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Understanding How Students with Learning Disabilities from an Urban Environment Experience Nature-based Informal Learning

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UNDERSTANDING HOW STUDENTS WITH LEARNING DISABILITIES FROM AN URBAN ENVIRONMENT EXPERIENCE NATURE-BASED INFORMAL LEARNING

by

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ABSTRACT
UNDERSTANDING HOW STUDENTS WITH LEARNING DISABILITIES FROM AN URBAN ENVIRONMENT EXPERIENCE NATURE-BASED INFORMAL LEARNING

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Under the Supervision of Professor Elizabeth Drame PhD.

Research has shown that there is an achievement gap with students of color in the urban environment and their White non-urban peers (Norman, Ault, Bentz, & Meskimen, 2001; National Research Council, 2012) additionally an achievement gaps exists between students with disabilities and their non-disabled peers (National Center for Learning Disabilities, 2011). The demand for Science, Technology, Engineering, and Mathematics (STEM) preparation is growing and more students need to be prepared in school for STEM careers (Carlson, 1997). The didactic traditional style of teacher led text book reading has proven unsuccessful for large groups of urban youths and students with disabilities (Kahle, Meece, & Scantlebury, 2000; Haberman, 1991; National Research Council, 2012). Using a hands-on, experiential informal learning environments in science has proven successful in engaging students to the science curriculum (National Research Council, 2012). Nature has also proven to engage students into the curriculum. This study combines these topics and addresses the gap in the literature where these topics overlap. This qualitative case study sought to understand how students with learning disabilities from an urban environment experienced nature-based informal learning.

The participants for this exploratory case study informed by ethnographic methods of observation involved seven eighth grade students with learning disabilities from an inclusive

science program at a public urban school. The students participated in four nature related informal learning experiences that were aligned to the science curriculum. These students' experiences were collected from observations, and conducting both one-on-one interviews and focus groups. The data was then triangulated, analyzed thematically, and interpreted. The students' experiences were shared thematically. The three themes which emerged from the data were:

-Hands-on learning is an engaging and a more enjoyable way of learning for students with learning disabilities.

-There is not enough science being taught.

-Students are not habitually accessing natural areas.

To

my grandma (Mama),

my parents,

and my wife and kids

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Chapter One: Introduction

Nationally students of color are performing below their White counterparts in all academic areas (National Center for Education Statistics, 2015; Vanneman et al., 2009). The achievement gap expands when a special education label is added and again when a low socio economic status label is added (National Center for Education Statistics, 2015). Urban students of color living in poverty and having educational difficulties in densely populated settings that are void of greenery are issues commonly discussed in movies, newspapers, and academic journals. This research examines the intersection of urban students with learning disabilities and experiencing nature-based informal learning through their science class.

Research shows science education has largely been unsuccessful in reaching students of color and non-mainstream student groups who are also underrepresented in the science fields (Meyer & Crawford, 2011) and urban students have less access to natural areas than their non-urban peers both in their extra-curricular lives and in schools (The National Research Council, 2012). It is also documented that "non-mainstream" student groups are under-represented in upper level high school science classes, science related majors at universities, and science related careers (Lee & Luykx, 2006) and that students of color make up a disproportionally high percentage of the special education population especially in the urban setting (Norman et al., 2001; National Research Council, 2012).

A gap in the literature exists for using nature related informal learning environments with students with learning disabilities in an urban context to help access the curriculum. The National Center for Learning Disabilities (2011) shows that students with learning disabilities are performing below their non-disabled peers, have lower graduation rates, and are less engaged and motivated than their non-disabled peers. These dismal statistics compounded by lack green

space exposure and successes in the science curriculum create a sense of urgency to explore new forms of accessing education for urban students with disabilities.

Urban students labeled as having a learning disability have a right to access the science curriculum according to the Individuals with Disabilities Education Act and as a matter of social justice, these students deserve the right to access science curriculum. In this research, I argue that using nature related informal learning environments provide an engaging setting, additional exposure to the science curriculum, and provide them with a hands-on learning experience that makes the science curriculum more accessible to them.

This study's location was in an urban setting that struggles with issues of race, poverty, and education. Its schools face many challenges that are related to the urban context. It is the largest school district in the state. It has almost 80,000 students over 80% who are low-income, over 80% students of color, and 20% students with disabilities. The district ranks consistently as one of the lowest performing districts in the state. As the general population of students struggle academically, the 20% of those students with disabilities have the additional burden of trying to succeed with a disability. Students with learning disabilities make up the largest special education population in a typical classroom.

Accessing Education in an Educationally Unjust System

Teaching the curriculum in an urban setting. In urban schools there is a "lack of structure to support innovative teaching practices" (p.1021) along with the other issues associated with an urban context such as lack of materials and supplies and underqualified teachers. (Kahle et al., 2000). Most teachers in the urban environment follow a didactic teaching style of giving directions and information, asking questions, going over assignments, helping with assignments, and grading while monitoring and managing classroom behaviors. (Kahle et al., 2000; Haberman, 1991). This teaching

style is teacher directed and generally works with student compliance. A reason for this type of teaching is because it teaches basic knowledge that can be tracked through standardized tests. These traditional forms of teaching generally work for students from middle and upper class European American homes, this didactic style typically doesn't work for students from historically non-dominant groups and actually excludes students from gaining access to the curriculum (National Research Council, 2012). The didactic teaching style often is used with high level vocabulary text driven science books that general have activities at the end of the chapters, which is the contrary to the inquiry first approach that the National Science Education Standards support (Leonard & Chandler, 2012). Using informal learning environments in science can be an influential, engaging, and motivating alternative or supplement to the curriculum (Melber & Brown, 2008; Tal, Nirit, & Morag, 2014; Lei, 2010). The informal setting can provide a place for a deeper development of knowledge and therefore an advancement in science learning (Kisiel, 2012; Knapp & Barrie, 2001).

Students with learning disabilities can have more difficulties with high level vocabulary and text heavy science books and can develop learned helplessness (Swanson et al., 2014; Sideridis & Scanlon, 2006). This can be manifested from the didactic form of teaching text heavy curriculum because of the tendency to do more for students with disabilities who are struggling than is necessary (Davis, Kilgo, & Gamel-McCormick, 1998). A teacher may simply give students the answers to help them "complete" the assignment instead of fostering the opportunity/motivation/engagement to do the work themselves. This can create the dependency on the special education teacher related to learned helplessness because of the continual perceived lack of knowledge or skill to work independently despite attempts to do so (McCarter, 2013; Gotshal & Stefanou, 2011).

Learning disabilities in urban education. Having a learning disability is an additional factor that contributes to the struggles of urban youths. According to the National Center for Learning Disabilities (2011) students with learning disabilities have disproportionately lower graduation rates and disproportionally higher dropout rates than their non-disabled peers. They also have the second highest student with disability dropout rate next to students with emotional disabilities. Many students with learning disabilities struggle with academic classes in a teacher directed textbook based curriculum (Swanson et al., 2014). Teacher directed learning can be unengaging and therefore less motivating. Sideridis and Scanlon (2006) state that "evidence points to the fact that motivation exerts significant effects on the academic functioning of students with LD" (p. 131). Other factors that can make academic classes difficult are text books that written too advanced with the expository writing being vocabulary heavy and poorly organized (Swanson et al., 2014). Students with learning disabilities not having the adequate background knowledge also serves as a hindrance to accessing expository text material (Swanson, et al. 2014; Brigham, Scruggs, & Mastropieri, 2011).

Race and socio economic status in urban education. Two additional layers in the struggles of the urban students with disabilities are racial status and socio economic status. This is evident by the large achievement gap that has been well documented which shows: Latino/Hispanic, Black, and Native American students score disproportionally worse on academic achievement exams than their peers (National Research Council, 2012). Additionally, students with low SES are twice as likely to be diagnosed with a learning disability and students identified as Latino/Hispanic, Black, or Multiracial are disproportionately overrepresented nationally with learning disabilities (National Center for Learning Disabilities (2011).

Providing educational justice through equitable opportunities and access to nature to urban youths could help close this gap. The National Research Council (2012) stresses personal interest, experience, and enthusiasm are "critical" to children's learning. Using a nature related informal learning environment provides an excellent interactive and stimulating setting where inquiry-oriented teaching strategies could be used to foster a positive experience for urban youths. Brigham et al. (2011) suggest using activities-based instruction/experiential learning as a solution to help students with learning disabilities access the curriculum. They follow-up by stating that "the hands-on approach emphasizes depth of knowledge over breadth" (p. 230). This hands-on approach in the area of science, can get students away from learning what scientists *know* to learning what scientists *do* and becoming active in the science curriculum.

Significance

This study was significant by understanding how students with learning disabilities from an urban school experienced nature-based informal learning by sharing their experiences in relation to the science curriculum. The research indicated that students reported being more engaged and wanted to learn science through the hands-on experiences that the nature related informal learning environments provided. It also showed the lack of time dedicated to science instruction, and insight to the perceived access and exposure students had to public natural spaces. This research leads to further implications of teacher readiness to teach science, providing access to science through hands-on and experiential learning, and the importance of exposing students to public natural areas while addressing different fears teachers, parents, and students have of nature. This research can also be the foundation for further research that shows directional correlation and/or the importance of nature in an urban curriculum with a population of students with disabilities. The students also indicated experiences of "seeing" and "doing"

science, which could lead to correlations in using nature related informal learning experiences and reversing learned helplessness.

The struggle of urban youths in school academics has been documented (National Center for Education Statistics, 2015; Vanneman, et al., 2009; National Center for Learning Disabilities, 2011; National Research Council, 2012) and the need and desire for nature has been documented (Tal et al., 2014; Brigham et al., 2011; Shuman & Ham, 1992; Ernst & Monroe, 2004; Klein, 1995; Kennedy, 1999). My study investigated the impact of using existing local green spaces in conjunction with the existing science curriculum for urban students with disabilities through the experiences told by the students who participated. Specifically, this study asked: **How do students with learning disabilities from an urban environment experience nature-based informal learning?**

This study is a potential resource for educators from an urban environment who struggle with educating students with learning disabilities. Other possible audiences are educators who are interested in using nature as a learning tool and academic researchers who are interested in further researching urban students with learning disabilities and nature through correlations in motivation and engagement.

Theoretical Lenses

The research was conducted as an exploratory case study informed by ethnographic methods of observation. I viewed students with learning disabilities through a Critical Disability Theoretical lens. Although my population had been labeled as having learning disabilities, I question the labeling of students with learning disabilities. I recognize this disability as socially constructed label that is formed through the interrelationship of an impairment, the student's response to the impairment, and the environment in which the student exists as described by

Hosking (2008). Taking students out of the normal classroom environment allowed them an alternative way to access education by accessing public natural areas. This research was shared through the experiences of the students, therefore giving them a voice to challenge negative attitudes towards their disabilities (Hosking, 2008).

Through a Social Justice Theory lens, as described by Pereira (2013), I feel that everyone in society should have the "rights, resources, opportunities, and access to relational contexts that provide someone with enough self-assurance to participate in the life of society" (p. 11). Some of the "rights, resources, and opportunities" I view in relation to the natural environment. I agree with the critiques of the lack of sufficient environmental education in schools (Walker, 1997; Oulton & Scott, 2000), and strive to give voice to the experiences students with disabilities have with accessing and interacting with nature in public informal learning spaces.

General Outline and Project Description

This study was conducted with eighth grade students in an inclusive classroom at a K-8 School. The eighth grade population was chosen because eighth graders are at an academic and social transitioning period and students who can make successful transitions to high school are better prepared for challenges they face in the future (Langenkamp, 2009). The focus was on seven students who had been labeled with a learning disability and were in the selected general eighth grade class. The class that was chosen to conduct the research in was the eighth grade science class. The science class was primarily used as an access point to implement nature related informal learning environments. I felt the connection between nature and science made accessing the population and my research more justifiable to the principal and teacher. The site was specifically chosen because of its proximity to several nature areas and a waterway, but the

research participants were the random students with learning disabilities who happened to be in the selected science class the year the research was conducted.

This qualitative research is classified as an exploratory case study informed by ethnographic methods of observation. It is considered specifically an exploratory case study because its purpose was "to identify the research questions or procedures to be used in a subsequent research study" (Yin, 2014, p.238) through understanding what students experienced in these particular settings. Multiple data sources were taken through interviews, observations, and visual material such as pictures taken. The case study was informed by ethnographic methods because it described and interpreted the experiences eighth grade students with learning disabilities had in nature related informal learning environments through interviews and observing their behaviors in science class when it took place in a nature related informal learning environment and in the regular classroom setting (Harris, 1968). I immersed myself into the study through participant observation by building rapport with the students, by being present in the classroom weekly, and participating in the informal learning environments (Creswell, 2014). I also worked with the special and general education teachers to plan and implement the informal learning experiences to be aligned to the curriculum while following the students' individualized education plan (IEP). Following the baseline data, four nature related informal learning experiences were conducted over the duration of eight weeks during the spring semester. At the end of the eight weeks an exit focus group with students and an exit interview the special education, science teacher, and paraprofessional were conducted. Data was then coded and analyzed to look for emerging themes.

Summary

This introduction presents the significance and contribution of the study and some of the educational struggles of urban education that creates a sense of urgency to try something different. It described some of the issues in urban education in regards to graduation, and achievement and the way academics are currently taught to students with special needs in an urban environment. It established the need and importance of nature through the value it can bring people in urban settings. It followed by sharing my theoretical lens through which I observed and participated in the research. It conclude with acknowledging my potential audience and then outlining and describing the research project. The following chapter provides the literature review, which lays the ground work of the study, and establishes the gap in the literature where nature education, special education, and urban education intersect.

Chapter Two: Literature Review

Introduction

There is a significant disproportionate achievement gap for students with special needs, specifically learning disabilities, in their participation in advanced science and other STEM classes. This disproportionality is more pronounced when the geographical term "urban" and all of its connotations of race and socio economic status are included (Norman et al., 2001). The lack of access to STEM opportunities results in lower achievement outcomes and less participation in STEM careers (National Research Council, 2012). With a significantly larger special education population than in previous decades (National Center for Learning Disabilities, 2011) and the concern for the "achievement gap", urban schools need to try new approaches to educate their special education populations. Urban 8th grade students with learning disabilities that are placed in an inclusive science setting served as the population chosen for the research. It focused on understanding how they experience science in a nature related informal learning experience. This study, addresses a gap in the research where the role nature related informal learning environments play in the achievement of urban students with learning disabilities in science class. Mastropieri et al (2009) and Brigham et al (2011) express concern over the lack of research that is done on interventions for students with learning disabilities in science. Individually each topic has been studied, but there is a gap in the literature in this cross section, which led me to the research question: How students with learning disabilities from an urban environment experience nature-based informal learning?

The literature review is organized by this introduction, in which I describe and outline chapter two, then the bulk of the literature will be in the following section of this chapter. Here I will make three claims:

1- Outdoor education benefits students by enhancing their motivation and engagement; but does not address issues of special education.
2- Special education literature focuses on race and urban contexts; however it tells little about the effects or benefits of outdoor/nature related education for students with learning disabilities.
3- Motivation and engagement are integral to the success of students with disabilities; yet nature related informal learning environments as a motivator or engagement tool for students with learning disabilities has not been thoroughly addressed.

These claims are addressed by separating the research into three categories. Outdoor/nature related informal learning environments, special education, and engagement and motivation. The first category defines the terms nature and outdoor education and how they are used throughout the research. I will discuss how outdoor/nature has been historically used in education as a contingent to the curriculum or as its own entity. I will also define informal learning environments in this section and how they are used as powerful educational tools. In the second section, I briefly discuss the historical context of special education and discuss its current state. The special education section will primarily focus on specific learning disabilities and the research that involves students with specific learning disabilities and inclusive programs in science. In the third and final section, I focus on the experience of students with learning disabilities. My emphasis is placed on defining and researching engagement and motivation, which will help observe, analyze, and interpret the experience of the student. I will focus on engaging and motivating students (specifically with disabilities) and as a separate construct, the possibility of using informal learning environments and/or nature to engage and motivate students.

By distinguishing these three areas, I establish the gap in the literature where the three areas converge and provide the context for this research by establishing the background knowledge and past research that has been done in each individual area to support my claims. In the final section I will discuss the significance of the literature review. I will justify the practical and scholarly significance of the literature review in relation to my research.

Urban. Because of the significance of the research being conducted in an "urban environment", I will first define how I use the term urban throughout the research. The use of urban in terms of population will be used as the literal meaning of all students who live or attend a school in the geographical confines of the city. Urban study researchers have generally defined urban cities based on demographic (population concentration), economic (percentage of non-agricultural work), administrative (legal definition or criteria), or more recently functional (reflection of economic, social, and physical extent of urban influence) (Boone & Fragkias, 2013). The reasoning behind my defining the urban population as such, is that in the functional definition, urban can be a code word for Black, poor, and undereducated. Irby (2015) describes that "the omission of Whiteness is a part of the problematic construction of urban that remains prevalent in urban education research today" (p. 15). It informally can be seen that the majority of urban people using nature spaces in the city are White. This study represents a random population of the students who happen to be in the selected classroom at this particular school during this specific school year. This research will use urban as defined above to research the experience of all urban students regardless of race or SES who have learning disabilities and their experiences with informal learning environments in the curriculum through the utilization of natural spaces in the urban setting. Although the specific student population is random, they

are all Black and receive free or reduced lunch. This research focuses on students that live and/or go to school in the geographical confines of the city.

The Research on Outdoor/Informal Learning and Students with Disabilities: The state of the field

Q: How does outdoor education/informal learning environments benefit students with disabilities?

Outdoor/Informal Learning Environments

This section defines, clarifies, and differentiates the most common terms, which include: outdoor education, environmental education, and experiential/hands-on education that are commonly used when discussing nature-based informal learning environments.

Outdoor education. Outdoor education is defined by Priest (1986) as "a method of learning; experiential; takes place primarily outdoors; requires use of all senses, is based on interdisciplinary content; and is a matter of relationships involving people and natural resources" (p. 13). Hoad, Deed, and Lugg (2013) additionally outline five points that distinguish outdoor education from traditional education. They include:

-the movement from artificial to more natural spaces as the spaces for learning

-provide intense emotional experiences for participants, caused by being in sometimes unfamiliar, natural spaces

-classroom behavioral norms to do with language, movement, and compliance with teacher expectations and instructions, may require rethinking

-the teacher may adopt a number of roles in addition to the traditional one of classroom teacher

> -moving from artificial to natural environments increases the potential for building awareness of different perspectives on the world emerge from interacting in different ways with other group members and places (pp. 42-43).

Through these experiences teachers create a more engaging learning environment and students become much more emotionally and physically engaged in the topic.

Tal et al. (2014) additionally describe outdoor education as having two main branches, one of "adventure" and the other of "environment." Teachers often focus on the content and neglect the social activity, which is where students find their enjoyment. This enjoyment can be related to engagement and motivation. The physical activity of attending an outdoor field trip and the sense of adventure, generally lead to the positive social activity. According to Tal et al. (2014), high quality practices for outdoor education include: "activity and action"," involved teachers"," using the environment", and "using the field trip as a social learning event" (pp. 438-439).

An example of this could be a unit on taxonomy or forestry in science. The traditional teaching method would be to read the science text book and discuss a tree diagram that shows descriptions, identification, nomenclature, and classification (Brigham et al, 2011). In addition to this, an outdoor nature related informal learning experience could be added to the curriculum. The teacher could take the class to the nearest park or natural setting and convert a commonly known place into an educative space. The teacher now leads the lesson in the outdoor classroom by giving real life examples of taxonomy or forestry. Students have the freedom and excitement of collecting specimens and a sense of adventure by handling different organisms or climbing trees to get leaf specimens. A commonly seen place such as the neighborhood park has now

been transformed into a learning space where students are engaged in a less structured environment with a teacher that has transformed to a field guide or facilitator instead of a classroom teacher. Through outdoor education, the subject has just been reinforced with a memorable and educative experience.

Environmental education. Environmental education is a very broad topic that can encompass anything that has to do with the environment. Sometimes it can be taught in conjunction with the general science class or it can be a self-standing class. Although environmental education sometimes uses outdoor education, environmental education can still be taught in the classroom. Tal et al. (2014) differentiates between environmental education's inception during the 1960's, which was more about environmental awareness and taking care of the environment, to the shift of environmental education's current mission, which is the sustainability of our natural resources.

As the "Green" demand continues to grow, education is slow to accommodate this growth and need. According to Ernst (2009) only 10% of teachers have taken environmental education courses as part of their teacher preparation courses. Research shows that environmental life experiences lead to environmental careers (Shuman & Ham, 1997). Therefore this further reinforces the need to get students exposed to environmental life experiences and also to get a higher population of teachers exposed so that they can create these environments for their students.

Much of the research on environmental education treats the subject as its own class and justifies the importance and need of having an environmental education class. This is a very large and broad topic, which doesn't directly relate to this research. The focus of this topic is using nature-based environmental education as a supplement to the general science curriculum.

Because of the broadness of this topic, this section will focus on the subcategory of environmental education known as environment-based education. It is defined by Ernst (2009) as: "a form of school-based environmental education which an instructor uses the environment as a context for integrating subjects and a source of real world learning experiences" (p. 71).

While environmental education is generally a science class, or part of science class, environment-based education uses the environment to supplement the curriculum in any class. An example of this is creating an urban garden. There is an obvious environmental education connection to science with sustainability, plants, soil, worms, insects, sun etc. The urban garden however, can also be useful to a writing class in terms of descriptive writing about plant growth, expository writing on how to plant or build the garden, and/or persuasive writing by trying to convince other schools to implement an urban garden. Math can be used in the construction of the garden, such as volume of dirt, growing surface area, pounds of produce, etc. Social studies can also be taught through how raising food has affected the history of the world/U.S. etc.

Although environment-based education can be used in all subject areas, the responsibility of initial implementation generally falls on the environmental education or science teacher. The science or environmental education teacher is usually responsible for the initiation of environment-based education because environmental education teachers find significantly fewer barriers that would keep them from implementing environment-based education according to Ernst's (2009) research. Ernst's (2009) research showed that 70% of responding teachers indicated they had interest in using environment-based education. Environment-based education was credited with "improving students' critical thinking skills and helping them become more disposed toward using these skills and habits that are essential to managing the increasing complex environmental issues that face our global society" (Ernst & Monroe, 2004, p. 520).

Similar results were found in the area of critical thinking and showed that students exposed to environment-based education made significant cognitive and skill gains (Klein, 1995). Other research showed that environment-based education is academically rigorous and pays off in higher test scores. It ensures that students do not simply learn about science, they perform science (Kennedy, 1999).

Experiential learning. Experiential learning or hands-on learning can be traced back to John Dewey's 1938 seminal work: *Experience and Education* and his model of experiential learning. Paulo Friere also did work with experiential learning in his critical pedagogy involving experiencing learning through teachers and students experiencing learning from one another. Kolb (1984) has also done extensive research on experiential learning. He states that "the emphasis on learning as opposed to the behavioral outcomes distinguishes experiential learning from the idealistic approaches of traditional education and from the behavioral theories of learning created by Watson, Hull, Skinner, and others" (p. 26). He argues that learning cannot exist without experience. There is no way to even measure experiential learning because "no two thoughts are ever the same since experience always intervenes" (p. 26). He believes so strongly in experiential learning that he goes on to define Learning as: "the process whereby knowledge is created through the transformation of experience" (p. 38). On a very psychological and critical level this is true, but this section focuses more on the general idea of using the "hands-on" idea of experiential learning. Kolb (1984) outlines a cycle for learning which, corresponds with experiential learning, as it was included in his definition of learning. It begins with the "Concrete Experiential" stage where a learner compares an experience to a previous one. Second is the "Reflective Observation" stage where a learner internalizes the new situation and changes feeling into opinions. Third, the "Abstract Conceptualization" stage is where the

learner develops generalizations or theories. Finally in the "Active Experimentation" stage the learner "diagnoses the problem and uses behavioral skills to take action. The learner experiments with different behaviors in an attempt to find one that works" (Powell & Wells, 2002, p. 34). Kolb's theory gives additional support to the theory of experiential learning being a critical part in a students' learning. This leads to the further need for students to "experience" as they learn. Learning through natural setting in informal learning environments ties in nicely with Kolb's theoretical framework.

The hands-on approach of experiential learning has evolved over the years. Jakubowski (2003) discusses how the more traditional role of experiential learning was to bring the real-world into the classroom through films, guest speakers, and newspaper articles. A more recent and powerful approach is to bring the student into an environment that they might not otherwise have been exposed to.

The hands-on approach can be both a manipulative and a real world connection. Sutton-Brady (2008) describes the ongoing need for relevance of a course subject to real-world situations for students' learning in a classroom environment. She also explains that providing the experience of taking students out of the classroom, provides students with a more hands-on and memorable learning experience. The National Research Council (2012) also stresses the importance of creating personal interest, experience, and enthusiasm for the science learner. Jakubowski (2003) also found that by taking students out of the classroom and experiencing real-world situations, students are "taking learning beyond the text, students cultivate their appreciation of diversity by actually experiencing it" (p. 24). Similarly, Powell and Wells (2002) found that "experientially based programs that directly engage the student in the learning seem to promote learning" (p. 37). Their research showed as much as a 24% increase in test scores after

participating in experimental science lessons. No research could be found about properly executed experiential learning being harmful to student learning other than the possibility of a student getting physically hurt. Brigham et al. (2011) concluded that "all students appear to prefer a more hands-on approach, which by its nature, tends to be more concrete and meaningful for all students" (p. 230).

Informal Learning Environments

This section defines and describes what informal learning environments are and how they are used in education. A particular emphasis will be placed on informal learning environments emphasizing nature.

Experiences outside the classroom in informal learning environments such as field trips are memorable for students. "When practicing scientists were asked about early influences on their current careers, many cited the importance of informal experiences with science, such as museum trips and outdoor activities, to their career choice" (Melber & Brown, 2008, p. 35). The National Research Council of the National Academies characterizes informal environments for Science learning as: "learner-motivated, guided by learner interests, voluntary, personal, ongoing, contextually relevant, collaborative, nonlinear, and open-ended" (NRC NA, 2009, p. 11).

According to Tal et al. (2014), the NRC also presented multiple strands for learning science that are supported by informal environments. These included:

> Experience excitement, interest and motivation to learn about phenomena in the natural and physical world (strand 1); generate, understand, remember, and use concepts, explanations, arguments, models, and facts related to science (strand 2); participate in

> scientific activities and learning practices with others, using scientific language and tools (strand 5) (p. 430).

These strands show the importance and value of using informal learning environments when teaching science.

Informal environments can be both physical and virtual, and with continuous technological advances, more informal learning environments are created (Falk & Dierking, 1997). This review focuses on how informal learning environments are structured under the different conceptual umbrellas of outdoor education, environmental education, and experiential learning. These are the most commonly used terms when addressing nature related education and are most relevant to this research. Neill (2004) listed up to 45 terms which are closely related to the idea of outdoor education; included in this list were environmental education and experiential learning. Although these concepts blend and overlap, each concept has a distinction which carries its own worth when used as an informal learning environment.

Access to informal learning environments is done through educational field trips. Field trips have been occurring in schools forever. However the focus has changed. Field trips have historically had a "fun" connotation. Many field trips are rewards for good behavior or academic successes such as going to a movie or going to the local park to play. The other traditional style of field trip is to the local museum or zoo. "School field trips to museums, zoo's aquariums, and nature parks have always been an important part of schooling, as evidenced by a long history of education research" (Morag & Tal, 2012, p. 745). Regardless of the type of field trip that is taken, it is usually a very memorable experience. This is shown in the research conducted by Falk and Dierking (1997) which showed that field trip experiences are recalled by 96% of the

people that were interviewed. Their study consisted of 34- fourth graders, 48- eighth graders, and 46 adults. Almost all of the people interviewed remembered the quality of going on a field trip and could remember when they went, who they went with, where they went, and three specific things they did. Lei (2010) also supports that field trips are important to student learning stating that "field trips are the viable method of extending the traditional classroom environment to outdoors" and that field trips "enhance synthesis of information, cognitive reasoning ability, self-confidence, self-efficacy, and research collaboration skills" (p. 43). Many times the local zoos and museums offer curriculum that is aligned to the schools' curriculum, which is relevant to the current topic in class.

Another style of field trips is to bring students to a specific place and then tailor the place to fit the current curriculum. Endreny (2010) describes this as "place-based" environments (a term she uses to describe taking students out of the classroom to learn about that specific place) provide students with common experiences that can be valuable to discussions and work done on the specified topic. These topics can be aligned to any subject area.

Kisiel (2012) refers to informal learning environments when dealing with science as Informal Science Education Institutions (ISEI's). These can be museums, aquariums, or nature centers. These places have "the potential to provide ideas for pedagogy, as well as support deeper development of science knowledge" (p. 67). Knapp and Barrie (2001) additionally state that "there is considerable evidence that an informal environment science field trip can be used effectively to advance science learning" (p. 351). While Nadelson and Jordan (2012) justify taking students on science related field trips because their study showed "increased knowledge, lasting impact on interest and the sustained learning of related content" (p. 221). This again

shows the impact of a meaningful field trip to an informal learning environment for students especially in the area of science.

Nadelson and Jordan (2012) distinguished field trips by organizing them into two categories. One of the categories is a "designed environment" such as field trips to a museum or science center; these have more of a specific learning intention. For example, in a museum there may be an exhibit about a specific topic, which is relevant to what is being taught in school (Morag & Tal, 2012). The other style of field trip involves visits to outdoor or field locations. In these settings, students "engage in experiences that are intended to increase their knowledge about the environment particular to the region in which the destination is located" (Nadelson & Jordan, 2012, p. 221). These learning environments are often less predictable and less structured, which leads to a larger range of learning possibilities. This differs from a museum where there is much more structure and a more rigid curriculum that has already been set. While both styles have strengths and can leave lasting memories, the latter style can be used more spontaneously since it can be tailored to any unit being taught. Swarat, Ortony, and Revelle (2012) found in their research of 533 demographically diverse sixth and seventh graders that "activities that were "hands-on in nature, and allowed for engagement with technology elicited higher interest" (p. 515). Regardless of which type of science field trip is taken, the experience is important to student learning.

The impact of informal learning environments in the area of science in particular on formal science achievement for different populations of students. Some science will always be taught in a classroom, but informal learning environments can be very helpful to use as a supplement or addition to formal science curriculum. Weinberg, Basile, and Albright (2011) state that informal learning environments are:

> Critical to provide contexts that promote positive gains in the attitudes and motivations of students to learn about the nature of science and become scientifically literate. Formal learning experiences are curriculum driven, associated with grades, and take place within a structured school setting. Informal learning experiences are voluntary, semi-structured, and interest driven. (p. 1)

Additionally Eick (2012) states in his narrative case study that "outdoor classrooms provide a real-world context for children's learning in science through use of nature-study, the link between outdoor experiences in nature and a state's mandated science curriculum" (p. 801). There has been much concern about the advancement of student learning in both science and mathematics in today's schools. Falk and Dierking (2010) have expressed their concerns by stating that "the vast majority of the rhetoric and research on this issue (advancing understanding of knowledge in Science) revolves around the failure of school-aged children in the United States to excel at math and science when compared to children in other countries" (p. 486). Although the need for more science has been expressed, the National Research Council stated that in 2008 the Center on Educational Policy wrote: "Science in K-12 schools is often marginalized by traditional emphases on mathematics and literacy" (Bell, Lewenstein, Shouse, & Feder, 2009, p. 13). It goes on to explain how this is shown through the incentives given for literacy and math instruction, which in turn takes learning time away from science and other classes.

Given the diminishing time of science class, but yet the growing need for science, informal learning environments seem to be a logical way to make the most valuable lesson out of less time. "Across informal settings, learners may develop awareness, interest, motivation, social competencies, and practices. They may develop incremental knowledge, habits of mind, and identities that set them on a trajectory to learn more" (Bell et al., 2009, p. 27). Falk and

Dierking (2010) also state that "most science is learned outside the classroom" (p. 486). Informal learning takes place in informal settings such as parks, nature areas, museums, science labs, zoos, and aquariums. In addition to changing times, different populations are excelling with different teaching styles. "Many students find that when science is taught in a hands-on, inquiry-based manner, it is a preferred subject area" (Melber & Brown, 2008, p. 36).

A reoccurring concern is student behavior and informal learning experiences do provide more opportunity for misbehavior but Brigham et al (2011) state that it is "rarely reported as a problem in the literature" (p. 225). Tal, Krajcik, & Blumenfeld (2006) also acknowledge that poor classroom management skills could cause negative problems but, positive and encouraging attitudes, and real-worlds context inquiry based learning has extra value when teaching science in an informal learning environment in an urban setting, which can help with behavior issues.

Despite these challenges and hurdles that need to be overcome, field trips to informal learning environments create memorable experiences for all children and when implemented correctly, provide valuable learning experiences that supplement the curriculum and are powerful engagement and motivational tools. To create an engaging and powerful field trip, Tal et al. (2014) recommend that field trips should be planned collaboratively between the field guides and teachers. This way both the teacher and field guide can participate in the teaching. The field trips should have relevance to the school's curriculum, but be based on student-centered learning activities so that the students participate in discovery and sharing their findings and experiences, through the manipulation of objects in their natural surroundings. The guides and teachers should also promote sharing and building on the findings of the students. Finally, the researchers recommend that field trips should "include amplified physical experience, adventure activities, and opportunities to directly experience unique features of the outdoors" (p. 457). This reflects

the special education motto of "what's good for students with special needs is good reinforcement for students without special needs."

Special Education an Emphasis on Learning Disabilities

Since the Individuals with Disabilities Education Act (IDEA) of 1975 mandated that "children and youth ages 3-21 with disabilities be provided a free and appropriate public school education", the issue of special education has been a hot topic of debate and research. According to The National Center for Education Statistics (NCES) students with disabilities in public education rose from 8.3% in the 1976-77 school year to 12.9% in the 2013-14 school year. Of that "The number of children and youth ages 3-21 receiving special education was 6.5 million or about 13% of all public students in 2013-14. The largest group of students with special needs were students with learning disabilities. Some 35% of students (2.3 million) who had been labeled special education had a learning disabilities" (IDEA, 2015). A specific learning disability's most recognized definition according to Kavale and Forners (2000) is the IDEA definition originally written by the U.S. office of education in 1977:

"The term "specific learning disability" means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. The term includes such conditions as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. Such terms do not include a learning problem that is primarily the result of visual, hearing, or motor disabilities, of mental retardation, of emotional disturbance, or of environmental, cultural, or economic disadvantage. (IDEA amendments of 1997, P.L. 105-17, June 4,1997,11 stat 37)".

Many other researchers and groups have tried to come up with different definitions, but the debate continues about what the proper definition for Specific Learning disability is (Kavale & Forness, 2000; Hosp & Reschly, 2004). The debate stems from what seems like an over identification of SLD. This stems from "the use of discrepancy as the primary (and sole) criterion for SLD identification" (Kavale, Holdnack, & Mostert, 2006, p. 113). Others have objected to the lack of consistent identification procedures and the significant variability of specific learning disability diagnosis from state to state (Coutinho, 1995).

As of recent, a shift of the identification process has begun. Formally presented at the Learning disabilities Summit in 2002 the Response to Intervention (RTI) model for placing kids into special education programs has been expanding through districts. It was agreed that the IQ test should no longer be used to qualify students with learning disabilities (Blanchett, Klingner, & Harry, 2009). This program implements a step-by-step identification process: A) students are provided with empirically validated instruction B) progress is monitored C) students who do not respond receive more intensive or different instruction D) progress continues to be monitored and E Failure to respond may qualify a student for special education (Kavale & Forness, 2000).

This vague definition results in learning disabilities having the highest percentage of students when compared to other special education labels (Hosp & Reschly, 2004). Along with the IDEA the need to provide education in the least restrictive classroom has resulted in an increase in students with learning disabilities being placed in the regular education classroom Gotshall & Stefanou, 2011). In fact "95% of school age children and youth ages 6-21 who were served under IDEA in 2012-13 were enrolled in regular schools" and "from 1990-91 to 2012-13 students who spent 80% or more time in the general education class rose from 33% to 61%. (NCES.edu). Regardless of how the label has been given, students who have been identified as

having a learning disability need support or interventions to help them close the achievement gap.

The classroom is "a logical place to start developing interventions that educators can implement that may reduce disproportionate representation" (Hosp & Reschly, 2004, p. 195). This is a call to action since such large disproportionality exists in the classification of special education students in regards to poverty and race, which are related to urban issues. The call is only recently calling loudly. "To date few researchers have sought to examine the effect issues of race, culture, language, and disability, let alone look specifically at the intersection of these issues as it relates to special education identification, special education service delivery, and students of color's access to an equitable classroom" (Blanchett et al., 2009, p. 391). There has continuously been a disproportionate representation of children of color assigned to special education classes since IDEA began and yet students of color are underrepresented in the gifted and talented programs (Hosp & Reschly, 2004). How are more students of color placed in special education classrooms? Blanchett et al. (2009) say African American and other students of color are more at risk for being identified as having developmental disabilities not because they are minority students, but because of being "more likely to live in poverty, receive inadequate prenatal care, and have limited access to early intervention strategies" (p. 392).

Some question the numbers of disproportionality and how accurate the disproportions are but "there is a general consensus that the record of educational progress of minority children in special education is unacceptable, and that significant disproportionate representation in special education is a fact" (Coutinho & Oswald, 2000, p. 144).

What to do about it is a debatable question that needs to be handled with caution. There is a need to question how reducing disproportionate representation in special education will help

students of color. In the case of Larry P. v. Riles in the state of California overrepresentation of African Americans in the category of Mild Mental Retardation (MMR) was found. In response to the court decision California school districts between 1980 and 1994 "fixed" the overrepresentation of African American students with MMR, but the population of students with Learning Disabilities grew significantly (Coutinho & Oswald, 2000). Coutinho and Oswald caution that "the elimination of over representation maybe counterproductive if the reductions are a result of changes in eligibility criteria or cut-offs" (p.145). Morgan et al. (2015) claim that there is an underrepresentation in special education since students of color often are enrolled in lower performing schools, which holds them to lower standards from their White suburban peers. Therefore showing that home life and attending lower performing schools would make many more students qualify for special education if they attended different schools.

While the debate continues, educators are able to influence the academic achievement of their students, -in fact that is their primary role. Interventions can lead to improved outcomes (Hosp & Reschly, 2004, p.196). As students get identified as having Specific learning disabilities a myriad of other issues could follow. Some of which include learned helplessness, poor social relationships, acceptance, racial disproportionality, perception, acceptance, connectedness to the classroom. These interventions can help overcome some of these issues because the interventions can be exceptionally powerful when a positive emotion is associated with them. Developing a relational approach through making connections with students that are positive emotional experiences can increase student's motivation and classroom successes. (Reinhard, P. & Linnenbrink-Garcia, L., 2014)

Informal science learning for students with disabilities. "Many students with disabilities find that informal learning experiences, such as visits to museums or parks, are motivating experiences and allow for learning through alternate modalities" (Melber & Brown, 2008, p. 37). Researchers Murray and Naranjo (2008) conducted a meta-analysis and found that many studies citing an inflated school drop-out rate for students with a learning disability "far exceed" the national average for students without disabilities. They also found that "dropout rates among low income students with disabilities are approximately two to six times greater than dropout rates among middle and upper income youth" (p. 145). Additionally, "students with learning disabilities or emotional or behavior disorders reported less desirable engagement than their average achieving peers" (p. 276) and engagement is a significant predictor of students dropout and completion of high school (Reschly & Christenson, 2006). They also state that students with learning disabilities and emotional or behavioral disabilities have the highest dropout rate among other students with special needs or general education peers. These statistics demonstrate the need to strengthen the engagement and curriculum in all subjects. Specifically in science, Melber and Brown (2008) state that "for a multitude of reasons, many students receiving special education services still do not receive enough science instruction to be considered in line with the national standards documents" (p. 35). Science is being set aside in order to focus more time on literacy and math. With less time devoted to Science and the growing demand for science knowledge, teachers must make the most of their science time especially for students with disabilities.

No literature was found about how informal learning environments have helped middle school students specifically with learning disabilities in the area of science. This is the gap in the literature that this study is meant to fill. Melber and Brown (2008) however state that younger

generations of individuals with general disabilities are not well represented a science related careers. They theorize that "although many factors have led to an underrepresentation of individuals with disabilities in science careers, a lack of early exposure to quality science experiences is likely one contributing element" (p. 35). They also acknowledge that while there is information on informal learning environments, "there is less information as to how these experiences can specifically support learners with disabilities" (p. 36).

While research on specific learning disabilities in relation to nature related informal learning environments was not found, research was found about nature and attention deficit hyperactivity disorder (ADHD). Although the focus of the research is on ADHD there are commonalities and generalizations that include disabilities in the general sense. There have been several studies done that show how ADHD can be helped through Restoration Theory (Taylor & Kuo, 2011; Taylor, Kuo, & Sullivan, 2001). Restoration Theory is when the natural environments help the brain recover from direct attention fatigue in part because it draws in involuntary attention which is thought to rejuvenate the brain's fatigue (Kaplan, 1995). Direct/voluntary attention can only be used temporarily because the brain gets fatigued. Examples of this are reading and answer questions, or studying. Involuntary attention is thought to provide relief for the brain. Examples of this are watching the trees blow in the wind (Berto, 2005; Kaplan, 1995). There has been some research that shows that students who suffer from ADHD can concentrate better when given time outside or in an informal setting. This is explained through students using direct/voluntary attention to focus on the subject at hand and then being able to relax their brains by using their involuntary attention and looking around the informal learning environment (Berto, 2005; Kaplan, 1995; Taylor & Kuo, 2011). The informal learning environments in these studies were all related to nature and outdoor settings that had

greenery. With the urban environment being filled with stimulation that "captures attention dramatically" like advertisements, traffic, and the general large population of people, walking in nature or viewing pictures of nature can improve direct-attention abilities" (Berman, Jonides, and Kaplan, 2008, p. 1207). These examples show the need for nature for all people, but especially people in the urban areas. Wilson's (1984) work on the Biophilia Hypothesis, which further argues the importance of nature, theorizes that since mankind has lived and evolved in generally natural settings, we as humans have an innate need for sharing experiences with nature.

As stated by Hoad et al. (2013) "classroom behavioral norms to do with language, movement, and compliance with teacher expectations and instructions, may require rethinking" (p. 43). This is sometimes the difference that can make students with disabilities excel. As the authors state later in their research, outdoor education "offers a set of affordances that are loosely bounded by the teacher's and perhaps students' purposes and abilities" (p. 43). Zelenski and Nisbet (2012) also found that being exposed to nature correlated significantly with all happiness indicators. Happy students are easier to teach than unhappy students.

Using nature and outdoor informal learning environments offers a situation that is different from the traditional school roles of teachers and students, and it allows for a new type of engagement where different students with disabilities have a chance to engage and participate to their fullest potentials. Block et al. (2012) state that "children described as "nonacademic" or exhibiting "learning difficulties" and "challenging" behaviors were experiencing "success" at school" (p. 424) with an outdoor gardening program. Ferris, Norman and Sempik (2001) similarly found that Therapeutic gardening serves as a "rehabilitation program to people who have suffered barriers to full social inclusion." Melber and Brown (2008) suggest implementing best practices for teaching science to students with disabilities through informal learning

environments. These include: “provide alternative assessment strategies”, “incorporate objects and specimens”, “plan for durability”, “get out of the classroom”, “prepare for accommodations”, and “empower the learner”.

Motivation and Engagement Relative to School Success

With the established achievement gap between students of color/urban and their White/non-urban peers and the achievement gap between students with disabilities and their non-disabled peers, it is important to provide equitable opportunities to learn science and “become engaged in science and engineering practices; with access to quality space, equipment, and teachers to support and motivate that learning and engagement; and adequate time spent on science.” (National Research Council, 2012, p.28) This section will examine the research done on the similarities and differences between motivation and engagement and examine the literature around student engagement and motivation as it relates to student with disabilities, science, and informal learning environments.

Engagement/Interest and Motivation

Engagement, interest, and motivation are generally seen as mutually related (Renninger & Hidi, 2011). For this research, interest and engagement will be used interchangeably but the difference between motivation and engagement/interest will be addressed. Many Researchers use the term motivation in their definition of interest (Swarat et al., 2012). One difference between interest and motivation is considering which comes first. Does engagement happen first, which encourages motivation or does a person need to be motivated to be engaged? “Interest researchers tend to view interest as the precondition for intrinsic motivation, whereas the motivation researchers often see interest as the outcome…” (Swarat et al., 2012, p. 518). Fredricks, Blumenfeld, & Paris (2004) describes the definition of engagement as “quite similar

to the constructs in motivational literature, such as motivation to learn, learning goals, and intrinsic motivation" (p. 64). Although they are directly related this research will discuss each one individually. This will be done because I feel that engagement/interest and motivation or lack of engagement/interest and motivation will likely emerge as themes and I feel that it is important to differentiate between the two in order to accurately describe the experiences students have with nature related informal learning environments.

Engagement. Enagement is defined by Swarat et al. (2012) as: "active involvement in learning and academic tasks, including behaviors such as concentration, attention, asking questions, and contributing to class discussions" (p. 518). Although in this study engagement is used interchangeably with interest, I feel it is important to show due diligence and acknowledge that Swarat et al. (2012) warn that "the relationship between interest and engagement is inconclusive; while it is reasonable to anticipate strong interest manifests itself as high level of engagement, some studies have shown that such a correlation is not always transparent" (p. 518). This was the only research found that argued against using interest and engagement interchangeably.

Fredricks et al. (2004) categorize engagement into three categories: behavioral engagement, emotional engagement, and cognitive engagement. Behavioral engagement focuses on participation; it includes involvement in academic and social or extracurricular activities. This engagement is "crucial for achieving positive academic outcomes and preventing dropping out" (p. 60). Emotional engagement is focuses on positive and negative reactions to teachers, classmates, academics and school. This type of engagement generates connections with institutions and influences willingness to do the work (Fredricks et al., 2004). While Cognitive engagement focuses on the idea of investment "it incorporates thoughtfulness and willingness to

exert the effort necessary to comprehend complex ideas and master difficult skills" (p. 60). Although engagement is categorized into three categories, Fredricks et al. (2004) and Guthrie and Wigfield (2000) recommend observing engagement as one entity since the three categories all work together. Nature related informal learning environments have the potential to engage or disengage students in any or all of the three categories. Fredricks et al. (2004) reinforce this by stating that using all three forms of engagement together provides "a richer characterization of children than is possible in research on single components" (p. 61). As Fredricks et al. (2004) recommends, in this research engagement/interest will be viewed as a combination of the behavioral, emotional and cognitive categories when describing students' engagement.

The term engagement in education seems to stem from John Dewey. He is credited with being the "forerunner" in modern interest research with his 1913 seminal book *Interest and Effort in Education* (Schiefele, 1991). Dewey is credited with beginning the experimentalism philosophy and was a supporter of social change and education reform. He advocated for student inquiry led and participatory learning through student interest. Since then interest and engagement have been studied and the terms have been dissected. Schiefele gives three basic characteristics of interest: "it is an active propulsive state, it is based in real objects, and has high personal meaning" (p. 300). According to Eccles and Wigfield (2002), interest can be split between individual interest and situational interest. Individual interest is "a relatively stable evaluation orientation towards certain domains" (p. 114). While situational interest is stimulated through an activity or task that the participant is involved in. Swarat et al. (2012) also discuss similar differences between interest and interests. Interest, being what science teachers hope to give students in a class period, while throughout the science course the hope is to instill science interests so students pursue a science related field. Eccles and Wigfield (2002) also subdivide

interest into feeling and value categories. Feeling categories are described as the "feelings that are associated with an object or activity" and value refers to "the attribution of personal significance or importance to an object or activity" (p. 214). Interest is also personal because through people's personal beliefs, values, and goals, people engage or disengage in different activities or situations.

Pintrich (2003) and Schiefele (1999) similarly use the terms "personal" and "situational" interest. Schiefele (1999) categorizes them as "personal interest representing a stable evaluation orientation toward a certain domain" and "situational interest being a temporary state that is elicited by specific features" (p. 257). Pintrich (2003) theorizes that a situational interest and designing environments to "catch and hold" student interest could create the development of personal interest. He also makes the correlation that students who are highly intrinsically motivated also have high levels of interest. This analysis of engagement and interest serves to make a better understanding of these terms so that students' experiences can be more accurately observed and described.

Engagement in schools. This section discusses research that has been done on engagement of students in schools that relate to using nature-based informal learning environments or similar concepts. Specifically taking students to an informal learning environments and engagement did not yield many results. Therefore it is felt that researching extra-curricular activities and engagement could help provide research on engagement. Extra-curricular activities provided a similar combinations of situational and personal interest. Reschly and Christenson (2006) found that students who participated in extracurricular activities "showed better attendance at school, were three times more likely to be in the top quartile in reading and math, and were more likely to aspire to postsecondary education than nonparticipants" (p. 279).

They also concluded that when students participate in extracurricular activities they have a stronger feeling of belonging or engagement with the school.

High school graduation rate was also correlated to engagement. Reschly and Christenson (2006) describe student dropout as a "gradual process of withdrawal from school" (p. 278). They suggest that withdrawal stems from a continual decrease in student engagement. This type of loss of engagement can be in class or in extracurricular student activities. They acknowledge students with disabilities by saying "student engagement variables were significant predictors of school dropout and completion for students with LD or EBD and students without disabilities" (Reschly & Christenson, 2006, p. 276). While these research examples don't directly describe informal learning environments, they do provide insight to the importance of student engagement through a more student led, experiential style of learning.

Beyond establishing the importance of engagement, research was found how to increase engagement in areas that are similar to nature related informal learning environments. Vansteenkiste, Lens, and Deci (2006) offer solutions to increase student engagement and consequently lower dropout rates. They state:

> If instructors help students see the long-term relevance to themselves in terms of intrinsic goals such as personal growth, meaningful relationships with others, becoming healthy and fit, or contributing to their community, for example, students are more likely to become more engaged with learning activities and in turn to understand the material more fully and to perform better in demonstrating their competence. (p. 28)

The proposed nature related informal learning environments could help provide that type of relevance. Choice and interest promote engagement (Margolis & Mccabe, 2006). Margolis and

Mccabe (2006) suggest using "novelty" and "relevance" to engage student learning and to engage students in class discussions. While Vansteenkiste et al. (2006) suggest making school relative and engaging to students and using student led inquiry driven lessons. Nature related informal learning environments can provide these students with this through cognitive, physical and social engagement. Tal et al. (2014) stated that students on outdoor field trips "interact with objects in various ways: by seeing, smelling, hearing, touching, stepping, and sitting on; and they interact with peers and adults in designed activities and in undersigned and un-planned events" (p. 456). These nature related experiences can provide students with hands-on experiential engagement. Swarat et al. (2012) also supports the idea of engaging students with hands-on activities when they found that "students focused primarily on the form of activity rather than content topic and learning goal" (p. 515). Renninger and Hidi (2011) also stress the importance of hands-on activities and tasks to generate and develop interest in a topic often times through the novelty and challenges that these experiences promote. This research helps to further demonstrate the power of engagement through hands-on activities and how this has been shown to increase student engagement.

Motivation. Motivation is the other potential theme that I foresee emerging. This section motivation is defined as it is applied in terms of education and potential through nature related informal learning experiences with a focus on students with learning disabilities. Students' self-efficacy and self-determination will be analyzed to give more accurate background to how a student acts in relation to motivation. This is important to address in the research because "Motivational orientations, attributes, and characteristics are highly predictive of subsequent student engagement and behavior in academic tasks" (Sideridis & Scanlon, 2006, p.131). Although special education and motivation are well researched, little research has been

done on motivating students with learning disabilities (Sideridis & Scanlon, 2006). Motivation in relation to education is defined as "an internal state that arouses, directs, and sustains goal oriented behavior" (Glynn, Brickman, Armstrong, & Taasoobshirazi, 2011, p. 2). When more specifically applied to science, motivation to learn science is defined as: "an internal state that arouses, directs, and sustains science learning behavior" (Glynn et al., 2011, p. 2). Motivation is "enhanced when students perceive they are making progress in learning. In turn, as students work on tasks and become more skillful, they maintain a sense of self-efficacy for performing well" (Schunk, 1991, p. 209).

Motivation was historically only a study of extrinsic stimulations; through famous studies such as: Pavlov's classical conditioning model and Watson and Skinner's instrumental or operant conditioning model (Lepper, Henderlong, & Gringas, 1999). Extrinsic motivation is generally done to obtain an outcome or reward that is different from the learning itself such as: wealth, fame, and image (Glynn et al., 2011; Glynn & Koballa, 2006; Pintrich, 2003; Eccles & Wigfield, 2002).

Around the beginning of the 1960's some scientists began studying different forms of motivation that dealt with internal motivation later called intrinsic motivation. Motivation was then separated into two categories extrinsic motivation (mentioned above) and intrinsic motivation. Intrinsic motivation was motivation undertaken for its inherent interest and enjoyment such as growth, relationships, and community (Glynn et al., 2011; Glynn & Koballa 2006; Pintrich, 2003; Eccles & Wigfield, 2002). In relation to learning, students who are intrinsically motivated to learn often "experience a feeling of enjoyment that occurs when they have developed a sense of mastery and are concentrating intensely on the task at hand, such as a lab activity" (Glynn & Koballa, 2006, p. 26). Yet most students also say that they are

extrinsically motivated in science by getting good grades or fulfilling graduation requirements (Glynn & Koballa, 2006). There was a significant separation that existed between the two motivational forces that hadn't been addressed yet and people were finding many examples of an overlap, such as the one mentioned above.

Researchers such as Edward Deci in the early 1970's began to notice similar themes and decided that intrinsic and extrinsic motivation could happen together. Students can be motivated both intrinsically and extrinsically as in the example of a science lab. Students can be motivated to complete a lab to achieve a grade but can also become motivated to do a thorough investigation because of their interest or intrinsic motivation (Glynn & Koballa 2006). Pintrich (2003) expands on this by reiterating the blurring of the distinction between intrinsic and extrinsic motivators. He suggests that extrinsic motivation actually has four strands to it in which the final strand is basically intrinsic motivation. He describes the four strands as: External, such as rewards; Introjections, seeking approval from others; Identification, taking more self-control; and Integration, where there is "high internal control and congruence between self and values to goals" (p. 674).

Appling this theory of extrinsic/intrinsic motivation as it relates to students with learning disabilities, a study was conducted by Pintrich, Anderman, and Klobucar (1994). Their research showed that many students with learning disabilities fall into a category that was defined by "low levels of comprehension and metacognition" but "high intrinsic motivation". Vansteenkiste et al. (2006) suggest that in order to enhance students' motivation for learning, "it is useful for practitioners to point out the relevance of the learning material, especially in cases in which students have low spontaneous interest in the material" (p.27). Therefore, they are trying to build their intrinsic motivation through extrinsic motivation. Vansteenkiste et al. (2006) coin the

term Autonomous Motivation, which involves the experience of "volition and choice" and is a combination intrinsic motivation and "well-internalized forms of extrinsic motivation" (p. 28). Vansteenkiste et al. (2006) feel that this is a better motivator than Controlled Motivation, which involves the experience of being pressured or coerced or "poorly internalized forms of extrinsic motivation" (p. 28). These two forms are the difference between a teacher saying "you *may* try to do your best" (autonomous) and "you *should* try to do your best". Another factor in motivation that is often cited when researching motivation in terms of education is self-determination.

Self-determination. Self-determination Theory (SDT) was originally developed by Edward Deci and Richard Ryan's seminal research in 1985 and is useful in explaining reasons behind variances in motivation, It is affected by "interpersonal environments" and "social contexts" (Vansteenkiste et al., 2006). It is defined by Glynn and Koballa (2006) as: "the ability to have choices and some degree of control over what we do and how we do it" (p. 27). When students can give more input into a science class their intrinsic motivation can increase because they feel they are not only involved but have claimed some stake in the class. The opposite is also true; students feel less involved and lose intrinsic motivation when they felt they had little control over their learning. The ability to go to a nature related informal learning environment maybe an extrinsic motivator but the actual being in the informal learning environment would be an intrinsic motivator. Students' self-determination could come from the social context of their friends being there and the less rigid education environment to socialize with peers and teachers.

Self-determination is "a model that has integrated both needs and social-cognitive constructs" (Pintrich, 2003, p. 670). The three basic needs are "Competence, autonomy, and relatedness" (p. 670) as described by Pintrich (2003). Margolis and Mccabe (2006) recommend

giving task-specific feedback as soon as possible, such as putting two spaces after a period when typing on a computer. This can motivate students to learn because they get the direction that they need by providing immediate feedback, yet students then feel empowered to continue with their project. Immediately noticing the pattern and reminding the student to put two spaces after a period, prevents students from getting frustrated after they thought they had completed their project and then needing to go back and add a space after every period they have typed. The informal learning environment provides this through the inquiry base process where students lead the inquiry process and teachers have the opportunity to continuously support.

Pintrich (2003) states that self-determination theory works in conjunction with three areas that drive motivation. These three areas are: Competence, which is mastering interactions with the environment, autonomy: being in control of one's own behavior, and relatedness: wanting to belong or be attached to a group. Keeping this in mind theoretically and in practice, nature related informal learning environments would facilitate the autonomy with a less structured learning environment, competency through the experiential learning that is accessible to all students, and relatedness through an engaging setting and curriculum.

Self-efficacy. "You can do whatever you set your mind to" and "if you can dream it, you can do it" are some phrases that are often posted up in school to build students' self-efficacy. Self-efficacy is defined by Margolis and Mccabe (2006) as: "the judgment students make about their ability to succeed on a specific task or set of related tasks" (p. 219). Glynn and Koballa (2006) simplify this in the context of science by describing it as: "confidence a student has about his or her ability to succeed in a field of science" (p. 27). It is split between two expectancy beliefs. They are outcome and efficacy expectations; "outcome expectations are beliefs that certain behaviors will lead to certain out comes and efficacy expectations are beliefs about

whether one can effectively perform the behaviors necessary to produce the outcome" (Eccles & Wigfield, 2002, p. 111).

Students who are confident and think they will succeed generally do succeed (Pintrich 2003; Eccles & Wigfield, 2002), although Schunk (1991) warns that "high self-efficacy will not produce competent performances when requisite skills are lacking" (p. 208). Many struggling learners have low self-efficacy for academics (Margolis & Mccabe, 2006). They state that self-efficacy can be used to improve motivation of struggling learners through enactive mastery, which is making accommodations to student assignments and tests to give them the opportunity to perform well. Vicarious experiences, which is having other students model examples or tasks, and verbal persuasions, which are also positive reminders and cues to manipulatives. Low self-efficacy causes motivational problems. If a student doesn't think they can be successful then they will "superficially attempt them, give up quickly, or avoid or resist them" (Margolis & Mccabe, 2006, p. 219). Pintrich (2003) clarifies this theory by giving an example of a student who has a very high self-efficacy and thinks he is a great reader when actually he is not; in turn he may not be motivated to go back and reread or accept feedback about how to improve his reading skills. It is important that students know what they can and can't do (Pintrich, 2003). Schunk (1991) also describes the thin line to walk on when discussing self-efficacy. He states that "successes raise efficacy and failure lowers it, but once a strong sense of efficacy is developed; a failure may not have much impact" (p. 208).

Other research on self-efficacy on students with disabilities from Pintrich et al. (1994) showed that "although the students with learning disabilities displayed lower levels of metacognitive knowledge and reading comprehension, they did not differ from the students without learning disabilities on self-efficacy, intrinsic orientation, or anxiety" (p. 361). They

also state that many studies show that students with learning disabilities place blame on their failure due to their lack of ability, but they acknowledge that a limitation of the study was a small sample size (39 students) in which all of them where White from White middle class Midwestern schools. Results could vary with different sample sets. In an informal learning environment students with different learning styles could have the ability to perform at their maximum ability and build self-efficacy.

Synthesis:

In the first section, the literature showed that experiential hands-on informal learning experiences are positive for all students as well as outdoor related learning experiences. The following section established the current state of special education and the achievement gap and discussed other nature related research that has been done with students special needs. The final section discussed the engagement and motivation as it related to students, education, and informal learning experiences. These three sections examined the relevant research and the historical context to show the gap in the literature and to therefore rationalize the significance of my research problem. It followed and proof-read with Boote and Beile's (2005) literature review scoring rubric striving to properly exclude unrelated topics yet using a large enough breadth of related research to address the specific research question. It addressed historical contexts and addressed research that documented both advantages and disadvantages of this research.

Chapter Three: Methodology

Research Design and Overview

In order to understand how students with learning disabilities from an urban environment experienced nature-based informal learning, an exploratory case study informed by ethnographic methods of observation was conducted. This was considered specifically an exploratory case study because its purpose was to explore and identify the experiences of the population (Yin, 2014) specifically in these nature related informal learning settings. This case study primarily examined the experiences students with learning disabilities had with nature as an informal learning experience outside the formal science education setting. The purpose of this study was to look for themes that emerged and to share, with thick rich descriptive data, how this group of students constructed and shared meaning from their experiences (Glesne, 2011).

Case study. The reasoning for using a case study was that this research was not meant to generalize, it focused on a specific small group of students using a "how question" to describe their experiences with nature related informal learning environments (Yin 2014). Yin (2014) describes a case study as the preferred method when the research questions pose "how" or "why" questions, the researcher has little control over behavioral events, and the focus of the study is based on a contemporary phenomenon. The study was a bounded system (e.g., an activity, event, process, or individuals) (Creswell, 2002), which was bounded by an eight week time period and the specific group in this specific class and during this specific school year. The phenomenon of the nature related informal learning experiences was told as an ethnographically informed description and interpretation of this student groups' experiences (Creswell, 1998).

Researcher role. I used participant observation and was immersed in the day-to-day lives of this group in their science class. I observed what was scheduled as a science time 13 times over the eight week unit, attended four informal learning experiences, and conducted 15 onsite interviews. I looked into the meanings of the groups' behaviors, language, and interactions of the selected student group (Creswell, 1998). Glesne (2011) describes the role of an observer along the continuum of full observer (one way mirror) to full participant (part of the community). I was a visible observer in the everyday setting of the science class (Yin, 2014), worked to establish rapport with students, and worked with the science and special education teachers to implement the nature-based informal learning environments. I did not act as another teacher in the class by becoming a full participant, instead I stayed in the middle of this continuum. I sat on the side of the classroom observing time-on-task monitored through non-verbal and verbal cues such as participating in discussions, raising hands, head down, eyes closed, chatting to neighbors, walking around the room. I also walked around observing if students were writing, on the correct page when readings were occurring, and answering any questions that were directed towards me. Twice during the research the science teacher was absent; the substitute was struggling with classroom management, so I left the classroom to not change my role/power in case I was asked to help manage or teach the class as the other adult in the classroom.

The power, in relation to a school setting, is defined as "a person's or group's capacity to have influence on the actions of others, and make them act in a way that is desired" (Virta & Virta, 2015 p.81). It is held primarily by the general education teacher. She was primarily in charge of the classroom instruction, lesson planning, and classroom management. The Special education teacher helped make accommodations for the students with disabilities and modified

assignments accordingly. She also wrote the individualized education plans and had more direct contact with the students with special needs and their parents. The paraprofessional used the accommodations and modifications the special education teacher had implemented and assisted with classroom management.

I tried to minimize the power I held. As a participant observer, I developed the informal learning experiences using the current curriculum with the special education teacher. I was introduced transparently by the teacher as a PhD student who wanted to use the class to do research on using field trips (nature related informal learning environments) in science. I talked about my previous teaching experience at the school and passions with nature. I wanted my position of power in the class to be someone who was approachable and knowledgeable in the content and who did not pose any threats of authoritativeness.

Study design. This study design was an impact of intervention study that was observed through an exploratory case study. As Yin (2014) defined the case study as an "empirical inquiry that investigates a contemporary phenomenon within its real-life context especially when the boundaries between phenomenon and context are not clearly evident" (p. 13). This lended itself well to the research because researching a classroom is an "open" system that is "in a constant state of flux and in constant contact with their environment." (Patton & Appelbaum, 2003, p. 63). The classroom was an "integrated system" as described by (Stake, 1995), which has many moving parts and can most thoroughly be observed as a whole to understand the phenomenon. Patton and Appelbaum (2003) state that "the case study's unique strength is its ability to deal with a full variety of evidence, documents, artifacts, interviews, and observations" (p. 63). This study also lended itself to the second of Yin's (1984) four applications for conducting a case study, which is to describe the real-life context in which an intervention has

happened. The interventions, which were the informal learning experiences, happened, but with the "constant state of flux" and the "integrated system" of the classroom, the research changed to fit the context.

Site selection. The study took place in one the country's top 50 largest cities that shares many of the same struggles in public education as other large cities in the U.S. The city has many greenspaces with parks, bike paths, and waterways. With a non-growing population, more green spaces are becoming available for parks and community gardens as vacant homes get torn down. Nature's importance is once again starting to be recognized with the recent rehabilitation of some of the existing green spaces, such as parks and water access points, and the new green spaces such as community gardens. Some of these established parks are forgotten, underutilized, or accessed by primarily higher educated White middle/upper socio economic status urban residents. As in many of the country's largest cities, this city is experiencing a downtown urban renewal but with urban renewal, gentrification of neighborhoods surrounding the downtown area is taking place too. Informally, a person can observe that natural spaces in the city are used primarily by White residents, which is disproportionate when the school system has over 80% students of color population and the city as a whole has a less than 40% White population (U.S. Census Bureau, 2015).

The site is a K-8 public school located in the city within a racially and economically diverse neighborhood. The school had a population of almost 700 students. There was a 75.9% Black, 12.4% White, and 9.9% Hispanic population that attended the school. 48.7% of which need special education services and 92.1% which are economically disadvantaged. The school is part of the largest school district in the state and also one of the lowest performing districts in the state according to the state report card. According to the State Department of Instruction, (2015-

16 School year) there are over 78,000 students in the district with a demographic of 55.7% Black, 24.1% Hispanic, and 13.7% White students in the district. 20.6% of students in the district have special education needs and 82.7% are economically disadvantaged.

This study was conducted with eighth grade students in an inclusive classroom at a public K-8 school. The site was specifically chosen because of its proximity to several nature areas and a public waterway. The eighth grade population was chosen because eighth graders are at a critical point in their academic and social lives and students who can make successful transitions to high school are better prepared for challenges they face in the future (Langenkamp, 2009). The class I chose to conduct the research in was the eighth grade science class. The science class was used as an access point to implement nature related informal learning environments. As stated earlier, the connection between nature and science made accessing the population and research more justifiable to the principal and teacher.

Service delivery structure of selected class. The eighth grade consisted of two eighth grade classes of about 30 students in each. Generally, there are about five to ten students with special needs in each class with the majority of them having a learning disability. The two general education teachers rotate classes. Each teacher teaches reading to their homeroom and then one teacher teaches English Language Arts and Social Studies to both classes and the other teaches Math and Science to both classes. The teachers are supported with one special education teacher and one special education paraprofessional. They alternate time in both classrooms using an inclusive model. This is where students with special needs are placed in the general education classroom and the special education teacher is also in the general education class to provide support (Tremblay, 2013). The class that I conducted research with was the English and Social Studies teacher's homeroom class during their Science class because it had more students labeled

as having a learning disability than the other homeroom. It had 27 students with seven students that were identified as having a learning disability, three females and four males.

The students with special needs are strategically placed in the room by their ability levels, who they work well with, and the amount of "special education time" they need according to their IEP. The special education teacher sometimes lead the whole group engagement, but the majority of the time was working her way around the room helping or making accommodations for the students with special needs. She also works with any other student who needs assistance. The paraprofessional also works her way around the room working with primarily the students with special needs.

Participants

Staff

Science teacher. The lead science teacher was a middle aged African-American woman who had 17 years of teaching experience. She had taught at this particular school for over 15 years and specifically eighth grade for the previous four years. She taught math and science to both eighth grade classes. She grew up and lives in the neighborhood and knows many of the students' relatives. She is also the girls' basketball coach and also attends most boys' basketball events. Between family connections and sports, she has established rapport with many students before the year begins. She said she

> always tries to build community in the classroom and have expectations and am going to make them (students) rise to those expectations…because if I don't have this set of expectations for you, then you're liable to not do anything or be anything in life, and then how good of a teacher would I be to let you do that? (One-on-one interview, April 25, 2016)

She previously had had experiences with nature such as going to the community nature center with students and doing some hiking. She enjoys nature but hates bugs and is not into "roughing it". As a child she spent time exploring and catching fish, crawfish, and turtles along the local waterway and woods.

Special education teacher. The special education teacher is a veteran teacher of 13 years and has worked in this site for ten. She is middle aged female and is of mixed race (Black and White). This was her second year as the eighth grade resource special education teacher. Her duties include: writing Individualized Education Plans (IEPs)/communicating with parents, making proper modifications and accommodations for the eighth grade students with special needs, and testing students with disabilities on state and district exams. Previous to this position, she worked in a self-contained cognitively disabled classroom. In the past, she had taken students to the community nature center. In addition, she owns some forest land up north that was handed down to her family from her in-laws. As a youth, who grew up in this city, she played in the urban forests, and spent time up north. She now prefers to stay in nicer hotels and jokingly says she has become "very prissy" and says she needs "at least four stars or better" but still enjoys nature (One-on-one interview, April 28, 2016).

Paraprofessional. The paraprofessional was in her 20's and also grew up in this city. She had three years of experience being a paraprofessional in this school working with the eighth graders. She is also African American and has not had many experiences with nature. She has attended some of the school trips to the community nature center and grew up near a city forest where she would have family adventures "riding bikes or taking walks through the woods" in the mornings. Her duties are to assist the special education teacher with her special education

responsibilities with the students with special needs. She is also called to cover classes when teachers have meetings or are out or late (One-on-one interview, April 29, 2016).

Students. The eighth grade students were 4 males and 3 females who all had been identified by the special education teacher as having been labeled with a learning disability according to their IEP. Their range of assistance in the academic classes were 30 minutes to three hours daily working in the areas of reading and writing and mathematics. Social Studies and Science are generally not included in the IEP because science uses reading and math skills and social studies uses a lot of reading skills. According to the special education teacher, reading, writing, and math assistance times can be accounted for in the content area of science or social studies. According to both the special education, general education teacher, and standardized tests, the students are performing below their non-disabled peers in the areas of reading, writing, and math. The general consensus of the teachers is that the majority of the students have difficulty focusing, are easily distracted, and miss a lot of work. All of the students identified as Black and have been given the pseudonyms: Corey, Jacobi, Dennis, Liza, Faith, Carmelo, and Shaundra.

Accessing the population. Due to the participants being a Protected Population because of their age and disability, a consent and assent form was necessary (see Appendix A) and approval by both the UW-Milwaukee's IRB Board and the district's Research Committee (see Appendix B for approval letters). All the information was shared with both the parent and the student. To verify understanding of the consent and assent forms with the students and parents I additionally shared the forms with both the special and general education teachers; who were able to assure and answer any additional questions parents or students had regarding the research.

As previously described, the site was selected because of its proximity to nature and high student with disability population. After receiving approval from the university and the district, the eighth grade staff was verbally asked if they were interested in participating in the study and after verbally expressing interest, the principal was approached in person. She also expressed interest; copies of the consent and assent forms were then handed out to the principal and eighth grade staff who in turn gave the forms to the students that had been identified as having a learning disability. Extra copies were provided because several students misplaced copies. There were two eighth grade classes that potentially could have been selected. The class that was finally selected was only chosen due to its higher number of students with learning disabilities. All of the students (seven) who had been identified by the special education teacher as having a learning disability returned signed forms.

Instructional approach and curriculum. The classes were designed to be taught in whole group-small group-whole group model where a teacher leads the engagement/opener and gives a review and overview of the lesson and some examples and then lets the students begin independent or group work. The teacher then moves around the class helping students on a more individual level. The lesson finishes with a whole group review of the lesson that involves "sharing out" work.

The school uses the Holt Science & Technology Science books and aligns them to the state standards. According to the school pacing guide, Environmental Science was the unit the class was beginning during the study. Science was supposed to be taught for 90 minutes after lunch on Wednesdays and Thursdays and 45 minutes on Fridays. Due to end of the year activities and various other factors, which will be discussed in the findings section, the schedule was not always followed. The suggested pacing guides are listed in the front of every chapter

and each chapter is divided into sections. The science teacher stated that she tries to spend a week on each chapter so sometimes that means condensing chapters or extending other chapters. Due to scheduling conflicts with end of the year activities, the plan was not followed. During the 13 classroom observations I conducted, science was taught from the book four of the 13 times. I had initially planned to do an informal learning experience every other week and that the "normal" science class taught from the book would happen two-three times a week. There were four nature related informal learning environment experiences that took place:

A nature walk around the school (Nature Walk)

A tour of the county farm and fish hatchery (Fish Farm)

A boating experience on a polluted industrial river and tour of the city recycling facility (Recycling)

A boating and fishing experience in a state park with clean water and a restored prairie. (State Park)

The experiences were planned with the science and special education teachers to align the experiences with the curriculum that was outlined to have been taught during the eight weeks of research. Habitat and Food Chains, Cycles of Matter, Environmental Problems and Solutions, and Earth's Ecosystems were respectively the chapters that the experiences were supposed to be aligned to.

Data Collection

All emails, phone logs, consent forms, and other interactions with district, school, teachers, parents, and students were stored and placed under lock and key or with secured

passwords to keep confidentiality. The observation notebook was saved and used for data. The interviews were all transcribed and saved.

Interviews. A total of 15 interviews were conducted with students and teachers. The interviews were conducted in the school and used open ended questions for the participants to chronical their experiences they'd had in science. Adult interviews were given as one-on-one interviews and student interviews were conducted as focus groups that ranged from two to five. The interviews were semi-structured to give flexibility by using open ended questions and opportunities to explore areas as they emerged (Doody & Noonan, 2013). I used probes such as "How did you feel about that?" and "Tell me more" to make sure I was encouraging students and teachers to fully elaborate about their experiences. Questions were not leading and participants were reassured that there are no wrong answers to help put the participants at ease. A list of interview questions are included in Appendix C. All interviews were audio recorded and transcribed. See Table 1 below:

Table 1: Student and Staff Participation in Interviews

	Preliminary Interview	Nature Walk Reflection Interview	Fish Farm Reflection Interview	Recycling/State Park/Exit Interview
Corey	X	X		
Jacobi	X	X	X	X
Dennis	X	X	X	X
Liza	X	X	X	X
Faith	X	X		X
Carmelo	X			
Shaundra	X			X
Science Teacher	X			X
Special Ed. Teacher	X	X	X	X
Paraprofessional	X		X	X

The study began with a pre-experience focus group with the student participants and one-on-one interviews with the science teacher, special education teacher, and paraprofessional. See Appendix C for complete questions. The student interviews gave preliminary data about how the students view science, their feelings towards science, and their relationship towards nature. Focus group interviews for the students were chosen because participants can all express perspectives on a shared experience (Glesne, 2011). It also allowed for students to work from each other's ideas and to get the thick and rich data described as making for a powerful case

study (Creswell, 2014; Glesne, 2011). I served as the moderator and facilitated the group discussion by posing questions, giving everyone who wanted to speak a chance, and making sure only one person spoke at a time. The adult one-on-one interviews established baseline data for how the teachers viewed their science class, nature, and the students with learning disabilities experiences with science and nature. The focus group and one-on-one interviews established the baseline data (pre-experience).

Observations. As a participant observer, I observed through both descriptive and reflective note taking how science classes were run and managed and how the population interacted with the science class. I took descriptive notes, which described the setting, lesson, and time stamped transitions and time-on-task for some of the students (Creswell, 2002). I also took reflective notes describing how I interpreted what had happened after the nature related informal learning experiences (Creswell, 2002). Because I was a participant observer and the experiences were very hands-on and mobile, it didn't allot me time to take descriptive notes during the experiences. During classroom observations, I was mobile and walked around the room observing and asking questions like "how are you doing?" and "what are you working on?" to students during the small group work time. I asked questions to all of the students as to not single out my research population. I observed physical cues of participation such as: raising hands, non-verbal listening cues of understanding, participation in science related discussions, completed classwork, and physical movement around the classroom. I went to the scheduled science class 13 times. I did not formally observe five of those 13 times because twice I left because of the teacher being absent, once because of extended recess, and twice because of graduation related project/party.

Implementation of the Informal Experiences

Following the initial interviews, I planned an eight week nature related informal learning environment experience that was aligned to the science curriculum that did not get completely followed, which is discussed in the findings section. The first week was to be an observation week where I would observe the class two times. Then students would go to a nature related informal learning environment and journal about their experience. Following the nature related informal learning environment, I would observe the normal science class again. Students would write their experiences on the nature related informal learning experience when they return to school as a closing activity. This data was saved and reviewed to help formulate additional questions for the follow up focus group interview where students discussed their experiences with the nature related informal learning environment following each informal learning experience. This experience cycle was to be repeated four times and finished with an exit focus group where students discussed their overall experience. As stated earlier the time constraints, conflicting scheduling, and end of the year were all factors that didn't allow this to happen and therefore the final interview was cumulative of the third and fourth experiences and the exit interview. The exit one-on-one interviews with the special, science teacher, and paraprofessional were also cumulative and included the third and fourth experiences. The study was eight weeks long, consisted of four informal learning experiences, and I was present for scheduled science time 13 times. The gaps in the observation dates were when the science teacher told me that science wasn't happening due to a field trip or testing.

See Table 2 below:

Table 2: Onsite Data Collection/Attendance

Bold signifies informal learning experience

Date	Science Class Description	Corey	Jacobi	Dennis	Liza	Faith	Carmelo	Shaundra
4/20	Students get new books from library	Absent	X	Absent	X	X	X	X
4/21	Food Cycle	X	Absent	X		X	X	Absent
4/22	Substitute	No observation	No observation	No observation	No observation	No observation	No observation	No observation
4/25	Energy	X	X	X	X	X	X	X
4/26	Energy cont. answer questions	X	X	X	X	Absent	X	Absent
4/29	**Nature walk Field Trip**	X	X	X	X	X	Absent	Absent
5/2	Review of FT/food chains/energy	X	Absent	X	X	X	X	Absent
5/11	Substitute	No observation	No observation	No observation	No observation	No observation	No observation	No observation
5/12	Math class Make up	X	X	X	Absent	X	X	Absent
5/13	Achieve 3000	X	Absent	X	X	X	X	X
5/18	Extended Recess	No observation	No observation	No observation	No observation	No observation	No observation	No observation
5/19	Matter, Water, Life	X	X	X	Absent	X	X	X
5/25	Graduation Project	No observation	No observation	No observation	No observation	No observation	No observation	No observation
5/27	Outside/Ice Cream Social	No observation	No observation	No observation	No observation	No observation	No observation	No observation
5/31	**Fish Farm**	X	X	X	X	Absent	Absent	Absent
6/7	**Recycling**	X	X	X	Absent	Absent	X	X
6/8	**State Park**	X	X	X	X	X	X	X

Data Analysis

The data was analyzed thematically. Themes and patterns from the data were collected. Throughout the research I reflected on my experiences, I also debriefed and wrote notes after interviews. The multiple data sources such as the student and staff interviews and descriptive/reflective observation notes were the data I used to triangulate the emerging themes (Yin, 2014). The data that continually emerged from all three data sources became the themes of

the findings. After solidifying my themes, I reviewed each data source again using my coding dictionary to looking for valuable quotes to give voice to the experiences of the participants. I also searched for disconfirming evidence and anything else that may have gone unnoticed. Throughout the writing process I continually referenced back to my data sources.

After each informal learning experience I conducted a brief early data analysis which helped me "focus and shape the study as it proceeds" (Glesne, 2011, p. 188). This was done in my reflective journal. All interviews were transcribed and coded transferred to a data chart with the other data collected. I read and coded the data and made comparisons. Some initial comparisons were to see which themes all four informal learning experiences shared. I also compared and contrasted data between the four informal learning experiences. I did this following Yin's (2014) four analytical techniques for case studies: Pattern matching, Explanation building, Time series analysis (through the 4 informal learning experiences), and Logic models (cause and effect; bad weather). I first "played with data" organizing it and reading through everything to look for patterns, then I began matching patterns that kept reoccurring in multiple data sources. I also used explanation building to analyze the data. For example when all of students said they enjoyed themselves on the experience I tried to explain their enjoyment by searching the data for answers such as enjoying nature, engaging in learning, or preferring hands-on methods of learning. Using time series analysis, I reviewed data about the quantity and frequency science was taught. I also reviewed time-on-task observations to help understand engagement levels of population during "normal science class". Logic models I used in collaboration with Pattern matching as I analyzed the data using the opinions of a "normal" science class as a constant variable and adding the informal learning experiences as unique experiences. This helped me solidify the themes that had emerged.

Table 3: Coding dictionary: Source and frequency table

	Student Focus group 1 Preliminary	**Student Focus group 2 Post Nature walk**	**Student Focus group 3 Post fish farm**	**Student Focus group 4 Post recycling & State Park reflection**	**Science Teacher interviews (2)**	**Special education interviews (4)**	**Paraprofessional interviews (3)**	**Class observation notes (date)**
HL(e)- Hands-on learning (engaging)	7x	7x	2x	2x	5x	5x	8x	Field trip debrief 4/29, 5/31, 6/7, 6/8
HL(Bb)- Book work boring	4x 4x (hard)				2x			Classroom observation 4/21, 4/25, 4/26, 5/2, 5/25
NS(t)-No science because of lack of time	2x				2x	4x	2x	Classroom observation 4/20, 4/26, 5/12, 5/25
NS(i)- No science because of lack of importance					4x	1x		Classroom observation 5/12, 5/13, 5/18, 5/27
SA(+)- Students have access	5x	1x			2x	2x	1x	
SA(-)- Students do not have access	2x	3x	2x		3x	2x	1x	
I- Interruption					7x	1x	1x	Classroom observation 4/20, 4/21, 4/25, 4/26, 5/2, 5/12, 5/13, 5/19
C- Concern			1x	1x	2x	3x	1x	

Personal Identity and Biases

I self-identify as a bi-cultural middle aged White Latino male. My mother is a South American immigrant and my father is Caucasian American. I sometimes surprise students when I switch to Spanish if I observe a Spanish dominant student struggling to communicate in English. Sometimes this establishes some rapport with Latino students; none of which were in my research population but there were Latino students in the class. Growing up in a culturally diverse home and living as a partial minority effects the lens through which I view social justice. I tend to empathize and work to overcome social barriers stemming from institutional racism against minority groups. Having a White appearance gives me access to the White world yet because of my ethnicity, I teeter between playing the role of a White ally and a Latino seeking to create a socially just environment.

I also consider myself an environmentalist, and in my previous work as a special education teacher I tried to bring nature related activities to the curriculum. I acknowledge my biases in my desire to find meaning by using nature more in the classroom. I try to create activities that teach students to enjoy, appreciate, and learn from nature. These biases influence my interpretations of the findings and results.

Summary

This chapter outlines the research design and overview of this study by describing why a case study format is being used and the theoretical lens from which this research project was viewed. It also describes the site, curriculum, and population of the study by providing details about the population and influential adults that will helped shape the experiences of the

population. It details how the nature based informal settings were planned and implemented and how data was collected and analyzed.

Chapter Four: Findings

Overview

The analysis of the student focus group and staff interviews along with my observational notes during the eight week unit using nature related informal learning environments revealed three themes that formed the foundation of the participants' constructions of their experiences as students with learning disabilities participating in nature related informal environments. The three themes are labeled as follows:

-Hands-on learning is an engaging and a more enjoyable way of learning for students with learning disabilities.

-There is not enough science being taught.

-Students are not habitually accessing natural areas.

Initially the themes emerged in the preliminary interviews and then were reinforced through their experiences with the four nature-based informal learning experiences (Nature walk, Fish farm, Recycling, and State park).

Descriptions of the Nature-based Informal Learning Experiences

Nature walk. The first informal nature related learning experience (Nature walk) was hiking outside the school in the natural area that borders the school. This is a public space that is wooded, has a river running through it, and holds populations of fish, frogs, turtles, a variety of birds, small mammals and larger mammals like beaver, fox, turkeys, coyote, and even occasional deer. Although the description sounds like a remote area, the school is less than three miles from the skyscrapers of downtown. In my debriefing notes (April 29, 2016), I described the weather as a "looking like rain, but the sun came out and was comfortable". The sun was shining, the sky

was blue, and many of the students were dressed in t-shirts and sweatshirts. We walked out the front door of the school and walked alongside the building towards the natural area. 15 feet from the edge of the building we entered a primarily deciduous urban forest and walked along a dirt path making our way to the river. I observed nobody complaining about the weather. Students displayed non-verbal cues of enjoyment such as smiling and pointing out different nature related objects such as plants and animals. We stopped to listen for animals and heard the rustle of chipmunks and squirrels running about, song birds singing, and a pair of mallards quacking. We also stopped to try edible plants (Garlic Mustard, Hostas, wild onions, Ramps, Spruce tips, Dandelion greens, violets, and Creeping Charlie). Students all seemed reluctant to try at first, but after a couple students tried the plants and confirmed that they were "pretty good" the rest of the students began to try the edible plants more enthusiastically. As we walked towards the river, I heard commotion, elevated voices, and exclamations of "nasty!" The students had found a dead Sucker fish on bank of the river. Its stomach had been eaten. The teachers used this as a teachable moment and had a discussion with students about the food chain and what might have killed the fish and what was going to happen to the fish. Students displayed active listening by all gathering around the fish to see it and participate in the discussion. Students began to make connections and participate in discussions when they saw animal tracks near the dead fish. Students identified them as dog paw prints and started collectively creating story of a fisherman who caught and killed the fish and left it on the bank, followed by a dog who came by and ate the stomach. Students seemed engage in creating the story and trying different edible plants by their participation and active listening.

I conducted focus group interviews (May 4, 2016) after the field trip with five (Corey, Jacobi, Dennis, Liza, and Faith) of the seven students, because two (Carmelo and Shaundra) of

the students were absent for the experience, they were therefore were not involved in the interview. The special education teacher was the staff member who participated because the science teacher was absent and the paraprofessional was covering a class. This learning experience outside followed the completion of sections 1 and 2 in the science book titled Everything is Connected and Living Things Need Energy. In these two sections, the book discussed habitat and food chains in our living world.

Fish farm. The second nature related informal learning experience (Fish farm) took place following the book section titled: The Cycles of Matter. This section discussed the water cycle, nitrogen cycle, photosynthesis, respiration, decomposition, and combustion. The science teacher was unable to attend, but the special education teacher and paraprofessional were able to attend. The special education teacher read the sections of coniferous and deciduous forests to the students on the 30 minute bus ride to the county fish hatchery and farm.

The county farm raises fish to stock the urban county ponds, raises trees to plant along the streets, and raises vegetables for the food pantries. The temperature was low 70's and it was a sunny day. Students toured the fish rearing tanks, walked through the different forests and prairies on the grounds, and looked at food production and composting sites. Students were allowed to feed the fish and were able to hold fish. They also saw goats that were used to produce milk. During the viewing of the goats, Dennis received some laughs from his peers. After being warned to not touch the electric fence Dennis received attention from his peers by touching the electric fence and getting shocked. Students laughed as Dennis jumped after receiving a shock. (Note: the shock serves as a deterrent to the goats and the shock is not dangerously strong). All the students and staff mentioned feeding/handling fish and seeing goats as a memorable part of the trip. Four (Corey, Jacobi, Dennis, Liza) of the seven students were

able to attend this experience and three (Jacobi, Dennis, Liza) participated in the reflection focus group (June 6, 2016). The two staff members (special education teacher and paraprofessional) who went were also interviewed separately (June 6, 2016).

Fish farm

The end of the year was rapidly approaching and due to end of the year scheduling conflicts, the third and fourth informal learning experiences where implemented on consecutive days.

Recycling. In the third nature related informal learning experience (Recycle), students took a ten minute bus ride to the recycling plant. This experience was planned to coincide with the book section titled "Environmental Problems and Solutions" where pollution and recycling

were addressed. Due to scheduling conflicts, the section was not read. The recycling plant is located on a very industrial waterway where concrete and metal line the waterway. The water was dark and murky and litter floated on the surface. The temperature outside was in the mid 60's and sunny. The students took row boats out to explore and observe a polluted water way and then took a tour of the recycling facility. This was many of the students first time in a boat. Shouts of "I'm gonna die!!!" and "Oh my God!, Oh my God!" could be heard as students took their first steps into the boats. Once the initial fright subsided, students displayed enjoyment by laughing and smiling as they rowed up and down the river. Students expressed their dislike of the smell of the recycling plant. They also commented on the litter that was in the water and expressed their dislike for the way it looked. Five (Corey, Jacobi, Dennis, Carmelo, Shaundra) of the seven students and all three staff members participated.

Recycling

State park. The following day, the nature related informal learning experience took place in a state park located on a clean waterway that had a restored prairie. The park was also a ten minute bus ride from the school. This experience was designed to coincide with the section Earth's Ecosystems where fresh water and land ecosystems were discussed. Due to the time crunch none of this section was read either. It also doubled as an end of the year picnic. Grills and food were brought and students were at the state park for the entire school day. Students listened to a Department a Natural Resources warden discuss the habitat and populations of animals the park holds. Students were given the opportunity to explore the prairie, take boats out on the water, and fish. All of the students and staff where present. The weather was mid 60's and sunny. Students expressed enthusiasm for getting a chance to go out in the row boats again. Two sailboats were also present and students rotated interacting with the environment both on the water and on land by fishing and exploring the prairie. Students caught Rock Bass and Gobies and expressed surprise when the DNR warden told them that coyotes and fox regularly are seen in the urban state park. Students didn't actually see either of the animals but saw pictures that were posted.

Five (Jacobi, Dennis, Liza, Faith, Shauna) of the seven students participated in a focus group interview (June 9, 2016) that served as a reflection on the last two experiences and the overall experience. All three teacher were also interviewed one-on-one (June 13, 2016).

State Park

Themes

Theme 1: Hands-on learning is an engaging and a more enjoyable way of learning for students with learning disabilities. This theme highlights the preference of hands-on learning as opposed to solely using the science text. I explain why students prefer hands-on learning and then give evidence from the experiences the students had with the nature related informal learning experiences and add support from the staff perspective.

During the preliminary interviews, I asked both student and staff participants about the quality of their experiences with the current science curriculum, their perceptions about science, and memorable experiences with science in general and nature related science experiences in particular. I purposefully did not mention hands-on learning to avoid a leading question, yet hands-on learning was brought up in all three staff interviews and directly or indirectly with the student focus group as something they desired in science class. The students volunteered the term "hands-on" and also indirectly referenced it by describing hands-on activities that they had participated in during previous years.

Before the preliminary focus group interview, I had been formally introduced to the class, had handed out the permission to participate forms to the participants, and had conducted four classroom observations. This interview was the first time I was with the participating students in a self-contained setting. Students demonstrated some apprehension in voicing their opinions. As we were seated around a rectangular table, students introduced themselves in sometimes inaudible voices or mumbles. Students fidgeted with objects and had trouble keeping eye contact. When I asked the preliminary student focus group what the students would like science to look like, a female student (Liza) volunteered:

> Hands-on, like where it's more engaging, like kids would want to do it. Instead of doing the book work and sitting down all day, we could get up and do things, because it's boring when you just sit down all day (Focus group interview, April 28, 2016).

Liza also described the difficulties she had when she had with the textbook; "when you sit down for a long period of time, your mind goes somewhere else and so you're not into it like you were in the beginning, so it gets boring real fast." Dennis (Focus group interview, April 28, 2016) added "I don't understand what they're trying to say in the book or whatever. I don't really like science." This admission to the difficulty and dislike of science seemed to engage the rest of the focus group into the conversation. Other students chimed in and added their opinions with statements like "it sucks; it's boring, we don't get to do anything; and we read the same thing for like a week." Corey (Focus group interview, April 28, 2016) added to the discussion by sharing his frustration over how science was taught "We don't get to do hands-on activities. We always read books and answer questions." Other students agreed and stated that they preferred science in a lab doing experiments or going outside versus doing book work and remembered science more fondly when they had these opportunities in the past. The science teacher, in a separate interview, also acknowledged this and expressed her frustrations in science:

> It gets kind of boring unless we can make it relative to what they're doing in real life or if we can relate it to what they see in real life, but it's been hard. It's been hard to do that and hard to make it relevant, especially since the book is so doggone outdated (One-on-one interview, April 25, 2016).

The students also agreed with the difficulty of reading and answering questions from a book. The students unanimously agreed that they don't usually even read the chapter, they prefer to read the questions and go back and look for the answers. Shaundra (Focus group

interview, April 28, 2016) explained why this is the preferred method for answering questions and described her retention difficulties.: "because if you read it straight through you're going to forget what you just read, so you just do the questions then go back to the passage. It's more better for you". Another student (Carmelo, Focus group interview, April 28, 2016) chimed in and stated his possible processing frustrations because "Some of the questions don't make sense at all."

In the preliminary interview conducted with the special education teacher she expresses her desire for science to be fun and engaging through hands-on learning.

> We have to know how to get our kids to a higher level (of science). I believe with the hands-on practice, it's real for them in science. If we did it right, it could be fun. It could keep them engaged and they would learn without even knowing they're learning. Science should be fun (One-on-one interview, April 28, 2016)!

In a separate preliminary interview, the paraprofessional adds that the students with learning disabilities' concern is "wanting to have hands-on activities in science to keep them more engaged, because a lot of them have low attention spans. When they hear science they want to be engaged" (One-on-one interview, April 29, 2016). The science teacher and students all shared memorable past hands-on science experiences such as dissections, going outside to pick Garlic Mustard, ice fishing, building volcanoes, and going to the botanical gardens and the community nature center.

Following the Nature walk experience Corey, Jacobi, Dennis, Liza, and Faith were interviewed in a focus group. They stated that they overall enjoyed the outside learning experience. They described retaining science related information through their hands-on

experiences by their descriptions of some of the most memorable experiences: "seeing dead fish, tasting some plants, and watching a student pick up a Garter snake". The students also gave insight to why they were more engaged in science being outside and learning as opposed to the traditional textbook learning. Dennis compared the experience to science class and said:

> Most of the time, we don't get to do what we want to do. We just got to do work all day. This was like more fun. We got to do more stuff than just doing work. We got to see stuff (Focus group interview, May 4, 2016).

Jacobi (Focus group interview, May 4, 2016) added "you got to see stuff that you don't see in the book. You have to look at pictures. We actually got to go on the environment of animals to see what happens." This spurred a comment from Dennis "The science book don't show you as much. It's like you can see it yourself instead of just seeing one picture of the food chain. You can actually like see it happen." Liza displayed her ability to use the textbook to make connections with the informal learning experience through the usage of the vocabulary words from the book as she described her experience and preference to hands-on learning versus book learning.

> We saw ecosystems, the habitat, because it's like you can go out there physically to see it instead of from the book and it was more fun because we saw plants and animals in action. Talking about the food chain and stuff like that; so it was better to go out there physically to see it as well (Focus group interview, May 4, 2016).

Jacobi expressed his desire to be more engaged in the science curriculum through hands-on learning by adding "I think we should take more field trips going out physically more than

standing in a book mentally because you're basically fantasizing on what you should physically be able to touch and experience."

Other positive memorable experiences were that students stated they enjoyed looking at the graffiti art that was around. One student (Corey) expressed the freedom and camaraderie he experienced by learning in an informal environment with his peers.

> Just experiencing it with my friends and stuff. We really got to just be ourselves and just be chill, cool, and how we shared the experience together of exploring and things and learning more about wildlife and how to survive like that (Focus group interview, May 4, 2016).

The special education teacher reinforced the theme of hands-on learning is more engaging when she reflected on the experience and stated "I thought it was more fun than it was learning, so I think it's going to register. They'll never forget that experience" (One-on-one interview, May 5, 2016).

Following the Fish farm experience Jacobi, Dennis, and Liza stated they all enjoyed themselves and would like to visit again. Liza described the connections she made to science: "I was having a good time. I was just looking around, but you notice the habitat, the ecosystem, the food chain, and stuff like that" (Focus group interview, June 6, 2016). This showed her higher retention of material as she was able to apply the previous chapter's vocabulary to the informal learning experience. This was also disconfirming evidence because the topics she discussed were related to previous chapters in the book. None of the students that were interviewed volunteered connections to the water cycle or nitrogen cycle. When prodded about the forests

and asked if they could tell us about a coniferous or deciduous forest, Liza asked "was we in it?" and Dennis added "Is that an endangered forest?" (Focus group interview, June 6, 2016).

The paraprofessional thought that the students with special needs especially were more engaged in learning by the hands-on experiential learning as opposed to using the textbook.

> I think the experience out of the classroom was better for a lot of the kids with special needs just because of the hands-on. I know they had more things to grab their attention than just sitting in a classroom, looking at a textbook, or listening to the teacher give the lesson and stuff (one-on-one interview, June 6, 2016).

Following the recycling and state park experience, students described their experiences with using hands-on learning by sharing the animals that they had seen and their enjoyment of the experience of interacting with nature especially with boats in both locations. It was the first time in a boat for most of the students. Liza summarized and solidified this theme when she described the success of the informal learning experiences through her overall science engagement and preference to hands-on learning as:

> In the beginning it was boring because all we did was book work and I wasn't really getting it, but when you do hands-on activities and we learned about it without knowing we were learning about it. It's more fun and kids get to know it better. I didn't even know what a food chain was or a predator because you just learn from books, and kids get bored, and sometimes your mind takes you to a different place when you read for a long period of time. It was boring but now it's fun to learn about science. You should do more activities with kids (Focus group interview, June 9, 2016).

Shaundra added "you get the picture in person and do it."

The science teacher also gave a very clear explanation of the benefits of hands-on learning in science and the engagement of students. She also discusses making the connections from the experiences to the book themes.

> I think they (all students in class) really, really enjoyed it. They loved how everything was seamless. We talked about environments, now we put you in the environment, and now you can observe what's in the environment. Tell me what you see? How does it relate to what we read in the book? And now they have a visual and something they can touch, something tangible for them to do, and even when we talked about the different habitats, everything that we talked about, they actually now have a full view of it. I can touch the nature; I can touch the leaves. I can see the water; I can touch the water. To me it made it (science) a lot better experience for them (one-on-one interview, June 13, 2016).

She adds information specifically for students with learning disabilities.

> The students with learning disabilities, I think, they valued the extra experiences more because sometimes when you're reading out of a book, and that can be a struggle for them, reading could be a struggle, and trying to understand and to catch up to what other kids already know… Well, here we are, you don't have to read nature (one-on-one interview, June 13, 2016).

The paraprofessional also specifically addressed the students with learning disabilities' preference to hands-on learning and their engagement in science "it was a good experience. Again it was all hands-on, so it gave them the opportunity to want to participate more" (one-on-one interview, June 13, 2016). The science teacher also reflected on her own use of nature in her

teaching. "I just think it (nature related informal learning experiences) was a much richer experience connecting what we read to what's outside and I just think I would like to do that more as a teacher" (one-on-one interview, June 13, 2016).

Theme 2: There is not enough science being taught. Students experienced very inconsistent informal and formal science instruction during the school year. This was evident in the preliminary student focus group, staff interview, and my observations. In the preliminary interviews, the first question I asked was "tell me about science this year?" or "how has science been going this year?" When I posed this to the students, they looked at one another waiting for someone to answer. I observed them displaying non-verbal cues of nervousness such as avoiding eye contact, looking to one another to answer, and fidgeting. Eventually Jacobi spoke up and expressed that they hadn't had much science throughout the school year. "We haven't did science like that, we did health" said Jacobi (Focus group interview, April 28, 2016). When the question was asked to the staff, they expressed frustration over the lack of science being taught. Lack of time for science and a lack of perceived importance towards science, compared to the other core subjects of reading, writing, and math were expressed as causes for the lack of science time. The science teacher shared:

> It's kind of a challenge scheduling a science block, because of course, we have to get in English Language Arts, reading, math and then we have a lot of other subjects that are going on. We have gym, we have social studies, we have all of those things that we of course are drawn away from the time that we have during the day for science as well (One-on-one interview, April 25, 2016).

She also describes her struggle as mandates from the district are implemented.

> Then here's another mandate and now they're taking one chunk of science block and dedicating it to something else (reference to a computer program). It's like wow, why can't we do that with the reading block or … you know (One-on-one interview, April 25, 2016)?

The paraprofessional reinforced the lack of time for science when she simply stated that the students "haven't had a lot of science; the little that they do get is very quick" (One-on-one interview, April 29, 2016). The special education teacher was very passionate about the lack of science that was going on during the school year. She added that "They definitely do not give enough emphasis to science, Definitely not enough emphasis on it, No one is forcing it, no one from the district monitors it that I know of, no ones making us do science fair stuff" (One-on-one interview, April 28, 2016).

Aligning to the lack of importance towards science, teachers expressed concern over their lack of science ability and training. The special education teacher described how the school implemented science:

> We don't have a science (teacher) they (teachers) are forced to take (it). They (teachers) have to take positions and you just either naturally gravitate towards science or you gravitate towards social studies. I'm more reading and social studies first and I love history. They usually set up the teacher who does math, they're usually the science teacher (One-on-one interview, April 28, 2016).

The science/math teacher in a separate interview confirmed that as she described her role as doubling as a science teacher. "I think as teachers, some of the things we have in our

knowledge base or our tool box is limited. I didn't go to school to be a scientist. I didn't go to school to be a science teacher" (One-on-one interview, April 25, 2016).

Although not enough time for science is directly related to the lack of importance for science the special education teacher gave insight as she teased out the difference between the subthemes of importance and time. "I think it's the trickle effect. I think the district needs to enforce it. We're so worried about standardized testing scores and what the school is being forced to do, we're not worried enough about the real learning" (One-on-one interview, April 28, 2016). She then addresses time by stating "there is no science, there's an hour each day of intervention taking away from class time."

After the preliminary interviews, I had the impression that very little science curriculum had been taught if any. Science time had been primarily used for a computer intervention time and/or health science. In my observation notes I noted that the first day of my scheduled observation (April 20, 2016), students spent the science time checking out the science books from the library, part of the second observation (April 21, 2016) was also spent having absent students check out science books while the rest of the class waited for them to return. There were only three days of science I observed (April 21, 25, & 26, 2016) being taught where the text book was used before the first informal learning experience was taken. After the first experience a full month had passed and I had been in to observe eight times before the second experience. According to my observations the book was used the day after the Nature walk to finish up answering questions from the previous chapter (May 2, 2016), then again when the section on the water and nitrogen cycle was taught (May, 19, 2016). The teacher was out sick once (May 11, 2016), Math took the place of science (May 12, 2016), the computer intervention took the place of science (May 13, 2016), the graduation practice took place during the scheduled science

time May 25, 2016), recess was extended into the scheduled science time (May 18, 2016), and an ice cream social took place during the science time (May 27, 2016). On the bus ride to the Fish farm (May 31, 2016), a section was read to the students about forests, but this was not during the scheduled science time.

From my observation notes the book was not used as much as the science teacher and I had planned. The science teacher reiterated her concern for science time in the final interview as she was discussing the interruptions.

> It's non-stop! That's the kind of day I have to teach, because if I interrupt the morning block, then of course, you're missing the core subjects that students are supposed to get grades in. Like the sixty minutes of uninterrupted reading, sixty minutes of uninterrupted math. It's hard to do that, and then schedule science in there (One-on-one interview, June 13, 2016)?

The special education teacher expressed her gratitude for going on the experiences because "it was good that they actually got exposure (to science)" (One-on-one interview, June 13, 2016).

Theme 3: Students are not habitually accessing natural areas. In the preliminary interviews I was curious to know what the students' experiences and interactions were with nature. I also wanted to know if they had had experiences with nature, was it locally or was it on a trip with their family or school. All of the students except Corey said they lived by a park that they could walk to. Although Shaundra described the park closest to her as "very ghetto" and no longer goes there. Students described having had limited experiences: fishing with their brother or uncle, taking walks in the woods, or playing by a local river or lake. Jacobi mentioned he had

been on a canoe ride with his family once and Faith had a family cabin in the woods, but other than that nobody shared any non-local experiences.

In the school environment, all of the students were aware that there was nature that bordered the school. They also had all been there at least once for either a hike with the afterschool group and/or for a clean-up on Earth Day. The students all had some school related experiences with the community nature center; experiences varied from rock climbing to hiking, to pulling invasive species, or finding dead animals. They also mentioned a school outing to the science and technology center that is located in the city, which has a large aquarium inside of it and looks out over a natural area.

When asked about what they thought of when they heard the word "nature" responses were: "Fungus/mold; trees; plants that you can eat, animals, fish, outdoors, hunting, and catching fish." Jacobi (Focus group interview, April 28, 2016) described enjoying the graffiti that was in the natural area and also mentioned seeing homeless people. The conversation then turned to experiences with nature. Liza shared an experience of having a raccoon in her house, Dennis shared a story of finding insects under a rock, Corey described watching a pair of squirrels mate, Jacobi described a fishing experience with his brother, and Shaundra shared a story about picking vegetables from her family garden.

All of the students had an idea of what nature was and all except Corey said that they have physical access to a natural setting near their house. They all were aware of the natural area bordering the school and had been there. They described nature through specific, not regular, events that had happened in their lives. None of the students described loving nature, or playing in a natural setting as a regular or habitual occurrence.

The staff also reinforced some of the students' limited experiences. All three staff members mentioned experiences with the community nature center. The science teacher stated that the group of students identified didn't seem to have much interaction with nature.

> These kids, I think, are more into other things. Some of them, of course are bike riders, of course they recreate. They go swimming at some of the deep well pools and they recreate with their parents for picnics, but I'm not sure how many go hiking or go pitch a tent. Especially out of the group we've identified, I'm not exactly sure what their experiences are as far as exploring nature, other than the (community nature center) (One-on-one interview, April 25, 2016).

When asked about the access to nature she explained that the city has many parks and natural areas that are all free to access and that if a student wanted, they could all have access to nature. She also added that if a child was not raised to appreciate it or if parents did not expose them to nature, children might not know what is available to them. The special education teacher shared a similar opinion, referencing free natural spaces all over the city but "I think a lot of them don't know anything about it (nature area) because they don't have parents like we had to take us there and do that type of stuff" (One-on-one interview, April 25, 2016). The three staff members interviewed and myself all grew up in the city in which the research was conducted.

The staff and students all expressed positive experiences that they had with nature through the community nature center. The paraprofessional mentioned experiences with nature through the community nature center but also added some disconfirming evidence of how the experiences through the community nature center were not always powerful. When asked what the students thought of nature she stated:

> They don't like it. I think it's only because of the way it's been introduced to them. They haven't had the ability to ease into it, they jumped right into it. They haven't had any background knowledge or background information of nature. It's always 'okay, we're going on the field trip to the community nature center. This is what we're going to do.' It's not so much of like, 'This is why we're going to do it. This is why you will probably enjoy it. Take off your surface level of thinking and dig deeper. If you were by yourself and went on a nature field trip or went to enjoy nature by yourself, how would you feel?' I think they're level of thinking is, 'Oh, we're walking through the woods and there's deer and bugs and all that other stuff is out there.' (One-on-one interview, April 29, 2016).

Following the Nature walk experience, Jacobi (Focus group interview, May 5, 2016) displayed his lack of school exposure to natural areas by stating that the experience had been his first time outside all year in school. A couple students mentioned that he may have attended a field trip with the community nature center but he stated that he had not. Dennis added in his reflection of the experience (Focus group interview, May 5, 2016) that he hadn't realized there were edible onions in the woods adjacent to the school. He also had difficulty remembering the name Dandelion when sharing the experience of eating a dandelion green in science class (Observation notes, May 2, 2016) and described eating "the leaves around the sunflower".

A sub-theme emerged after the Nature walk experience in relation to accessing nature in relation to fear. The special education teacher introduced the sub-theme of: parental fear of nature, as a reason for students not regularly accessing natural areas. The special education teacher described her fear of nature: "I was kind of worried about the kids being lost or falling in the fast-moving river" (One-on-one interview, May 2, 2016). The special education teacher

again brought up the sub-theme of fear of nature in her one-on-one reflection interview (June 6, 2016) because of the water that was present in the fish rearing ponds. She expressed her concern of students drowning. Liza provided additional insight to the sub-theme of fear of nature when she expressed her fear of bees because a honey gathering beehive we passed and discussed as we walked through the facilities. Fear of nature was also addressed by many of the students after being on a boat, because for many of them, it was their first time in a boat during the Recycling experience. Liza (Focus group interview, June 9, 2016) described it as "you get scared at first, but after a while it gets fine, you get used to it. You can catch on more me faster." The other students agreed. The city has plentiful access to water but most students had never been a boat before.

Summary:

The three themes emerged in the initial interviews but continued to resurface in every reflection. All participants enjoyed the experiences and discussed how using the natural-related informal learning environments made science more engaging and provided a more hands-on approach to learning. Time for science was a reoccurring theme that moved between mandates that took time away from science; to science being seen as not as important as the three core subjects of math, reading, and writing. All of the participants, except one, said they had physical access to nature yet many of the students did not habitually recreate in nature and many had never been to the nature related informal learning experience sites.

Chapter Five: Discussion

This exploratory case study informed by ethnographic methods of observation was conducted to explore how students with learning disabilities from an urban environment experience nature-based informal learning. This study involved the stories from seven eighth grade students, labeled as having a learning disability from an urban school, collected from preliminary and reflection interviews and classroom observations conducted between April 20, 2016 and June 9, 2016. Data was supported with interviews from the science teacher, special education teacher, and paraprofessional. Four nature related informal learning experiences that were aligned to the science text book took place over the course of these eight weeks.

When reviewing the preliminary data, three themes emerged and continued to resurface throughout the reflection data. These three themes provided insight into the gap established in the literature review where the role of nature related informal learning environments play in the education of urban students with learning disabilities in science class.

Conducting this research reinforced the critical disability, ecological, social educational justice lens that I view education with. In my observations of the students during the nature related informal experiences, I felt that creating these hands-on experiences created a setting that provided the students an equal opportunity for learning. Taking students out of the classroom proved a powerful experience that students and staff reflected as useful, enjoyable, and engaging. Students expressed higher interest in the subject area and staff described an increase in confidence of the content for students with disabilities. The science teacher explains referencing the nature related experience: "if you're out and about experiencing it (science topics), to me that was better for my kids, especially the ones with disabilities, because they felt successful" (One-

on-one interview, June 13, 2016). This supports the research that demonstrates the importance of individual and situational interest and engagement for students (Margolis & McCabe, 2006; Eccles & Wigfield, 2012; Pintrich, 2003; Schiefele, 1991). The informal learning environments also provided students with choice and freedom (Corey, Focus group interview, May 4, 2016) that was described in the findings and supports the research that stresses the value for education of choice and interest in learning (Margolis & McCabe, 2006).

The hands-on learning that took place in the nature related informal learning environment experiences was a more engaging and enjoyable way of learning for students with learning disabilities. This theme reinforced the existing literature that states that nature can provide an engaging and motivating way of learning (Hoad et al., 2013; Tal et al., 2014). As stated in the Findings section, students and staff overwhelmingly described the enjoyment they had and the students repeatedly stated how they were able to "see" and "experience" what was written about in the science book. The staffs' descriptions of the nature related experiences and the students use of real-life hands-on experiences to create memorable experiences reinforced the literature described in chapter two (Powell & Wells, 2002; The National Research Council; 2012; Renninger & Hidi, 2011; Tal et al., 2014).

The experiences also provided a deeper understanding for the science curriculum as the research showed (Kisiel, 2012; Knapp & Barrie, 2001); reinforcing Melber and Brown's (2008) research that stated science is enjoyed more when it is taught with hands-on experiences. These student and staff interviews also reinforced Swarat et al. (2012) research which stated that nature related hands-on activities elicited higher engagement.

As stated in the literature review, science often takes a marginalized position compared to math, reading, and writing (The National Research Council, 2008; Bell et al., 2009). This was

especially true at this site. When the science teacher and I initially collaborated to lesson plan the eight weeks of research, I was under the impression that science was being taught two to three times a week. We had planned to take a nature related informal learning experience during the third science class every other week. As stated in the findings, teaching science from the textbook only occurred six times. When the textbook was being used, many interruptions happened during science time. Most were school specific and not specific to science class such as: behavior redirection, fire drill, phone calls, school staff entering to ask something, and tardy student disruptions. This is worth mentioning because although these interruptions could happen in any subject area it still diminishes the total instructional time of a class. In this study the six times that the science textbook was used, class time was lost to these type of distractions.

The lack of science time inadvertently led to the importance the nature related informal learning experiences had. As the special education teacher stated: "You know it was awesome right? It was good that they actually got exposure" (One-on-one interview, June 13, 2016) in reference to the experiences and the lack of science being previously taught. Although the lack of science was a reoccurring theme the activities did create powerful experiences were science was taught. This is reinforced by Falk and Dierking's (2010) research that suggests "most science is taught outside the classroom" (p.486).

It is also worthy to note that the school district tests students in the areas of reading, writing, and math through state and district standardized assessments to determine the successes and failures of the school and district as a whole in terms of their academic progress. Since the focus of testing is on the three core subjects reading, writing, and math, the schools may focus more attention to the tested subjects to improve testing scores.

The research shows that urban students have less access to natural areas than their suburban counterparts (National Research Council, 2012). Yet in these findings all but one student said they lived near a park. The large amount of public space available to urban residents was also described by all of the staff. This access to green space maybe unique to this specific city, but the findings indicated that students had some previous experiences with nature and that the school had provided them with access. They also described interactions they had with nature but the shared previous experiences students shared in the preliminary interviews, I interpreted them as specific experiences and not habitual experiences. This was reinforced with the staffs' perceptions that were shared about students not regularly playing outside. This was also evident because many students had not previously been to the experience sites, which all but one are located a short bike ride or bus ride from the school.

A subtheme that emerged was fear of nature. Fear came up in relation to water briefly when a student described being on a boat for the first time and the special education teacher expressed her fear of students drowning. Fear of water is a concern that needs to be looked at further. All four field trips included water: A river was present during the Nature walk experience; Fish ponds were present during the Fish farm experience; And students were on boats for both the Recycling and State park experiences. It is important to note the that possible causes of fear may stem from a lack of ability to swim and specific to this school site: that a student had drown on a field trip a few years back, which changed safety protocol for water related field trips. Also two sisters from the neighborhood drowned in the river downstream from the school 10 years ago, but a memorial still stands. The previous year a graduate from the district committed suicide jumping off a bridge and drowning downstream of the same river we saw on the Nature Walk experience. Water is present in many of the green spaces around the

city as in a pond, river/creek, lake, or pool; fear of water could be a possible reason many of the green spaces aren't regularly used.

Limitations

This study was an exploratory case study in which I had not set out to prove anything, but to gather the experiences of using the nature related informal learning environments in an urban environment with this specific population. It is still important to note that this study took place in the final eight weeks of school. Although the research states that there is a lack of time for science, I still felt that because of the time of year that this study took place, the lack of science didn't perhaps reflect the rest of the school year. While students and staff stated that there had not been much science taught during the year, observation data such as: extended recess, ice cream social, and graduation practice were reasons science didn't occur that were related to end of the year activities. Additionally time of year could have been a factor in the science teacher being absent two days of science class and missing two informal learning environment experiences. Possible reasons could be needing time to dedicate to grading papers, getting grades ready, and shutting down and organizing the classroom for the year. Time of year could've also played a role in the student absenteeism.

The population is another limitation to consider. A sample size of seven students from one class, of one school, during one school year is not a large enough population to make general claims and it is possible a recreation of this study during another year with a different group of students in a different school could have completely different themes.

Race never came up as an issue in terms of feeling accepted in a green space primarily used by Whites. I had anticipated, with racial issues revolving around gentrification, this to be a

talking subject, but it was not. It could have been due to my appearance as a White male that race did not come up.

I also anticipated motivation to emerge as a theme, but possibly because of the time of year the study took place, motivation wasn't a focus. Another reason to consider the lack of motivation was the lack of textbook learning that occurred. Because of the lack of class time devoted to textbook based instruction, changes in motivation possibly were difficult to compare.

Implications

This research was an exploratory case study to preliminarily address the gap in the literature. This case study indicated that urban students with learning disabilities and staff generally enjoyed and engaged in the science curriculum through hands-on learning in nature related informal learning environments. The informal learning environments proved very valuable from both the staff and student perspective. Students were able to apply the minimal amount of textbook science that was taught to make connections from the book to real-life situations and seemed to have a higher retention of information. These successes justify the need to utilize nature related informal learning environments more in the science curriculum. Students' ability to better access the science curriculum through the nature related informal learning environments and the lack of previous usage of the nature related informal learning environments implies a need for more frequent usage of these environments in the science curriculum for students with disabilities. This could be achieved by providing more information about surrounding available green spaces or a collaboration between the county parks and the school district. The need is evident by the lack of successes that the literature shows about urban students with disabilities in relation to science and the successes this research demonstrated. The school's proximity to an adjacent green space and the lack of usage of the green space by the

school is an issue that reflects an issues of social justice through the lack of access and opportunity that students with disabilities have.

Lack of time dedicated to science was another issue of social justice that needs consideration. The little base knowledge the students had of the science content most likely effected the science experience they described after the last two nature related learning experiences. The students had not had any lessons on the subjects that the last two experiences where aligned to. Therefore students didn't have any base knowledge to describe freshwater ecosystems, habitat destruction, or conservation practices, which where key subjects that the final two experiences where aligned to. Even without any book knowledge, students mentioned differences in clean and dirty waters. This not only implies the value that the experiences had on students but implies that students are already comparing and observing the ecosystems which could've been more powerful had they had more background knowledge. This supports the importance of science time and the possible value in stronger advocacy for science time.

This research helps support the importance of nature related informal learning environments and opens research to link nature related informal learning environments to higher scores in science standardized tests and/or correlations to voluntary participation in science related classes in high school for students with learning disabilities. Another possibility is using nature related informal learning environments to motivate staff/school to prioritize science time or looking into motivation changes for students with learning disabilities. This study could be reproduced in another subject area to find out how students with learning disabilities react to using nature related informal learning experiences in other subject areas.

Fear of natural spaces was a theme that needs to be further addressed. Fear of bugs, getting dirty, and "bad" weather (rain and cold temperatures) was anticipated, yet the rooted fear

of natural water and the threat of allergies were not. These fears could be relate to the lack of habitual usage of natural areas. Ironically the school has a pool and the students all have swim lessons as part of their gym credits. The science teacher also described students playing in the "deep well" pools, which implies the ability to swim since the pools are "deep". Further research is needed to understand the disconnection between the ability to swim in a pool yet having a fear of water in nature. Not enough is known to make any claims because variables including race, urban population, SES, and the sample population could all be factors but these variables weren't independently studied in relation to fear. More data would be needed to further investigate how to reshape staff and students' fears of nature.

Recommendations

- Educational opportunities for staff to familiarize themselves with surrounding natural areas that could be used in the curriculum.
- Educational opportunities for staff to develop lessons that utilize surrounding green spaces.
- Further investigation in the disruptions to the science curriculum.
- Quantitative research on nature related informal learning environments and assessments.

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Appendix A

Consent Forms

Consent to Participate in Research Interview

Study Title: UNDERSTANDING HOW STUDENTS WITH LEARNING DISABILITIES EXPERIENCE NATURE RELATED INFORMAL LEARNING EXPERIENCES IN AN URBAN ENVIRONMENT

Person Responsible for Research:
Thor Stolen, Doctoral Candidate
Elizabeth Drame, Professor, School of Education,
Department of Exceptional Education

Study Description: The purpose of this research study is to investigate how students with learning disabilities experience nature related informal learning experiences in an urban environment. Approximately 5 subjects will participate in this study. If you agree to participate, you will be asked to participate focus group interviews. This will take approximately 45 minutes of your time for each session.

Risks / Benefits: Risks that you may experience from participating are considered minimal. There will be no costs for participating. Benefits of participating include an opportunity to reflect on your personal experiences science class.

Confidentiality: Identifying information such as your name, will be collected for research purposes. The interview will be recorded. Your responses will be treated as confidential and all reasonable efforts will be made so that no individual participant will be identified with his/her answers. The research team will remove your identifying information after transcription and all study results will be reported without identifying information so that no one viewing the results will ever be able to match you with your responses. Data from this study will be saved on a non-networked, password-protected computer off-campus for 2 years. Only the PI and graduate assistant will have access to your information. However, the Institutional Review Board at UW-Milwaukee or appropriate federal agencies like the Office for Human Research Protections may review this study's records.

Voluntary Participation: Your participation in this study is voluntary. You may choose not to take part in this study, or if you decide to take part, you can change your mind later and withdraw from the study. You are free to not answer any questions or withdraw at any time. Your decision will not change any present or future relationships with the University of Wisconsin Milwaukee. There are no known alternatives available to participating in this research study other than not taking part.

Who do I contact for questions about the study: For more information about the study or study procedures, contact Thor Stolen at tastolen@uwm.edu.

Who do I contact for questions about my rights or complaints towards my treatment as a research subject? Contact the UWM IRB at 414-229-3173 or irbinfo@uwm.edu.

Research Subject's Consent to Participate in Research:
To voluntarily agree to take part in this study, you must be 18 years of age or older. By signing the consent form, you are giving your consent to voluntarily participate in this research project.

_____
Printed Name of Subject/Legally Authorized Representative

_____ _____

Signature of Subject/Legally Authorized Representative Date

Consent to Participate in Research Observation

Study Title: UNDERSTANDING HOW STUDENTS WITH LEARNING DISABILITIES EXPERIENCE NATURE RELATED INFORMAL LEARNING EXPERIENCES IN AN URBAN ENVIRONMENT

Person Responsible for Research:
Thor Stolen, Doctoral Candidate
Elizabeth Drame, Professor, School of Education,
Department of Exceptional Education

Study Description: The purpose of this research study is to investigate how students with learning disabilities experience nature related informal learning experiences in an urban environment. Approximately 5 subjects will participate in this study. If you agree to participate, you will be asked to participate in observations. The researcher will observe you as you participate in your science instruction. The observation will be conducted at any venue where you participate in your science lessons. The time frame for the observations will be guided by the length of your science class (normally 90min).

Risks / Benefits: Risks that you may experience from participating are considered minimal. There will be no costs for participating. Benefits of participating include an opportunity to reflect on your personal experiences with science class.

Confidentiality: Identifying information such as your name will be collected for research purposes. The observation will be transcribed. The transcriptions will be treated as confidential and all reasonable efforts will be made so that no individual participant will be identified through their behaviors. The research team will remove your identifying information after transcription and all study results will be reported without identifying information so that no one viewing the results will ever be able to match you with your responses. Data from this study will be saved on a non-networked, password-protected computer off-campus for 2 years. Only the PI and graduate assistant will have access to your information. However, the Institutional Review Board at UW-Milwaukee or appropriate federal agencies like the Office for Human Research Protections may review this study's records.

Voluntary Participation: Your participation in this study is voluntary. You may choose not to take part in this study, or if you decide to take part, you can change your mind later and withdraw from the study. You are free to not answer any questions or withdraw at any time. Your decision will not change any present or future relationships with the University of Wisconsin Milwaukee. There are no known alternatives available to participating in this research study other than not taking part.

Who do I contact for questions about the study: For more information about the study or study procedures, contact Thor Stolen at tastolen@uwm.edu.

Who do I contact for questions about my rights or complaints towards my treatment as a research subject? Contact the UWM IRB at 414-229-3173 or irbinfo@uwm.edu.

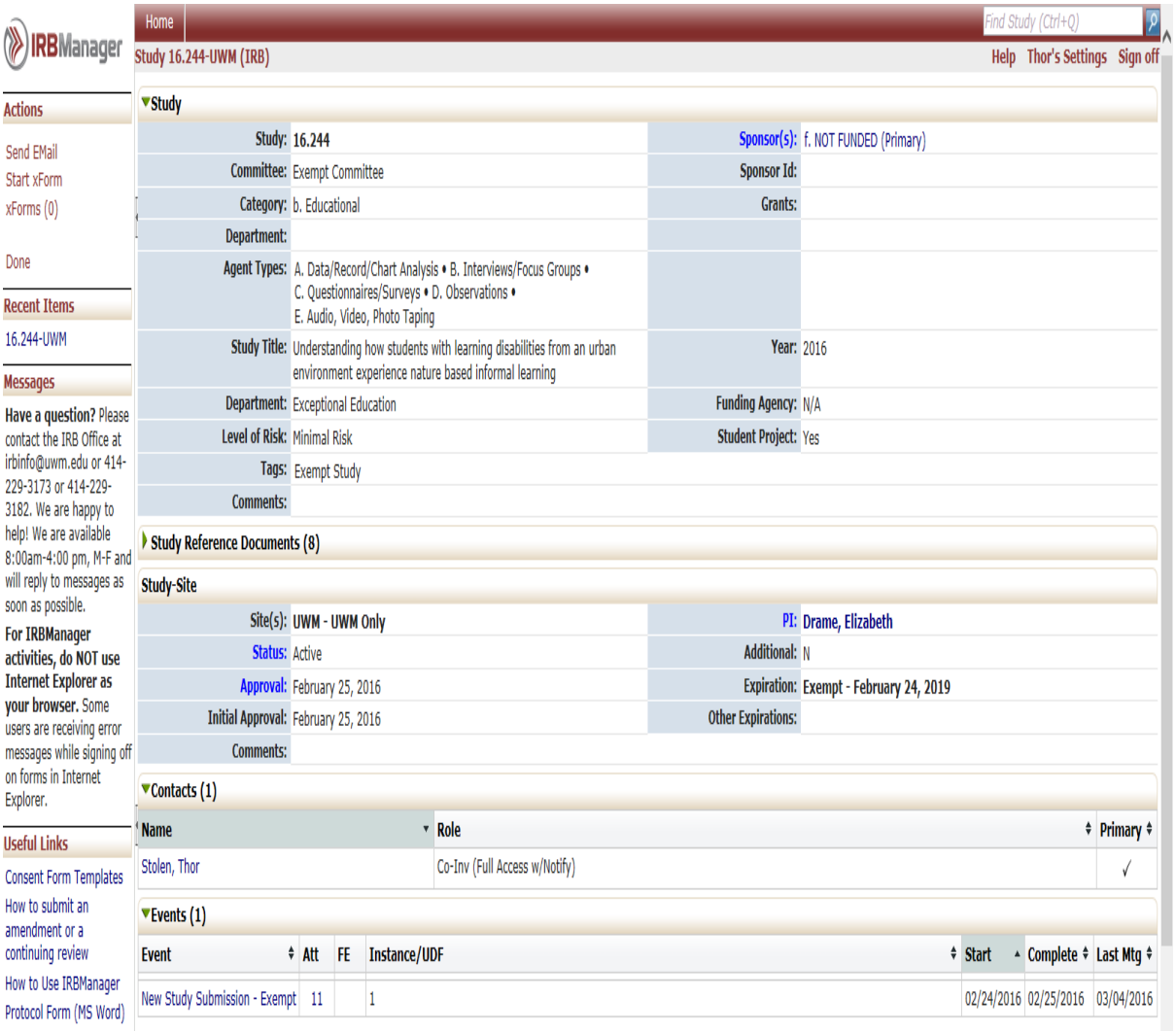
Research Subject's Consent to Participate in Research:
To voluntarily agree to take part in this study, you must be 18 years of age or older. By signing the consent form, you are giving your consent to voluntarily participate in this research project.

_____
Printed Name of Subject/Legally Authorized Representative

_____ _____
Signature of Subject/Legally Authorized Representative Date

Appendix B

IRB Approval Letters



IRBManager

Home

Find Study (Ctrl+Q)

Study 16.244-UWM (IRB)

Help Thor's Settings Sign off

Actions

Send EMail
Start xForm
xForms (0)

Done

Recent Items

16.244-UWM

Messages

Have a question? Please contact the IRB Office at irbinfo@uwm.edu or 414-229-3173 or 414-229-3182. We are happy to help! We are available 8:00am-4:00 pm, M-F and will reply to messages as soon as possible.

For IRBManager activities, do NOT use Internet Explorer as your browser. Some users are receiving error messages while signing off on forms in Internet Explorer.

Useful Links

Consent Form Templates
How to submit an amendment or a continuing review
How to Use IRBManager
Protocol Form (MS Word)

Study

Study:	16.244	Sponsor(s):	f. NOT FUNDED (Primary)
Committee:	Exempt Committee	Sponsor Id:	
Category:	b. Educational	Grants:	
Department:			
Agent Types:	A. Data/Record/Chart Analysis • B. Interviews/Focus Groups • C. Questionnaires/Surveys • D. Observations • E. Audio, Video, Photo Taping		
Study Title:	Understanding how students with learning disabilities from an urban environment experience nature based informal learning	Year:	2016
Department:	Exceptional Education	Funding Agency:	N/A
Level of Risk:	Minimal Risk	Student Project:	Yes
Tags:	Exempt Study		
Comments:			

Study Reference Documents (8)

Study-Site

Site(s):	UWM - UWM Only	PI:	Drame, Elizabeth
Status:	Active	Additional:	N
Approval:	February 25, 2016	Expiration:	Exempt - February 24, 2019
Initial Approval:	February 25, 2016	Other Expirations:	
Comments:			

Contacts (1)

Name	Role	Primary
Stolen, Thor	Co-Inv (Full Access w/Notify)	✓

Events (1)

Event	Att	FE	Instance/UDF	Start	Complete	Last Mtg
New Study Submission - Exempt	11		1	02/24/2016	02/25/2016	03/04/2016

[redacted] [redacted] PUBLIC SCHOOLS

Office of Innovation & Information
Division of Research & Evaluation
[redacted]

April 7, 2016

Thor Stolen
UW-Milwaukee
tastolen@uwm.edu

Re: Research Request

Dear Mr. Stolen:

I am pleased to inform you that your research proposal entitled "Understanding how students with learning disabilities from an urban environment experience nature based informal learning" has been approved. Please maintain a copy of this letter as proof that you have received district approval to conduct research.

Please submit a copy of your completed research project to the Division of Research and Evaluation at [redacted]

I thank you for your interest in conducting research within [redacted] and wish you success with this project. If you have any questions, please contact [redacted] at [redacted]

Sincerely,

[redacted]
Research and Evaluation Manager
Office of Innovation
[redacted]

Appendix C

Interview Questions

Interview initial 1-on-1 teacher interview

How has your experience teaching science this year been so far?

What have been some of the highlights?

What have been some of the struggles?

How do you think students feel about science this year?

What about specifically your population of students with learning disabilities?

What are some of the strengths and weaknesses you've witnessed with each student with a learning disability?

Student#1

Student#2

Student#3

Student#4

Student#5

What does nature mean to you?

What have been some past experiences you've had with nature?

Have you used a natural setting as a field trip?

How and what did you think of the experience?

How did you think the kids felt about it?

Student Focus group Interview (preliminary)

Can you tell me your opinions of science class this year?

What have been some of your positive past experiences with science?

What are/were some complaints about science class you have?

When you hear the word nature, what do you think of?

What have been some experiences you've had with nature?

What school experiences have you had with nature?

Focus group interview post informal learning environment 1

How did you like the field trip today?

What were some memorable parts of the field trip?

What connections did you make between what you are learning in science and what you experienced today?

Has anyone been to the park before?

What were some experiences you've had previously at the park?

Focus group interview post informal learning environment 2

How did you like the field trips to the aquaponics lab and river today?

What were some memorable parts of the field trip?

What connections did you make between what you are learning in science and what you experienced today?

Has anyone been to the aquaponics lab or river before?

What were some experiences you've had previously at either place?

Focus group interview post informal learning environment 3

How did you like the field trip today?

What were some memorable parts of the field trip?

What connections did you make between what you are learning in science and what you experienced today?

Has anyone been on a boat before?

What were some experiences you've had previously had with boating?

Focus group interview post informal learning environment 4

How did you like the field trip today?

What were some memorable parts of the field trip?

What connections did you make between what you are learning in science and what you experienced today?

Has anyone been to KGMB and that part of the river before?

Post teacher 1-on-1 interview

How do you feel about science class after this four week research session?

What have been some of the highlights?

What have been some of the struggles?

How do you think students felt about this science unit?

What about specifically your population of students with learning disabilities?

What are some of the strengths and weaknesses you've witnessed with each student with a learning disability?

Student#1

Student#2

Student#3

Student#4

Student#5

Has your meaning of nature changed?

How about in relation to science class?

Post Focus group Interview

Can you tell me your opinions of science class since we incorporated nature?

What were some positive experiences?

What are/were some complaints?

When you hear the word nature, what do you think of?

How do you feel about using nature in science?

Curriculum Vitae

Thor Antonio Stolen

Dissertator and Research Assistant

School of Education

UW-Milwaukee

AREAS OF INTEREST

Special education; Cross-categorical inclusive settings; nature related informal learning environments, hands-on learning, and urban education; schooling experiences of students with disabilities; Bilingual education; participatory research methodologies

DEGREES

Currently — ABD (expected graduation date of fall semester 2016), Exceptional Education, UW-Milwaukee

Dissertation: *Understanding how students with learning disabilities from an urban environment experience nature-based informal learning*

Advisory Committee: Elizabeth Drame (Chair), Decoteau Irby, John Munson, & Maggie Bartlett

2004 — M.A., Special Education, Cardinal Stritch University
Thesis: *Using field trips as educational tools*

2002 — B.A., Communications, UW-Milwaukee

ACADEMIC APPOINTMENTS

2014- — Grant funded Research Assistant, School of Education – UW-Milwaukee

2015	Adjunct Professor, Exceptional Education for Urban Education – UW-Milwaukee
2002-14	Wisconsin Department of Instruction certified Cross-categorical 6-12 Special Education Teacher (Bilingual Certificate) – Milwaukee Public Schools