to talk to someone other than the researcher(s) or if you cannot reach the researcher(s).

I will be asking some questions to find out how you want me to report your ideas. You can refuse any that you do not like without any penalty.

Do you agree for data records to include identifiable information? ☐ Yes ☐ No

Do you agree to being quoted directly, without the use of your name? ☐ Yes ☐ No

Do you consent to audio recording? ☐ Yes ☐ No

Do you consent to video recording? ☐ Yes ☐ No

May I contact you to gather additional data or recruit you for new research? ☐ Yes ☐ No

Finally, would you like a printed or electronic copy of the information we have just reviewed?
_____ (note response)

Do you have any questions for me before we start?

(CONSENT PROVIDED > START ZOOM AUDIO/VIDEO RECORDING)

IQ1. Tell me about yourself as a teacher. How would you describe your role and your philosophy for teaching young students (with extensive support needs)?

- What about your students? Grades, ages, content, level of need? **possible follow-up questions*
- What's your school like? Location, work/learning climate?

IQ2. Tell me a story about a memorable or even transformative experience you've had with nature at any point in your life?

- Any outdoor activities or hobbies?
- How do you think your personal experiences with nature have informed your beliefs about the role nature can play in the education of your students? (RQ2)

IQ3. What is the outdoor space like at your school?

- What is it like to use these outdoor areas of your school? For your teaching? For your students learning?



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- How often are these outdoor spaces used purposefully for learning?
- Which locations on your campus do you feel provide the best opportunities for your students to connect with nature?

IQ4. How often would you estimate that you directly use nature (i.e., outdoor spaces or natural objects) in your teaching and tell me about a time you've used it?

- How did your students respond to it?
- How did planning compare to typical lesson?
- Did you consider it successful? How do you judge the success or failure?
- How did the experience and outcomes compare to traditional instruction?
- What are some other times where you've used nature with your students?
- (Never used) Are there any particular reasons why you have never used nature in your teaching? What are your thoughts on incorporating nature into your instruction?

IQ5. (↑ - Use) Tell me (more) about the benefits you've observed from using nature in your instruction. What are the things you've seen your students gain from experiences with nature?

- Describe benefits to the wellbeing of your students? (e.g., physical health, mental health, or social connection) **(Nature and wellbeing)**
- Describe own wellness? (e.g., personal enjoyment, stress relief, bonding with your students) **(Nature and wellbeing)**
- Describe benefits to student knowledge and skills? (e.g., content knowledge, attention, motor skills, social skills) **(Improved outcomes)**
- Ways students with extensive support needs benefit in unique ways from nature-based learning? **(Only by nature)**

(↓ - Use) In your opinion, what are the ways you could see that students (with extensive support needs) could benefit from learning in and with nature?

- Tell me about any other strategies or activities that you use to promote the same kinds of benefits? *(Are benefit unique to NBL and/or what are other pathways teachers use to get to the same benefits?)*
- (No benefits) Can you elaborate on why you do not see any potential benefits for students (with extensive support needs) learning in and with nature? Are there any specific concerns or challenges you foresee, other priorities for you?

IQ6. (↑ - Use) Tell me (more) about the challenges you've encountered when trying to use direct learning experiences with nature in your instruction. What are the things that make getting your students to nature (or nature to your students) challenging?

- How do you decide where to teach a lesson? **(Nature not considered)**
- Curriculum demands, time (planning and execution)? Opposition or resistance from parents, administrators, or colleagues? Their concerns? How have you handed resistance? Resistance from students? **(Constrains of time and expectations)**
- Any training or encouragement to try nature-based approaches? **(Preparation resources and support)**
- Level of comfort in teaching outside with your students? **(Confidence)**
- Are spaces available to your students? Accessible? Safe? **(Outdoor spaces and safety)**
- Is there something outdoors or with nature you've always wanted to do with your students, but haven't, because you thought you couldn't? What stopped you?



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(↓ - Use) Talk to me about the reasons why learning experiences with nature haven't been something you've used with your students?

- How do you decide where to teach a lesson? (**Nature not considered**)
- What methods have you found that work for you to generate successful learning experiences?

IQ7. (↑ - Use) What do you think made the nature-based learning you've tried possible?

- Personal knowledge or qualities (e.g., training / preparation)?
- The spaces the school has available?
- School culture of philosophy?
- Resources and/or support (administrative or community)?
- Anything specifically SPED related that facilitated?
- (If multiple factors) What was the most critical?

(↓ - Use) What factors have you found that you need to be able to experiment with new methods of teaching? What does it take to get you to try new teaching methods?

(BARRIER SPECIFIC QUESTIONS)

IQ8. What would it take to raise teacher awareness of nature-based learning approaches to teaching? (Nature not considered**)**

IQ9. What kinds of training, resources, or support would you need to better connect the school experiences your students (with extensive support needs) to nature? (Preparation resources and support**)**

IQ10. What can be done to alleviate some of the pressure on teachers (e.g., time, performance expectations), that would empower them to experiment with new tools or instructional approaches (like providing more nature-based learning experiences)? (Constrains of time and expectations**)**

IQ11. Wherever you believe yourself to be now, what do you think it would take to improve your confidence in using nature with your students (with extensive support needs)? (Confidence**)**

IQ12. If you had total freedom to add or change whatever you needed to, how would you improve the outdoor spaces at your school for your students? (Outdoor spaces and safety**)**

CLOSING

That's all my interview questions, is there anything you'd like to add to our discussion that we didn't talk about? Or do you have any questions you'd like to ask me about our conversation or about this research in general? If you think of anything you are welcome to contact me.

Also, I might need to contact you later for additional questions or clarification of the information you have provided today. May I contact you again to provide feedback on the accuracy of the transcription of our discussion or to review my interpretations of the information you have provided?



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Appendix L: Questionnaire Single Most Important Benefit of NBL

Table 11

Questionnaire Participant Identification of Single Most Important Benefit of NBL

Benefit subtheme	Example quotes
Outcomes	
Useful enhancements are retained through participation in learning experiences with nature. Responses focus on what is gained from the NBL experience.	
Well-being:	
Improvements provided for social, emotional, cognitive, and/or physical health.	“Positive health and cognitive growth has been proven to increase if there is at least daily interaction with nature.” “it provides calm to an otherwise chaotic world.” “I believe it is grounding.”
Knowledge and skills:	
Advancement of problem solving, social skills, and/or a more concrete understanding of abstract concepts.	“It helps to improve academic performance.” “Nature based instruction benefits students through the use of natural objects or natural experiences to help build curiosity, motivation, problem solving skills, collaboration empathy and a respect for the world around them.” “Nature is magical- all things we learn can be learned from watching how our world works.”
Connection:	
Cultivation of a reciprocal relationship with nature, where individuals develop a lasting appreciation and a sense of responsibility to care for the environment.	“Connecting children to the natural world helps them to see the beauty and wonder in nature and inspires them to help protect the environment.” “Students benefit from nature-based learning by developing respect and responsibility for all of nature.” “As humans, we need to understand and connect with nature and how the natural systems work within our planet to be able to live in a way where we can continue to exist in a harmonious way with the planet we live on. If you don't experience, connect, and learn about nature, you are not going to care about it much.”
Experiences	
Value is intrinsic to involvement in learning with nature. Responses focus on the NBL experience itself, the practice of	

the activity, the cognitive processes,
and the emotions in the moment.

Captivating engagement:

Participation is immersive, capturing students' attention, activating senses, and inspiring interest; a narrowing of focus in the experience.

"It allows students to learn in an interesting way."

"I think it engages some students and allows them to see concepts through a different lens."

"The most beneficial part is the immersive learning that takes place."

Practical exposure:

Involvement in hands-on activities in real-world situations offers direct contact with elements of learning.

"Because of the experiential aspects of nature-based learning, and because authentic learning involves real-world relationships this type of learning should be more directly related to students' life experiences."

"Students can have hands on experiences."

"The biggest benefit is the feeling and experiences that kids have when they touch and interact with nature."

Creative exploration:

Motivated by a search for understanding, nature facilitates the exercise of deliberate observation, careful investigation, and practice in the application of knowledge and skills.

"It allows kids to learn using their primitive instincts with nature."

"Leading them to use observation and their native curiosity to discover and get answers."

"It provides a way to use students' natural curiosity about their surroundings to facilitate critical thinking."

Combination* of benefit themes:

Despite the prompt asking for beliefs regarding the "single" most important benefit of the use of nature-based learning approaches, definitions provided by teachers constituted aspects of multiple identified themes.

"Being outside and connected to the outdoors is naturally stress reducing and impacts both thinking and behavior."

"For students to learn best they need to be engaged, bringing real life to them is very helpful. We study life cycles in science and look at insects and plants. We are lucky to have a large field with trees and insects and birds to watch. Often at recess they choose to catch insects in our bug boxes or study leaves or snow and ice in the winter."

"They all love when we go out in the woods. So many do not have that experience at all! I am teaching them to be observant of their surroundings and notice the changes over the year."

Note. *A "combination" of benefit themes is designated as including 3 or more identified core thematic concepts.

Appendix M: Questionnaire Single Most Restrictive Barrier to NBL

Table 12

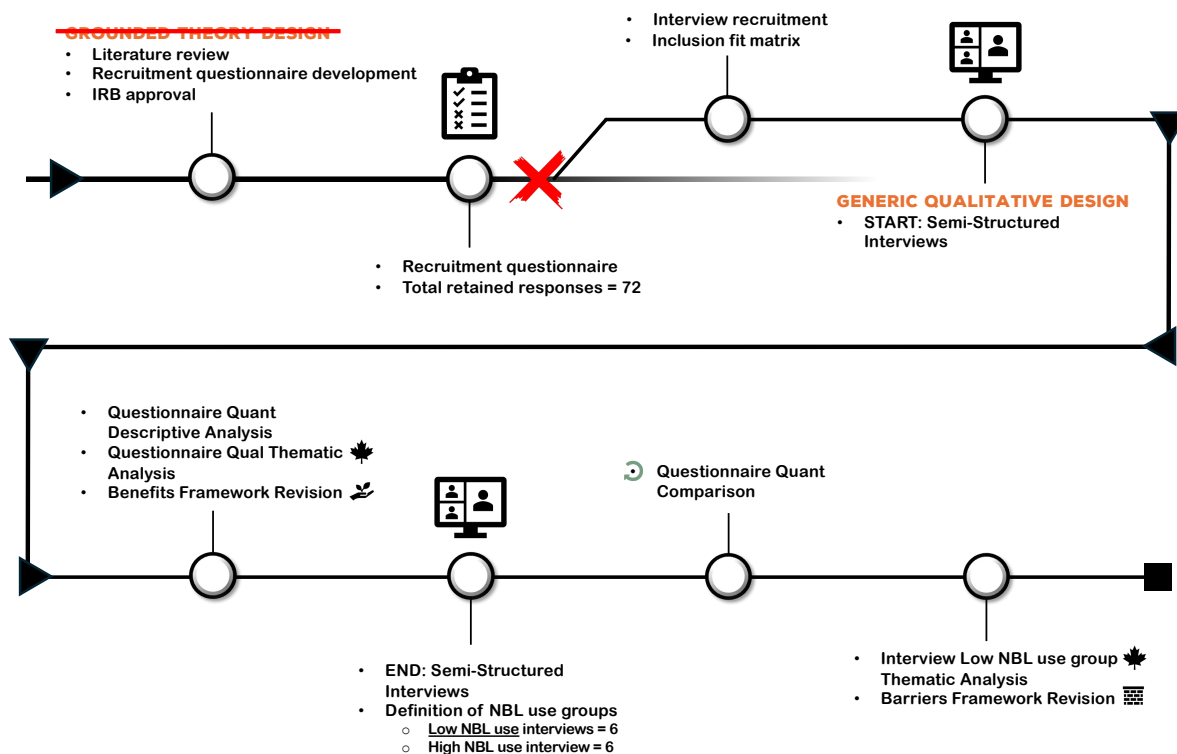
Questionnaire Participant Identification of Single Most Restrictive Barrier to NBL

Barrier subtheme	Example quotes
Nature not considered: Nature is a diminishing part of modern life resulting in a barrier where nature is excluded from educational use by being overlooked and/or misunderstood.	“Traditional education does not prioritize environmental knowledge -- primarily because it used to be so ingrained into everyday life. The current lifestyle of most Americans does not include nature in anyway.” “Allergies!! Also, people just don’t see the benefit. They think kids will ‘get distracted’. I have classes outside when I can, and if I can keep kids with severe cognitive disabilities focused, regular ed could as well.”
Constraints of time and expectations: Instructional use of nature cannot break through the supremacy of scripted lessons, prescribed curriculum, and pacing guidance brought on by pervasive high-stakes assessments and performance standards (for both students and teachers).	“Lessons/curriculum are prescribed to teachers and time/ability to be creative and incorporate nature is limited.” “The most restrictive barrier would have to be lack of flexibility in provided curriculum in the district. We are required to teach on a very specific schedule with no room for deviation/variation. I must follow the curriculum and for the most part, cannot bring unique touches into the classroom.” “Up until it expired it was the "No Child Left Behind" culture of testing, testing, testing. ... in my district, how you spend each minute of your day is very prescribed by the district office. In the 1990's I taught Kdg. and would often include a nearby stream into learning opportunities. I would take my 25 (or so) students to recess on some days to play, experience nature, go on nature scavenger hunts, or gather items to bring back to write about, count, share, etc. If I were to do anything like that nowadays, I would probably be fired.”
Preparation, resources, and support: Use of nature for learning is made formidable without additional funding, materials, training, and/or administrative backing.	“The lack opportunities and funding provided to teachers. Administration pushback can also be a big barrier.” “Not being properly prepared for continuous nature-based opportunities.”

	“Administration. I was an administrator for twelve years. My school had an extremely solid foundation of nature education. District admin love to say they support schools incorporating different methods. However, they also push/demand the same Model that the US has been using since the 1950s. They are only concerned about test scores and working in an outdoor garden, hiking, camping, etc is not direct instruction. This mentality is why I went back to the classroom after 12 years as a principal.”
Confidence:	
Development of sufficient knowledge, skills, resilience, and networks of support become an obstacle to teachers assertively attempting the integration of nature into their instruction with consistency.	“It takes additional effort on the teacher’s part.” “The space can be very large and engagement could get lost without good management.” “other people’s buy-in.”
Outdoor spaces and safety:	
Nature-based learning is deterred by apprehensions over lack of access to natural spaces, hazardous environmental conditions, safety concerns, and limitations in the design of built environments.	“Not everyone has the same access to nature based learning, weather, environment both natural and man made can all impact teachers ability to use nature based learning.” “Access to safe spaces. Extreme temps and Hazards (rocks are hard, small kids can choke on dirt/sand, etc.)” “Some playgrounds are built without the ability to have nature experiences.”
Combination* of barrier themes:	
Despite the prompt asking for beliefs regarding the “single” most restrictive barrier to the use of nature-based learning approaches, definitions provided by teachers constituted aspects of multiple identified themes.	“Time constraints (have to follow pacing guides), lack of access to nature, lack of understanding on how to incorporate nature into lessons.” “Weather, time, and resources.” “The most restrictive barrier is the stress from the top of the chain of command. They want rigorous teaching following the pacing guide and curriculum. Nature isn’t included in the curriculum so it’s like teachers have to hide and be sneaky to get their class outside sometimes.”

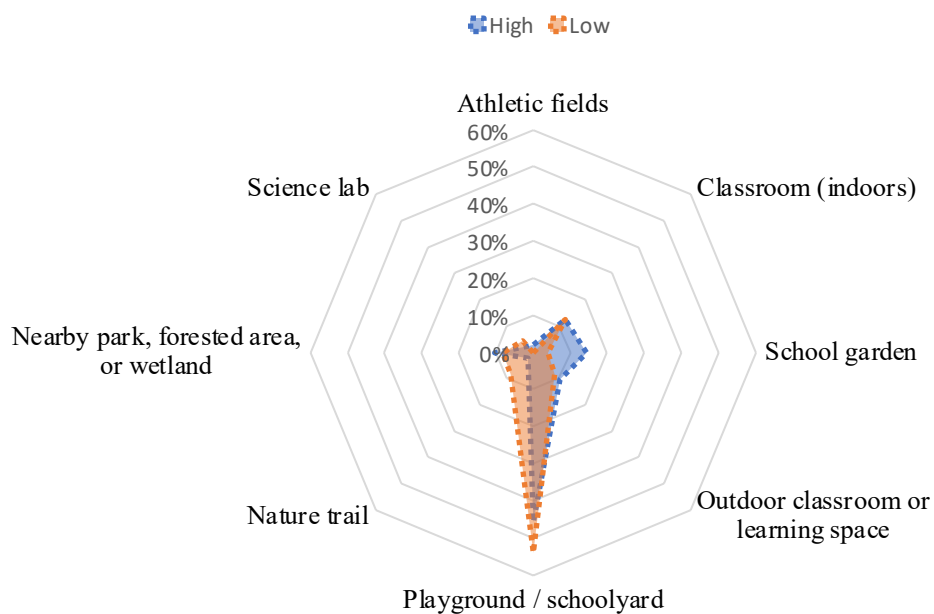
Note. *A “combination” of barrier themes is designated as including 3 or more identified core thematic concepts.

Appendix N: Methods to Analysis Timeline



Appendix O: The Shape of Use – NBL Places vs. Practices

Most Common Place Nature Encountered



Most Common Way Nature Used

