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# CREATING A NATURE-BASED ENVIRONMENTAL CONNECTION TO AT-RISK EBD STUDENTS IN A SELF-CONTAINED CLASSROOM

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CREATING A  NATURE-BASED ENVIRONMENTAL CONNECTION TO AT-RISK EBD

STUDENTS IN A SELF-CONTAINED CLASSROOM

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A capstone submitted in partial fulfillment of the requirements for the degree of Master of Arts

in Education: Natural Science and Environmental Education.

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Dedication

To Colby, for your consistent desire for walks through the apple orchard and desire to nap in the sun in the field. It gave me the needed inspiration I needed to look for in my ideas for the created lessons.  Your tail always wagged to remind me that I should always make time to go outside and play no matter how stressed or old I get. Thank you to my students, your needs in various fields of subject matter continued to be a source of direction for lesson design.

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**Chapter One**

**Introduction**

Every classroom should offer a welcoming place for students to learn, and for the teacher to provide instruction. A conventional classroom offers the safe environment needed to teach with its word walls, reference charts, whole class learning objectives and possibly some pictures in the room to "brighten up" the feel of it. "A classroom should not have walls" has been my philosophy since I earned my first master's degree in Special Education 12 years ago. To me, this literally means that there should be few boundaries regarding student imagination and productivity. The student imagination should be able to go beyond what is taught, allowing them to make their own connections. With this insight, I always felt limited as an instructor, and wanted to strive for to improve my environment and thus the learning of my students. The students that I traditionally work with have many behavior disabilities, so there is a need to make them feel safe as well as motivated and connected to their community.

In consideration of the strong focus in the public school setting for conventional subjects, there has been little emphasis on environmental education; this is something I have become passionate about. Additionally, with the increase of urbanization, the available connections that students have to their own natural environment have become less accessible. I want to create a way for the students to have an understanding and almost intimate relationship to natural environments through the use of a biophilic themed classroom as well as lessons involving environmental education.Due to the lack of focus on environmental education in regard to the student's own personal environment brought me to me reaserch question: How can I create a nature-based environmental connection to at-risk EBD students in a self-contained classroom?

Throughout my years of teaching I am often asked by administrators as to how a certain

lesson will be relevant to my students? Other common questions included, "Will this lesson be a prerequisite to an upcoming lesson?" or, "Is this lesson a continuation of a former lesson?" Perhaps the most intense question I receive is, "How will they use this lesson in the real world?" The definitions themselves within these questions, as in "how" and "real world", seem to change each year. Each year, the real world of the students also changes. The issues that persist with the students are different from what we had to deal with when we were students. As a teacher I have to be able to modify my curriculum with each new set of standards that are placed on the students while employing an understanding that the world that my students live in is not the same as mine over 20 years ago.

**Current Teaching Background**

I am currently the head teacher of a special education school in the Windham Public School District in Connecticut. My classroom is one of three self-contained classrooms that are considered a private school housed inside a public high school. It is not completely linked to the public school system but affiliated nonetheless. The students who attend this program are diagnosed with learning disabilities as well as various forms of Emotional Disturbances. Most of these students also have differing levels of anxiety and can become very overwhelmed if there is not enough structure into their learning days, or a lapse in their coping skills. My responsibility is to monitor and document their behavior throughout the day every 30 minutes in the areas of Following Directions, Use of Appropriate Language, Respect to Others, Staying on Task, and Staying in Assigned Area. They are scored on a quantitative data scale of 0-2 for each 30 minute increment. Staff is trained to score each student as objectively as possible so as to prevent any subjective scoring or personal bias. I have seen many behavior management programs in the past but this one, to me, is very well designed.

The program where I teach is highly structured to assist the students so that they may return to the regular education population. This is different compared to other similar populations of students. I teach in a self-contained classroom version, whereas other education programs related to the company are designated self-contained schools. I have been able to observe the difference between the two dynamics of my self-contained classroom and the dynamic of the self-contained school that is located in Hartford, Connecticut and there was a rather significant difference in functionality. Students in self-contained schools tend to show improvements with negative internalized behaviors and are less likely to be retained in their current grade as compared to students in a self-contained classroom. Perhaps this may be in relation to the self-contained schools having on-site mental health workers that the self-contained classroom is not able to provide consistently (Lane, Wehby, Little, & Cooley, 2005). The difference with my program, and other reviewed programs of this nature, is that we actually have an on-site social worker dedicated to our students and only our students. This does provide insight to specific, disclosable behaviors that assist the rest of the staff as to how we can positively work with the students in emotional contexts.

The students in my caseload are taught with the same district standards and Common Core standards as other students in regular mainstream classrooms. We maintain a higher staff-to-student ratio with rigorous lessons involving all the required grade subject material. As a teacher in this program I am limited, along with my students, as to where we can conduct our classes. In this program we spend almost all day, every day of the school week in one classroom. We learn there, we eat there, we do projects in there, and once a week we have one 45 minute gym outside the classroom. The classroom becomes their home where, throughout the years, I have listened to numerous students claim they feel safer in this environment. They take pride in

it and this also helps build rapport with the students.

I am required to teach all the subjects to my students in my classroom, from English to Math, History and Science plus all the electives. With the grace of my direct supervisors I am given a fair amount of freedom as to how I may go about teaching these numerous subjects as long as I follow the program and curriculum guidelines. My previous years of teaching had only provided me with limited ideas and resources as to how I could become a stronger more influential teacher and I always found myself wanting more. I wanted more not just for me but for the students whom I taught as well. Luckily, toward the end of my first year of teaching in this program I discovered Environmental Education. This was an area I had never heard of but knew right away this could be a beneficial field to explore and be a part of.

**Author Background and Journey**

I have always been attracted to the outdoors and was able to experience how inspiring it was to be outside, and further how great it feels to teach outdoors. I've taught mountain biking for the Town of Groton in our local forests and shores. I relaxed in the woods or kayaked the nearby mill pond at a cottage I was renting in Maine. I felt the invigorating energy of becoming trained in reiki in an old refurbished barn in the shadows of the White Mountains. I worked in a natural pharmacy in New Hampshire where I became educated in herbalism and healing teas. I remember how relaxed I felt whenever I spent an hour or more in a florist's greenhouse.  I couldn't understand why I felt the attraction to nature but I really didn't care, I felt safe, physically, mentally and emotionally safe.  Camping became my therapy, it was better than any resort hotel. I never liked staying at a hotel but I was always quick to set up my tent and spend weekends in the campsites around Mt. Washington. I was able to converse with the Wabanaki and Penobscot tribes at their pow-wows and saw how they had lived with the natural

environment. I knew that the outdoors was helping me, but I could not understand how or why. What I did discover is that the more time I spent in nature or nature-like spaces the more I wanted to protect it.

Around 2017, it became apparent that there would be a need to have more effort on my part to help preserve the environment. I wanted to work in the field of environmental protection, but unfortunately did not have enough education background to start there. I discovered that a Master's Program in Natural Science and Environmental Education had existed as an online course from Hamline University. I quickly felt that if I couldn't directly be in an Environmental Protection field than I could certainly educate those that could be involved in protecting the environment in the future, and was soon accepted to Hamline's Program.

As my course work started I found out how little I actually knew about teaching about the environment This was fascinating to me because it just made me want to seek out and learn more. I wanted to bring this passion to my students right away. My students are all from a low income urban environment and that was, for most of them, the only environment they knew. I had to remember that the definition of environment is the surroundings or conditions in which a person, animal, or plant lives or operates.

I was amazed that I had not previously noticed during my own learning or teaching experiences that there are little to no course offerings in Environmental Education. I noticed it was taught in other states and that even other countries had intensive courses in the field of environmental education. There are some private businesses that offer after school programs or a preschool nature program, however, there was , in my view, a huge niche to teach the upper grades nature based classes in the state of Connecticut. With all the requisite main areas of science, (physics, biology, chemistry, general earth science), there seems to be little room to fit a

full dynamic course of Environmental Education into the main curriculum. I began to notice that "of" the environment and "in" the environment were occasionally included in general science courses, but there was no teaching "for" the environment. So I was still left with the questions of how to teach this while adhering to education standards? How was I going to teach my students the importance of protecting their environment? How was I going to connect my students to their natural surroundings to foster a feeling of coexistence with their environment? This was the conundrum I faced due to; the lack of natural environmental space (being an urban environment), limited access to nature space (the nearest trails/wooded areas were further than walking distance), and the fact that my students are confined to one classroom.

After giving this some thought, I found myself considering the greenhouses. I thought they would make an ideal classroom environment that could provide a connection to environmentally based education, while offering an intimate connection to nature. Knowing that utilizing environmental features (sunlight access, plants etc.) in office buildings offers a superior work environment (Dreyer, Coulombe, Whitney, Riemer & Labbe, 2018), I thought the same could be said for implementing this in a classroom. However, with the limitations of acceptable designs in the classroom coupled with the lack of access to outdoor classroom spaces at each school , let alone the district, this would prove to be a difficult problem in the standardized classroom. Additionally, the need to adhere to district fire codes would only add to the difficulties. This is where I find the challenges lay, but at this point, I realize the benefits outweigh the costs.

There needs to be an understanding of how certain groups of people (students) react to natural-based features so as to gain the knowledge of what environmental factors are needed in the workspace to satisfy their needs (Dreyer et al, 2018). Numerous stressors, both internal and

external, need to be taken into context with my students particularly. If I change something too rapidly, or do not give them any scaffolded instruction, I could potentially lose them. I want to stay privy to their anxiety and learning styles but also give the students a chance to flourish with their creativity and be a part of this process. This is their classroom as much as it is mine. However to the students the classroom  is a safe area, so introducing a totally different environment aesthetic would not necessarily be easy..  To me it is obvious that not all the conventional classroom designs fit the needs of a student. Heerwagen, Kellert, & Mador's book, Biophilic design: The theory, science, and practice of bringing buildings to life, truly helped solidify my resolve to forgo specific restrictions that I would face. They helped me to come to the realization that that opportunities for outdoor engagement (be it indoor and/or outdoor) must be made available in order to see the benefits of developmental needs. This is in part due to the rapid  development of the neurological and physical functions of children (2008, pg 159). Even though my topic of this project is creating a nature-based connection to at-risk EBD students in my self-contained classroom, I need to keep the one overriding question in my head throughout this whole process: is this beneficial to the future of the environment and my students?  In reviewing this literature  I learned the reasoning behind what it is I am trying to do to  assist my students in making a connection to the environment through nature based lessons in natural settings.

My research question for this capstone project has essentially emerged to "How can I bring a nature-based environmental connection to at-risk EBD students in a self-contained classroom"? I feel that the best way to accomplish this would be by exposing my students to plant life (bringing plants into the classroom), and relying on natural light (I've only one window in my classroom so I think the use of natural light bulbs will have to be enlisted). (natural air?) I

also plan to use various environmental educational lessons I have developed to better assist my students in the understanding of how to live and recognize the importance of their environment and how it affects them. My ultimate plan is to bring as much of the outside influence inside my classroom.

**Summary**

With my personal discovery of biophilia through my academic experience and a desire to teach in the field of environmental education, I'd like to create this project for my current caseload. My hope is to inspire my students in the way that I am inspired to protect the environment. I want to find ways to excite them to care about their environment as much as I do. I feel that I can do this by bringing an outdoor feel to the indoor classroom. I also want to have this project inspire my students to spend more time outdoors by showing them how beneficial the outdoor environment can be.

The following chapters breaks down how this project will form and potentially be accomplished. Chapter Two will contain a literature review of rationale that focuses on the education of a connection to nature. It will also look at aspects I need to implement to accomplish this project. This includes areas of biophilia, biophilic design, the importance of environmental education and how it can create a connection to the natural world. I also review topics of behaviors and barriers that are seen in the population of the students I teach. Chapter Three reviews the methods and framework of how I organized my project including lessons and professional development.  Chapter Four  reviews  my reflection of the completion of the project journey. It will also include concluding remarks of how it connects to the classroom.

**Chapter 2**

**Literature Review**

This chapter contains a literature review of  topics in relation to the research question, how can a nature based connection be made to at-risk students with various  Emotional Behavioral Disorders (EBD) in a self-contained classroom? The question may seem simple enough but to most educators there are a lot of foundations to grasp when working with students with EBD. The chapter is divided up into subsections that I feel are needed to answer this question and to allow for a base of provided background  that other scholars have detailed in the areas of behavior, environmental education and the term biophilia.

The first section goes into biophilia and this section reviews the idea and hypothesis of biophilia and how it can be used as both an educational tool and  a form of therapeutic escape . The second subsection " What is Biophilic Design and how is it used?" reviews books and scholars who have studied the effects of various forms of buildings and classrooms that incorporate natural views and/or  features into their designs and the positive effects they provide along with how it is shown to improve cognitive and emotional function. Biophilia fosters the instinctive connection to nature and is seen in many designs and this is covered in the second subsection. A large basis of this project will be the use of the biophilic design of a classroom. The third subsection reviews the factors that can affect the learning of my population of students in my caseload. This subsection reviews the limitations of students with EBD in classrooms. I wanted to research what areas I need to consider and stressors that could benefit from a more natural setting. There is a wide spectrum of what can be considered emotional behavior disorders and I wanted to review a few that I witness in my classroom. The fourth subsection reviews biological stressors on students and how traumatic events can negatively affect social and

academic skills. The fifth subsection reviews Environmental Education and benchmarks that came through on the history of its development in the early twentieth century to how it is shown to provide motivation to protect the environment. It also goes into certain details of how environmental education can also guide a connection to the outdoors especially for urban environments. Nature based connection requires various levels of environmental education to help with understanding of environmental awareness.

**What is biophilia?**

There is a word out in the environmental education world known as biophilia. Biophilia, a term used by E.O. Wilson, is defined as an innate tendency to focus on life and life like processes, (Wilson 1994). However the idea of biophilia was first coined by Erich Fromm who, in 1973, stated that it is a passionate love of life and all that is alive; it is the wish to further growth, whether in a person, a plant, or an idea of a social group, (Williams, 2018). Breaking the word down where "bio" means life and "philias" refers to "the attraction and positive emotions people feel for certain living spaces, actions and beings in a natural environment", (Kayihan, 2018). Biophilia is thought of as a generally encoded human process that human beings are attracted to things in nature as an instinctual process. Children are theorized to be born as "biophilic beings" as seen through their desire to explore and learn for the natural area without fear (Heerwagen , Kellert, & Mador, 2008, pg. 155). Other tangible examples of biophilia are a children's desire for a teddy bear to calm them or even names of software programs (Apple, Jaguar, etc.) to names of cars (Tacoma, Colorado, Baja etc), (Williams, 2018, p.22).

Biophilia can relate to how science and traditional environmental knowledge could be taught in the same curriculum because this is an area where truth, rather than opinion, is to be maintained. It is important to see how the outcome of human activities are in relation to the

natural world, making them one in the same,(Mueller, Tippens, Van Eijck & Roth, 2009). Kayihan had even gone deeper into Wilson's innate tendencies idea by translating them to how "the structure of our brains contains basic mental facilities that develop with contact with the external environment in a somewhat predictable fashion". (Kayihan, 2018). Biophilia provides understanding how humans behave as well as give a convincing environmental ethic based on it. The concept allows for the opportunity to connect with nature as well as grow from it. Feeling like a part of nature makes for behaviors similar to that of a naturalist, (Clowney,2013). Young children, for example, are even aware that their actions can have a negative effect on natural environmental surroundings. Just by cutting down a tree or the action of picking petals off a flower than that person is hurting those plants and this was found to be the thought process of both rural and urban children, (Yanez, Fees & Torquati, J., 2017). It is just as important for a child to have every chance to explore the world around them through their own eyes. It also gives the child a positive experience to feel comfortable and empathy towards nature, so as to prevent the risk of biophobia (aversion to nature) from developing, (Nurturing children's biophilia, n.d.).

Wilson's hypothesis of biophilia claims that humans need contact with nature and that humans are incapable of living a healthy life without it. This would call for a more intimate connection with nature that would utilize bringing nature based designs into the building, such as using natural materials. Ideally, this would also require building within an area that is natural instead of just taking down a natural aspect, such as destroying a wooded area, to build upon (Heerwagen et al, 2008, pg.63).

Nature helps with relaxation and allows for the distancing from stress-triggering environments or scenarios. Clemens Arvay had talked about Andreas Danzer in his book The

Biophilia Effect. Arvay had reported that Andreas Danzer, who was an Austrian Musician, became sick with a form of Tuberculosis. While he was in the hospital he was too weak to do anything physical such as go outside and this morphed into a form of depression. When he was able to be strong enough to venture outside he would spend longer and longer times outside and began to notice his depression lift and was able to sweat out the toxins on his hikes and even the side effects of his medication decreased. Arvay later brought up a later study in which Architect, Roger Ulrich, who also is a professor at the Center for Healthcare Building Research at Chalmers University and Aalborg University of Denmark, looked into how nature and gardens in hospital\s relieve stress and pain for the patients. He also researched the aesthetic theory where "Aesthetics is a branch of philosophy dealing with perceptions of beauty and "Affect" pertains to a feeling or emotion within. (Arvay, 2018,pg 2, 39). Utilizing the hypothesis of biophilia can prove to be a good foundation to creating the nature-based environmental connection to the classroom for students with emotional behavioral disorders who spend the entire day in the classroom.

**What is Biophilic Design and how is it used?**

Biophilic design is the conscious attempt to design natural systems that humans have the innate attraction to (biophilia) into the design of a built environment (Heerwagen et al, 2008). Viewing peaceful natural environments has shown to improve cognitive functions and have a reduction in negative physiological arousal (Benfield, Rainbolt, Bell, & Donovan, 2013). Visual connection to nature has the ability to shift the brain to a less stressful mode of processing. The difference of experiencing nature instead of navigating it can lull one into a state of "soft fascination", or, a mental state produced by full engagement in the pleasurable context of nature (Browning, 2016). Physical surroundings such as natural environments have shown to have positive effects on psychological well-being. (Burnard & Kutnar,2015). Maturation of childhood

is even healthier in correlation with contact with natural settings (Heerwagen et al, 2008, pg. 4).

When referring to Biophilic design Browning states that there are 14 patterns of a biophilic design(Figure 1) that are not considered new ideas but rather traditional design elements and they are categorized into 3 areas: Nature in Space, Nature Analogies, and Natures of the Space. Several of these patterns/areas may displayed but careful attention must be adhered to for intended health/productivity outcome :

1. Nature in Space: (Direct experiences of Nature)

   1. Visual Connection to Nature

   2. Non-visual Connection to Nature

   3. Non-Rhythmic Sensory Stimuli

   4. Access to Thermal and Air Flow Variability (High levels of $CO_2$ in the air interferes with cognitive function, human beings evolved at a time where $CO_2$ levels were at 180-200 ppm whereas now it is over 380 ppm and even some buildings measured at 1500 ppm. Airflow should feel more like the outdoors.

   5. Presence of Water

   6. Dynamic and Diffuse Light

   7. Connection to Natural Systems

B. Nature Analogies: (Representations of Nature)

   1. Biomorphic forms and Patterns

   2. Material Connection to Nature

   3. Complexity and Order

C. Nature of the Space: (Replicate preferred spatial experiences found in natural settings)

   1. Prospect

2. Refuge

3. Mystery

4. Risk/Peril, (Browning, 2016).

Along with the six biophilic design elements there is a revelation of over 70 biophilic design attributes such as color, water, air, animals etc. Sunlight is an important attribute in that using natural light as opposed to artificial light has shown improvement in morale, comfort, health and productivity. Including plants is essential because they represent survival from food to security and this can improve the feeling of comfort and security in an environment that has plants (Heerwagen et al, 2008, pg.7). According to Stephen Kellert, six guiding principles of biophilic design to go along with the attributes :

1.    Environmental Features (Water features, various plants)

2.    Natural Shapes and forms

3.    Natural Patterns and processes (use of the 5 senses as they relate to nature)

4.    Light and Space (varying ceiling height and varying light projections, tree canopy simulations)

5.    Place-Based relationships

6.    Evolved human relationships with nature (How the forest provide forms of protection and other elements of survival),  (Burnard & Kutnar,2015).

The goals of a biophilic design is to "reestablish positive connections between people and nature in the built environment", (Kellert, 2005),with the idea that some biophilic elements should include organic inspiration such as natural light use, natural ventilation, natural species around the building and even natural rhythms and sounds (Heerwagen et al, 2008, pg. 32). Away from home many workers spend most of their time inside the buildings they work therefore an

indoor environment can play a crucial role in the factors of a person's wellbeing The growing recognition of nature based experiences are recognized as supplying many benefits for physical, mental and social health (Dreyer et al, 2018). This has become more and more prominent as of late in numerous building designs such as hospital and business buildings. These building designs have been following the idea of biophilic design to improve the health and productivity of their patients and/or clients. Studies have shown faster recovery rates with patients who are in rooms that have larger windows to the outside area of what could be deemed "nature" as opposed to rooms with little or no windows at all. In addition, other studies show that regular exposure to nature has improved the health and focus of school aged children and even mental focus of students with ADHD and other learning disabilities. ADD/ADHD tends to be diagnosed as a behavioral disorder where a lot of the behaviors are linked or observed in active students whose behavior would be normal if in the woods as compared to the environment of a classroom (Heerwagen et al, 2008, pg. 157).Biophilic designs have a sense of inspiration and encourage activity, (Chambers,2018).

Biophilia , along with two other theories (Stress Reduction Theory and Attention Restoration Theory Attention Restoration Theory) have helped to explain the benefits of connecting to nature and its effect on mental wellness along with wellbeing. Attention Restoration Theory (ART) states that nature can provide recovery from attention fatigue and offer an 'escape' from routine activities and allow for ideas/imagination to happen with little effort (Chiumento, Mukherjee, Chandra, Dutton, Rahman, & Bistow, 2018). In the views of biophilia, natural views could lower student stress, restore attention and improve overall mood. This can lead to a better classroom experience for both parties of teachers and students. Enhancing the mood and lessened stress could have also shown a higher overall course grade

(Benfield et al, 2013).

Biophilic design is viewed as a very important missing component in sustainable building or room design (Heerwagen et al, 2008). The Restorative Environmental Design (RED), for example, is an environment design that should give the experience or idea for people to enjoy where they are and not just view it as a place to function but a place they can move among in several ways, (physically, mentally etc.). The concept of "restorative environmental design" (RED) assists with cultivating ideas of sustainable design and biophilic design. RED helps to acquire a stronger connection with the people in the building and the outside natural environment. The concept of RED can assist with the promotion to care for the environment as well. There are four components of having a restorative environment:

1. Being Away: Idea of being in a different location in a more mental sense ( Daydreaming)
2. Fascination: little, if any effort, is focused on something
3. Extent: perception of a space to be larger than it is
4. Compatibility: biophilia-natural affinity for nature and making it compatible to the needs of the students, (Burnard & Kutnar, 2015).

Studies using offices, recovery rooms and schools have shown that attention span and recovery improve when the focus on environment design is based on RED, (Burnard & Kutnar,2015). The idea of the use of Restorative Environmental Design has shown to connect students to their learning environment. One psychophysiological study conducted in 2007, involving four different classrooms, had used the concept of RED. The design made use of renewable energy sources and sustainable materials such as gardens on the roofs, use of recycled materials, rainwater harvesting and even "composting toilets". A biophilic theme had formed with the building structure and materials including the curriculum with increased exposure to

plants and various forms of outdoor inspired art. The study had shown that the students had a positive connection to their school and it had even served as a positive learning environment, (Burnard & Kutnar, 2015).

In regards to RED, natural elements such as water sounds have been shown to be most effective in reducing the perceived decibel level in an office setting and this can be utilized in a school setting with small fountains. Although it can be considered distracting due to how the human brain tends to focus on the sound of water as opposed to other noises this can offer a sense of relaxation, (Browning, 2016). Like water, wood can also have a positive effect on the users. Being a  positive sustainable source, wood is readily available and even the  use of it has both a functional and decorative and has positive impacts on the users most importantly those related to human stress,  (Burnard & Kutnar, 2015).  Unfortunately, there has been little focus set on the natural exploration and creativity of the natural environment (Heerwagen et al, 2008, pg. 161-162.) and therefore modern tendencies forget about the psychological needs or preferences of human beings regarding the built environments. In the current era of designs, buildings only consider the idea of form and function and  more of a  "machine to live in" or just a function of a shelter (Kayihan, 2018). In relation, certain designs of classrooms tend to also resist the idea of viewing the natural world and are designed with no outside open natural views. It is thought that the more open space may create distractions or even limit the type of information or work towards specific behavioral goals in the setting. It is also closed off to  reduce outside noise as well as improve heating/cooling costs and more space dedicated for bulletin boards and bookcases, this is becoming an all too common design for classrooms. There is a more positive effect of windows with a natural environmental views as opposed to that of areas with no windows or views of concrete walls. Even if there are no windows,  research in biophilia has

shown that individuals prefer the presence of landscape-style paintings instead of the abstract paintings, (Benfield et al, 2013). They may not have the same effect as an actual natural window view but can yield a more positive effect than having no painting or natural picture.

Natural views are just as important for teachers as they are for students, teachers are reported to seek out natural and restorative settings during downtime as a way to cope with the stresses of the daily events. The idea that scheduling of outdoor classrooms field lectures, painting natural scenes on walls or acquiring plants to windowless classrooms should not be ignored. Two college level classrooms were reviewed, one with a natural view one without had shown that that classroom with a natural view gave a more positive rating of the course. They also earned higher end of semester grades but there was little to no difference in the attendance (Benfield et al, 2013). Several other experiments have been observed to the effect of possession of plants in an office environment found that attention capacity of the occupants performed better for a span of 25 minutes than being in a room without plants. Indoor plants have proven to have psychological benefits but it also depends on the context or focus of the plant (Burnard & Kutnar, 2015). Employees without window views are more likely to bring in plants and other naturalistic views/pictures to compensate for their inability to access to the outside environment . Decreased performance in academics and measured differences in hormone levels are observed in students windowless classrooms as compared the higher level scores in mathematics and reading of students in classrooms with larger window views and more natural light (Benfield et al, 2013). Browning claims that sometimes areas such as a workplace design that lacks a natural view can impair cognitive ability. He continues to explain that emerging sciences have proven natural environmental design of a space can boost productivity and wellbeing. There is a connection to positive experiences with nature to how they benefit psychological and

physiological response (lowering blood pressure, heart rate, muscle tension and improved focus). A team at Melbourne University conducted an experiment with subjects who were put through a stress-inducing activity and then exposed to views of a concrete roof during a recovery task and another group that was exposed to a green roof with many plants on it had noticed that the group who viewed the urban roof showed no change/shift in processing mode whereas the green roof group exhibited a higher performance on the recovery task in about 40 seconds, (Browning, 2016). Heerwagen et al referred to a case study that had shown a significant correlation with nature and cognitive function when a group of inner city students moved into "greener" homes and even just having natural scenes indoors had a measurable positive effect on the students wellbeing. (Heerwagen et al, 2008, pg. 157).

Spending time in nature recharges mental energy, relieves stress and rids fear and anxiety,(Arvay, 2018, pg. 37). Browning's review of a group of 2500 students in Barcelona were studied for 13 months to see if the amount of green space (either at home or on the way to school in regards to tree canopies) had any effect on emotional or mental function. The study had resulted in a positive effect on cognitive development for children of schoolyards with large amount of tree coverage as opposed to students with little to no trees in the school yard. (Browning, 2016).

There are several possibilities to achieve biophilic design when it comes to the scale of the room. Geometrical weaving of plant life into the building itself, staying away from the rectangular to approach a more crenellated set of boundaries that partially surround areas. Inclusions of indoor gardens if the room is large enough keeping in mind the average height of the inhabitants so that it does not become so overwhelming that it defeats the goal of the design (Heerwagen et al, 2008). Burnard and Kutnar felt that research into the benefits of RED needs to

continue in order to help identify the benefits they give to the students with improvement of

learning abilities, stress reduction, and improvement of well-being. Attention Restoration Theory

(ART) which focuses on understanding how individuals replenish their ability to exert attention

on common tasks, such as those at the workplace that require directed attention. "Being away"

can be addressed with the use of indoor gardens, nature views or other ideas that

occupants/students can see or visit physically that are unrelated to their work area. (Burnard &

Kutnar,2015).

One issue with buildings and environmental spaces is that 50% of the world's population

is living in urban environments therefore decreasing the frequency of exposure to green spaces in

people's lives (Dreyer, et al, 2018).  Sometimes building standards do not allow for certain

biophilic elements. For example, the Cliff Bar factory was limited but it did have photos of staff

and customers eating the product outside and they were posted throughout the work area and it

had shown that even simulated aspects of nature can lower blood pressure and heart rate (albeit

not as much as the real thing) (Browning, 2016). The elements of a biophilic design has evidence

that even a visual of natural elements speed up healing, illnesses heal faster and students show

faster learning techniques, (Kayihan, 2018).

The desire for natural views is not limited to workplace, residents in low-rise apartments,

for example, has shown that the residents with nature views had felt overall satisfaction  with

their living situations compared to those that did not have views. Increased concentration,

decreased inhibition, and an ability to delay gratification had also been shown with inner-city

girls who had views of natural spaces from where they lived  (Benfield et al, 2013).

Employees on a job site in South Korea, who had window views, such as a forested area,

even reported fewer common issues and even saw an improvement of their satisfaction in their

worksite. They also felt they had more feelings of privacy and the natural view gave a stronger feeling of task enthusiasm, higher levels of patience and decreased frustration  (Benfield et al, 2013). Even though the subjects observed in South Korea were not students with EBD, it still had shown positive results in an area that could be a source of stress. Lowering frustrations as well as a decrease in other negative emotions can be a vital reason for designing the nature based classroom. Biophilic designs can take on multiple variations and not limit the ways to bringing a nature based environmental connection to the students with EBD.

**What limitations are the most prevalent that exist in self-contained or conventional classrooms?**

Some limitations do arise when looking into a design of a biophilic classroom that may not stem from the physical design of the room itself.  Emotional Behavioral Disorders (EBD), characterized by behavioral and social characteristics, has shown impaired relationships with teachers and peers and also limits abilities to understand social cues and interactions as well as limit problem solving skills. Students with EBD also have limited academic skills which create challenges to provide these students with a curriculum for a least restrictive environment (LRE) and these students tend to be placed in more restrictive settings (Lane et al, 2005).  An important part of an LRE mandates that students will benefit educationally in their placement, this is proven when a student(s) begin to show growth in both academic and social areas (Lane et al, 2005). More restrictive settings can also lead to reduction in nature play and a lack of quality of urban environments combined with new forms of technology (video games), numerous safety concerns have greatly distanced children from a natural environment (Chiumento et al., 2018). Kathleen Lane of Vanderbilt University and her colleagues did a study of EBD students to see there was a difference between students in self-contained classrooms as opposed to self-

contained schools. They looked into social skills, from a teacher's perspective, of behavioral

differences of groups of students having higher levels disciplinary incidences. When comparing

the difference between a self-contained classroom and a self-contained school there was little

difference of social skills or externalizing behaviors.  However, students in self-contained

schools showed improvements in internalizing behaviors and are less likely to be retained in their

current grade. This may be in relation to the school having on-site mental health workers that the

self-contained classroom does not provide consistently (Lane et al, 2005). There have been

incidences and studies that feel that self-contained situations may not provide an accurate

depiction of the academic and social achievement with students receiving special education.

Additionally classrooms of students diagnosed with EBD may not be well equipped enough to

meet the needs of these students. It is vague to how well the self-contained settings give the

needed support to improve students with EBD. The use of empirically-validated tools like a

behavior rating scale, school record data, or other behavior data is vital to measuring the

student's progress. Even now, too little focus has been brought forth to monitor the educational

progress of students with EBD who receive services in a restrictive setting that utilizes data-

driven measurement. With this lack of information there is little to guide teachers in effective

instructional strategies for these students. Data for academic instruction may be limited in part to

the fact that student behavior needs to be manageable before implementing instruction, if a

student is showing inappropriate behavior that leaves less time to provide the needed academic

instruction from the teacher(Lane et al, 2005). Social and Therapeutic Horticulture or STH, is a

term that is used to explain the intervention use of green space-based environments for groups

with mental health needs. STH has more of a focus the actual needs of the improvement of the

wellbeing of the participants instead of the productive gardening that may be associated with the

Stress Reduction or Attention Reduction Theories. A pilot program for the use of STH known as "A Haven of Green Space" out of England defined the term 'place' as a meaningful location that incorporates three elements: Location, Locale/material setting for interactions and evoking of subject and emotional attachments. The Haven Green Space developed from a previous horticulture project that was well received and had positive results. (Chiumento et al., 2018). Understanding each student and knowing that there may be a need for other resources for a student's specific needs can help to assist in the creating the nature based classroom design effectiveness.

**Biological stressors and academic performance.**

Situations that take place outside the school and classroom can also create more of a negative outcome in addition to the situations that occur inside the classroom and school. These conditions can come from multiple sources that will affect behaviors that are displayed in the classroom environment and even interfere with perceived success for the student and many of them are not in the student's control. Domestic Colleges and universities, for example, require standardized tests for admission to their institutions. The effects of the test taking ability for the students must be considered given high-stakes nature of these tests and the factors that can affect them. Previous studies also claim that college aged students show that anxiety disorders have a negative impact on educational attainment (Rutkowski, Vasterling, Proctor, & Anderson, 2010). Students tend to score lower on standardized tests who come from a lower socioeconomic status (SES) as well as minority groups as compared to students in higher economic areas. Students from the lower SES areas have a higher likelihood of being exposed to stressful situations (such as inconsistent parenting, divorce, death, multiple forms of abuse, etc.) as compared to the students from a higher SES or even white students. Biological stress factors can affect test

scores. Stress factors can come from multiple situations such as school, home, neighborhood and these have effects on the function of stress related biological systems (Heissel, Levy, & Adam, 2017). The limbic system is the fight or flight system but also tells the body when to relax, (Arvay, 2018,pg 37). PTSD, for example, can be a factor that can contribute to poor concentration, intrusive thoughts as well as hypervigilance. PTSD has also been linked to poor working memory, and several other cognitive disorders and can adversely affect performance on test taking abilities. One prevailing symptom of PTSD can be avoidance of stimuli associated with the trauma causing an increase of arousal symptoms (leading to poor concentration). Adolescents with PTSD when compared to students without PTSD display lower academic achievement in the areas of math, reading and language (Rutkowski et al, 2010). Extended exposure to stress can also affect students ability to learn new material or accurately respond to specific cognitive tests including a standardized test. Stressful events can change how a student views the world such as how ambiguous events might be perceived as hostile. Effects of stress on arousal , attentional focus, and/or memory recall could differ if stress is intrinsic (if it is related to the test) or extrinsic (not related to the test), (Heissel et al, 2017). Studies have shown a relationship of exposure to violence in an urban community and how it affects school achievement in the areas of standardized test achievement and grade point average has a negative correlation (increase of violence leads to decrease in scores),  (Rutkowski et al, 2010). It is argued that students may perform better on tests if they feel challenged allowing them to feel energetic or alert. It can also be argued that students could perform worse if they are facing high stress on the psychological and biological situations (Heissel et al, 2017). Post-traumatic Stress Symptoms (PSS) can be linked to those who went through military combat, physical and/or sexual assault, child abuse, various disasters or accidents (Rutkowski et al, 2010). Students deal

with an evolved form of fight or flight from dangers in today's society. Prehistoric humans were in constant fear of being eaten by predatory animals, so their limbic systems were in constant stress mode. Just because those types of animals do not exist today does not mean that there are not metaphorical versions of the predator or perceived threat to their livelihood. For example, daily routines of the urban indoor environment can create intense levels of stress such as noise, traffic, school work, bosses, teachers/students, except running away from these problems is not an option and these stresses do not go away creating chronic stress overload problems.(Arvay, 2018,pg 38). Students with PSS may benefit from learning coping strategies in various forms of counseling or compensatory strategies (Rutkowski et al, 2010). Seasonal changes might also have an effect on mood as well as an improvement of grades and effort, in other words, the winter months sessions of the college courses had shown a decreased mood as opposed to the fall and spring semesters when the views were more colorful and vibrant (Benfield et al, 2013). Creating an area that has a Nature-based connection can allow for the therapeutic haven that a student needs to feel safe. Sometimes the safest place for a student is their classroom and connecting it to nature can show them there are more safe places for them to attend to.

**Environmental Education and benefits**

Numerous factors can interfere with students' education including limitations on curriculum teaching. However there are movements and studies that are showing positive effects of environmental education. In the United States there is a continuous struggle with the question of what Environmental education means in regards to that of an environmentally literate citizen and how to implement effective programs in the education field. One area to refer to is with the organization of the North American Association for Environmental Education or NAEE when it started the National Project for Excellence in Environmental Education in 1993. This was, in a

way, a response to the education reform movement of the late 1980's to the early 1990's. The

National Project's purpose was to establish guidelines for the creation of accurate and

comprehensive EE programs in relation to the national standards of core curriculum standards

that many states had adopted. Since this was a project that was funded by the United States

Environmental Protection Agency the guidelines were to adhere to a US audience only

(Simmons, 2005, pg. 162-163). Other countries have been using environmental education for

much longer than the US has with a focus on younger students. Germany and Scandinavia, for

example, utilize "Forest Kindergartens" and follow the approach that:

1. Nature provides avenues for increased curiosity and creativity.

2. Contact with nature fosters a more in depth appreciation for the
environment.

3. The Forest provides an area for students to build confidence and trust.

4. Children gain competence in social skills and more positive conflict
resolution (Heerwagen et al,2008, pg.164).

Due to a growing urban population of the current US lands there is a continual need for

environmental education. . Here, in the urban areas, threats of flooding, heat, drought and other

disturbances have been connected to climate change. Recent attention to EE in urban

environments combined with negative consequences of low access to nature has called for an

innovation in EE practice, (Fraser, Gupta, & Krasny, 2014). A rapid decrease in exposure to

nature (rapid urbanization) can be associated with chronic stress and poor mental health (Dreyer

et al, 2018) ,therefore, having access to green spaces and forms of nature is shown to improve

mental wellbeing of children. Greenspaces offer forms of "escape" in urban environments by

providing the restorative and relaxing properties accompanied by nature (Chiumento et al, 2018).

It has even been suggested that a new subfield course of "community EE" that can help facilitate EE in the direction of health and wellbeing for stressed areas or communities. (Fraser et al, 2014).

Urban development in the early twentieth century and young people losing opportunities with direct contact with nature had possibly brought to attention the need for creating the movement of environmental education, (Fraser et al, 2014). During the 1930's environmental education was viewed in public schools as a way to promote environmental agendas from the emergence of the "Dust Bowl Mindset" which also gave rise to the education in conservation, (Disinger, 2005, pg. 140). EE has been argued as a problem-solving, or even a behavior change in alignment with the 1977 Tbilisi Declaration in reflection to modern ideas of technical/scientific education. The Tbilisi Declaration stated that a responsible environmentalist human is one who is "aware of specific environmental conditions and motivated and capable of acting to ameliorate them". EE has propositions suggesting numerous potential for competing goals such as supporting school success, social emancipation, youth development, standards based practice, or personal reflective processes, (Fraser et al, 2014). The Webster dictionary states the study of ecology has several definitions: : 1:a branch of science concerned with the interrelationship of organisms and their environments **2**: the totality or pattern of relations between organisms and their environment, (Ecology, n.d.). Reviewing evidence in 2002 from a South Korean Middle School saw that a course in biology with a focus on teaching for environmental issues had enhanced motivation for learning more in environmental science. This in itself shows that developed curriculum, that includes current concepts, engaged students to practical experiences with ecological and environmental issues as well as foster those environmental connections.

Ecology and Environmental education may be related in educational approaches; however, ecology focuses on the science strand inside the field of EE. Ecology has concrete explanations in the field of environmental awareness whereas environmental education is a broader field of environmentalism with more diverse views. Even though Ecology is more science based and not exactly "for" the environment it does supply the knowledge needed to assist with the field of EE. Environmental Education needs science to help establish and solidify its objectives, (Barker & Slingsby, 2005 pg. 82-84).

Three approaches to environmental education consist of learning about ecological problems, outdoor nature education and education for the environment, (Fraser et al, 2014). A data-set compiled by Fraser et al had looked into unique environmental educational outcomes. Some of these outcomes were:

1. Environmental Sustainability ( Concern for environmental protection and natural resource conservation with the goal of teaching ecosystem protection.)

2. Place Based (Local natural resources where people learn to observe nature over time in their own community)

3. Spirituality (Focus on deep personal connection with nature causing an effective interconnection to the natural world)

4. Cognitive (EE is used as a tool to increase knowledge and understanding of the natural processes and systems, supporting critical analysis of environmental problems)

5. Collectivist ( Achievement of  positive societal goals, local or global, focusing on how nature teaches people to respect one another.)

6. Agency ( promotion of active citizenship, motivation to solve complex environmental problems),  (Fraser et al, 2014).

Several of these outcomes can also be linked to Bloom's Taxonomy of Remembering - recognize, Understanding – give an example , Applying – predict , Analyzing – relate, and Evaluating – conclude, (Using Bloom's Taxonomy, n.d.). Scholars in the field of EE research have argued that emotional involvement and personal experience are pivotal to knowledge and informed decision making. Educators must know that transmission or breaking down of information is not enough (Barker & Slingsby, 2005, pg.73).Teachers have come to be required to have to teach the what and the who as basic knowledge that the teaching standards required of them. With these standards, it is important to remember that children have unique learning styles that match their domains of development, which occur in an orderly sequence during their lives. These domains ( Physical, emotional, social, language and cognitive) change in a predictable way (Nurturing children's biophilia, n.d.).

**Summary**

Keeping in mind the varying degrees of obstacles that can be present in a classroom it is important to recognize them. Teachers may have to review ways to work with students who are diagnosed with these disabilities but also find ways to teach the students coping skills.  The concept of biophilia may be a hypothesis but it's research over the years has provided numerous ideas to assist in education and even therapeutic connections.  The concept of biophilic design has shown to create connections to the natural environment. Being able to connect to the environment can only be strengthened by having various forms of education in the field of environmental education. In chapter 3 puts in motion the question of How can I bring a nature-based environmental connection to at-risk students in a self-contained classroom? The chapter will talk about the intended audience, setting lessons to be used in the focus of environmental education, and ways to accomplish staff development for replication of this project for future

use. Included in chapter 3 is a small pilot assessment conducted on the students to see what

levels of connection they currently have to the environment.

## Chapter 3

**Methodology**

This Chapter will focus on the creation and use of the question: "How can I bring a nature-based environmental connection to at-risk EBD students in a self-contained classroom?" I wanted to make the setup of a classroom that can be of ease to the teacher as far as the logistics of cost and regulations were concerned. I also wanted to give a feeling of control to the students to allow them to have a say on how their classroom environment can be designed by supplying them with a topic and focus of the design. This was also done by giving the students the plan and allowing them to be creative with the outcome as the lessons progressed. I was committed to the aspect of environmental education and, based on my philosophy, "a classroom should have no walls" helped my motivation to take down conventional classroom design barriers. The main objective of this project was to design lessons with the district curriculum in mind and combine them with environmental education ideals. Another intention of this project was to eventually transform the classroom into biophilic designed theme with the work the students had completed visible throughout the classroom. I also felt that these lessons do not have to be limited to just one type of classroom, but rather every classroom dynamic can use this project. I wanted to also create an environment that students can feel safe in, relaxed and connected to allow them to "be away" without the need for lessons involving lectures.

**The audience**

The audiences to this project were both fellow teachers as well as my students. My classroom that I currently teach in is set in a public high school in an urban environment with approximately 300 students of a Hispanic majority in an area that is considered low-income compared to the surrounding towns. The students are part of a private school setting integrated in

the public school environment and these are self-contained classrooms.  The students have

several barriers that interfere with their learning and a majority of the disabilities involve one

form or another of emotional disability (emotional behavioral disorder or EBD). I, along with

two other teachers,  spread amongst three classrooms, teach in the behavioral program that

strives to teach these students to gain skills needed to return to the regular public education

population. The students in my classroom are with me for the entire day (7:30-1:45 Monday-

Friday)  A majority of these students live in an urban environment (low income apartments)

where plant life (such as wooded areas) are not as accessible to them even though they live one

town away from a rural area that is home to at least three nature preserves. These students come

from low income families and all have Hispanic nationalities. Using the idea that  biophilic

design features can also narrow socioeconomic differences (Heerwagen et al, 2008, pg. 147),  I

wanted to give the students inspiration to use this project and bring it to their homes, or at least

part of it.

The program that I am a part of is an actual nationwide private school program that is a

corporation owned education system with a successful behavior program. The teachers here are

trained in various forms of behavior modification but are always looking for new positive ways

to extinguish unwanted behaviors in order to prevent learning interruptions. Each teacher is

responsible for a separate classroom that is run exactly like the other classrooms with focus on

implementing routines, academic lessons in accordance with the public school curriculum as

well as the student's Individual Education Plan (IEP).  A student's IEP is a legal document that

has specific goals and objectives that are individualized to the student's various specific

education needs. Although  the demographics of students in the program are almost entirely

Hispanic, every student in the program has their own IEP. The other audience would be the

educators that I work with in my program but also for use with classrooms outside this program. This project does not and is not to be limited to use in a behavioral setting. I also wanted this project to be replicated for any conventional classroom.

**Project Description**

This project was a focus on environmental education and utilizing it in the conventional classroom setting combined with required district curriculum. To focus on environmental education and utilizing it in the conventional classroom setting combined with required district curriculum I based this project on the question of how can I create a nature-based environmental connection to at-risk EBD students in a self-contained classroom? This is a ten lesson unit that is designed to progressively transform a classroom into a nature based learning environment as the unit progresses. Lessons were themed for various forms of environmental education that allow for students to make connections to their environments. This is produced for the use in a high school level classroom but each lesson can be modified for younger grade levels as well. I focused on making as many lessons as hands on as possible. They involved how nature can actually inspire, teach and heal.

These lessons, all combined, hit as many subjects as possible. Sigurd Olson's book Listening Point was utilized as the introductory lesson. He described his discovery of his area of peace in the Quetico-Superior area in Northern Minnesota as "Listening Point". Olson talked about the land being a place where it invites stillness and taking in what is around us, (Olson, 2008). Olson's statement of "Everyone has a listening point somewhere", (Olson, 2008, pg 8), was a topic for a creative writing lesson. The lessons following the "Listening Point Lesson" are meant to progress in student designed artifacts that become added to the overall classroom appearance of a nature based environment. A writing lesson taken from an Aboriginal ritual

known as the Journey Stick. This offers a different modem of organizing their writing ideas and they can hang their completed stick in the classroom. This leads to a lesson in geometry in nature and they explore the idea of Fractals and they would decorate the room with Fractals they created from observed tree canopies. Following the fractals there is a lesson in tree aging techniques for creating a writing piece based on the history of the student's hometown from the timeline the tree was alive. A lesson on making elderberry syrup follows and compares over-the-counter cough medicine to connect herbalism and how modern medicine evolved. I also wanted to teach about healing power of nature and they will make their own elderberry syrup (really good and fighting colds). Another lesson in writing letters to local businesses were intended to create a stronger community connection as well as needed communication skills students in the high school level would benefit from in future endeavors. The idea is for the students to have done research into the natural environmental pieces they want to utilize and how to care for them. Another hands on lesson was designed involving algebra and geometry in making a hanging wooden pallet garden to teach the students to create a garden in tight spaces from recycled material. From there they will have a lesson to give them a sense of control with the plants that we acquired and use a blueprint with algebra and geometry to create a classroom design which will help finalize the classroom into a more natural feel. This helps the student develop a solution-focused strategy that shows the student has a deep insight into the nature of the problem. This should also have encouragement for the student to include PIES (physical, intellectual, emotional and social needs) (Barlex & Trebell, 2007). I felt that with their own knowledge and self-awareness of their emotions that they would look for a design that would best benefit them. One of the final lessons was for the students to research and design their own environmentally safe building based upon all the prior lessons that were administered previously combined with their own independent

research.  This evolved from the"Design-without-make" concept. Introduced by David Barlex.
This concept allows the students to improve their communication skills by collaborating, in
groups, by developing skills to design, (but not make) a futuristic product or even environment. I
had used photos from my Environment and Society Course where we had visited various
facilities such as a watershed building and Anderson Field and how they used the environment as
a focus of the design. These design of these facilities, suggested by Barlex, contained five types
of design: Conceptual (what sort of product is being made), Marketing (who or where is this
design for), Technical decisions (how the design will work), Aesthetic decisions (what the design
will look like) and Constructional decisions (how the design will be assembled) It should also be
considered that changing a way a design will work also affects how the design will be
assembled, (Barlex & Trebell, 2007).   This activity can be a complex form of presentations and
research due to the requirement that the designer (in this case the student) is required to create a
plan of something that does not exist. This required simultaneous attention to the numerous
aspects of detail he or she designs. It does follow a method similar to a scientific method much
like a self-designed lab report. Finally a vocab lesson to make their own healing magic wand
much like the journey stick lesson finishes out the unit. This time the students focused on
vocabulary and designing their own word based on a strategy known as the VERA (Vocabulary
Enhancement Routine for Academics) essentially allowing them to become "word-smiths" by
creating their own spell for healing.

Throughout the project the classroom becomes transformed into a "mini-greenhouse"
where the idea of six guiding principles of biophilic design can be implemented, (Burnard &
Kutner, 2015). I wanted the projected classroom design to work with theories of Attention
Restoration Theory, (Chiumento et al, 2018),and  Restorative Environmental Design, (Burnard &

Kutner, 2015).

**Curriculum Development Framework**

I eventually wanted to create a classroom that has the therapeutic based nature environment that the students create. I felt that if they accomplished the goals of each lesson of what they were doing and why they were doing specific skills it would be more meaningful to them. With this larger overall goal of the project in mind the curriculum framework was a backward design approach from the setup and ideas put forth by Wiggins and McTighe in their book Understanding by Design (2005). Wiggins and McTighe are quoted as saying "If you don't know where you are headed, then any road will get you there" (2005, pg. 43). I didn't want there to be any lack of direction. I feel that the goals of each lesson set forth would create guidance for the eventual creation of a classroom that has a nature based feel to it. I wanted students to have a focus by laying out the destination of what I wanted them to achieve which is a form of environmental awareness. As each lesson progresses it gives the sense of declination of where the unit plan eventually ends up. I followed   Wiggins and Mctighe's three parts to the backward design framework and they are:

1.    Identify desired results -Having my students achieve more connections to the environment through environmental education based lessons.

2.    Determine acceptable evidence- Completed projects and assignments by achieving desired results set out by given rubrics.

3.    Plan Learning Experience and instruction- Students will need to have access to items to set up the classroom, what lessons or how can the planned lessons be connected to the state and federal standards of the district, (2005).

There are required standards or guidelines implemented into the designed lessons. I

wanted  to adhere to Common-Core standards and the Next Generation Science Standards as much as I possibly could. The student lessons help to create an understanding that their nature based work  should be visible, communicated, and adaptable to their vision or needs, (Dreyer et al, 2018). I felt that the students should have an integral part in the design process of their classroom. This project focused on student based input with  pride in their set-up.  Construction and co-construction of students' own learning is seen as a key element that helps make learning in design and technology essential (Barlex & Trebell, 2007).  The Next Generation Science Standards (NGSS) have sections in the areas of Ecosystems and interactions and biological evolution with a focus on human impact on the environment. The most important standard I will use with my lessons will be the standard of the High School Environmental Science Standards-3 (HS-ESS-3) that holds the standard requirements that focus on Earth and Human Activity, (Read the Standards NGSS, n.d.). Giving the teachers a focus as to how recognized and required standards are able to be integrated really justifies the lessons used in this project.

**Summary**

Creating a  nature-based environmental connection to at-risk EBD students in a self-contained classroom was the focus of this project. This project was designed to assist in environmental connection for my students. The concept of creating a biophilic design wasn't meant to be created at the start of this project but rather have it evolve into the nature based design as the assignments progressed. The lessons that are used are compiled from other resources and researched ideas that allow for the students to have a large part in the design of their classroom. This way the healing nature of a biophilic design is taught to the students on how to design a healing biophilic environment that they can also replicate in different areas of their world.  I want this project to be replicated for long term use of this concept to the other

classrooms similar to mine or even other classrooms through the use of professional development. Each lesson can be modified for multiple grades and other lessons can be supplemented or added in as desired but this project had a focus on high school aged students. The following chapter will focus on the execution of the lessons and chronological design of the classroom throughout the spring.

**Chapter 4 Conclusion**

**Introduction**

  The past two and a half years with the Natural Science and Environmental Education program at Hamline University I have learned more than I ever thought possible. In the areas of environmental education, or my own teaching career for that matter, I had learned a multitude of benefits that I could bring to future students. This project is a culmination of years of research to help me narrow down my research question of "How Can I Bring a Nature-Based Environmental Connection to At-risk EBD Students in a Self-contained Classroom?" The purpose was to support my philosophy that a classroom should have no walls but also create a sense of belonging and a safe environment. The research was probably the most valuable piece to this project because I was able to use the information in more than just project design. I was also able to connect to other professionals in the areas I was researching. Chapter 2 I reviewed literature that was central to the ideas that I had. I used the research of the experts to help hone the skills strategies and information needed to create this project. I had created a 10 lesson unit that would help the students transform their classroom into the nature based design. Each lesson provides paths to critical thinking and understanding of why the student would be performing the tasks, most of which are hands on projects. It also includes lessons that will provide students with a tangible representation of what they have accomplished.

  This chapter reviews what I gained as far as my own learning through my research and development of the project.  I talk about how everything that I have gathered was beneficial to my own professional development as a teacher. There is a literature review where I show how the information in chapter 2 was utilized in the project. I included a section about the limitations I had foreseen as I created this project. Another section reviews how I can add on to this project

to create future projects. Finally, I talk about how I plan to share this research with colleagues and community.

**Learnings**

Throughout the compilation of this project I learned important dynamics of the whole research process. I never considered myself to be a researcher in any stretch of the imagination as a whole. In fact, before I started this journey to complete this project I felt my research skills were adequate enough to get me to my goals. I found that I was not as well prepared as I had assumed. From pinpointing a singular topic, then seeking out appropriate information by renowned researchers to unpacking the massive array of articles in the Digital Commons Database, I felt overwhelmed at first. Humbling as it was, I was grateful that I was able to use the extensive research that I gathered and took my time to utilize it in the correct context. This took less time than I had originally thought. I found that in my desire to teach in the field of Environmental Education had an innate motivation to want to learn more. What had started out as a daunting task had evolved into a work of passion. The previous researchers and experts in the field of Environmental Education has become the silent teachers who helped me stay on track but also help make connections to my current field of teaching.

As a learner to this I had decided to listen to the experts who had previously accomplished research papers and know that I needed to pace myself. I enjoyed the idea that I was not taking a role as a teacher but more of a student who explores areas that I would not have otherwise had the time or ability to be part of. I learned more about the healing aspect of Environmental education through icons like Stephen Kellert, and E.O. Wilson and their biophilia concepts. This led me to looking into other schools that are in my state that follow their teachings and designs. I also learned that even though the idea of nature based classrooms are not as

prominent in the United States as it would be in the European countries or Australia, they are starting to become more popular. Without having exposure to the information I had gathered I would not have become aware of these institutions that I was basing my research off of.

Writing is not my strong suit, although I enjoy it, I know that I am going to have to take a longer time to organize my thoughts. Waiting until the 11th hour was never something that crossed my mind, and I was glad that I had not. In fact this was unexpected because I didn't wait until the last minute for my thoughts were better organized. I was able to find information at calmer pace and not rush through something that I had wanted to take pride in. I was also able to look at how the language of the articles and sources of information I utilized to help me learn to become a better more informative research writer.

**Literature Review**

Even though this was the largest portion of my project I found this to be the most beneficial and even fun at times. I went in to each piece of information with a level of scrutiny so as to make sure that it was not going to be false or misinformed. The literature review gave me a chance to see where other researchers obtained their sources from, and it assisted me in tracking down more sources as well. I was able to research and review information on the fields of Environmental Education, Biophilia and its designs, specific behavioral disabilities and how nature can benefit many, if not all, learning abilities. Perhaps the most relevant sources was from Williams (2018).  I had relied on the UbD (Understand by Design) concept, (Wiggins, 2005), to not only design my actual project but also drive my research.. It allowed me to look at my destination as my focus of bringing a nature based environment connection to at-risk EBD students in a self-contained classroom. A focus was developed from the information of Barker and Slingsby (2005) when they referred to teaching for the environment and in turn led to the

works of Burnard and Kutnar, (2015).  Burnard and Kutnar led to me understanding how natural elements like wood and water would lead to learning opportunities of the environment. I was also pleased to find uses of research and articles focused on students who live in urban environments and the needs that existed for a more environmental connection, (Heerwagan et al, 2008). Browning (2016) said that workplace design can either impair production or with the use of environmental design can actually improve the productivity and health of the inhabitants. Having worked with students who have Emotional Behavioral Disorders, I wanted to utilize the ideas of Kellert and Wilson with the study done by Arvay (2018) where the use of nature improved anxiety and other mental functions. Creating the nature based environment and giving control of design to the students, similar to what Chiumento (2018) had discussed with his Haven Greenspace, helped me mold the project into the direction I had focused on.  It was with everything that I had found that there was indeed a connection to how a nature based environment can assist in my teaching. I used the literature to help me find out how the outside world can be a therapeutic source and offer a wealth of information.

## Limitations

There are schools around the country that have nature based classrooms and have reaped the benefits of that design of classrooms. The state of Connecticut has a very limited concept relating to the nature based classroom and most of those schools are limited to primary grades and little, if any, focus on upper level grades. Connecticut sets high standards for the education of students and with fire codes in conventional classrooms it makes it difficult to add many of the designs that see this project adds into a classroom setting.

Budget can also be a concern in regards to limitations. Plants are great to have in the classroom but they are not always the most cost friendly. This is the reason for the community

outreach lesson. In my experience when looking into the possibilities of obtaining funds I had a lot of kickback from members of administration and this was because they had a difficult time seeing the connection to the education of the students. Many local florists might not have plants ready to donate at times of the year when school is in session so it would be imperative to start this project at the beginning of the school year or even in the middle of spring. Finding a florist with a greenhouse that is open year round would be beneficial however, such as the case in my community there was only with a small greenhouse. However this was the greenhouse that was very willing to assist with the project.

Culture shift would be another limitation too. This might be due to the fact that I work in an urban low income environment and there has been little exposure to the natural world. Most of my students prefer to stay inside or play only their sports after school such as football or basketball. Although there are a lot of hands on activities in this project, this is up against a learned helplessness with my students. This will require extra time to break that barrier for them to accomplish their tasks. Students that I have worked with over the years have also had high demands for immediate feedback or results. This project is a process of gradual completion and this type of behavior can interfere with project completion.

**Implications**

Some implications of this project can lead to ownership of the environment. One example of the implication is that just showing the diversity of nature elements that the students can be exposed to the therapeutic benefit that nature can provide. Also the utilization of nature as a foundation can help students learn to foster a deeper connection to their natural surroundings. The lessons in this project can lead to connections and more critical thinking strategies and skill sets to assist them outside of the classroom environment. These lessons will also help with making that multi-curriculum connection with science, math, language arts and

the environment. Using a nature based design in a classroom can create that feeling of safety and comfort. Another implication that this project may instill is that it can lead to other class work being performed outside the building itself. These lessons can lead to a new sense of exploration of what is available to the students that they may otherwise overlook in the standard implementation of the district curriculum.

Another implication would be how a change in assessment could be implemented. One form of assessment that can be used was a style taken out of Geoffrey Mills' *Action Research: A Guide for the Teacher Researcher.* It was a combination of the teacher being a passive observer (looking for the reactions or behaviors the students had during the lessons, (2014). This will also give the opportunity to assess what worked and what could be improved on for future lessons. Looking at journal entries and writing pieces the students generated, for example, can show the awareness the students progressed throughout the lessons. This project has helped me to take a step back as a facilitator and assess how well the students were able to take charge of their own environment throughout the lessons, this way there is potential for a stronger level of ownership to the students' work.

These lessons can also demonstrate how guidelines laid out by the Common-Core State Standards as well as the Next Generation Science Standards can be versatile. Each lesson has a given rubric so that students will have access to in order to help them stay on task. Each rubric follows the same grading format of how they can earn points but it also gives them the ability to use it as a way to stay on task as well.

**Future Projects and Recommendations**

The idea of creating a nature based classroom leads the door to open for many other projects. For Example, I would like to work with the school social worker or school psychologist

and recommend they create an outdoor therapy area to run sessions and even take forest bathing field trips. This way, they are not limited to just having sessions in their confined office.  The relationship of working with the custodians to gather materials can assist in using recycled materials for future designs.  I also want to use administrations' support because I feel it would also help the school in creating an outdoor classroom that can be shared by all grade levels and abilities. I also think bringing in the skill set of many other teachers and experts in subject areas would assist in a more holistic environmental school use. The thought of using the outdoors in almost all subjects can help to design a multisensory approach to the different learning styles of the wide range of students.

I would like to involve greater community involvement in future projects. Becoming more aware of their own environment and what they have around them can help increase the sense of belonging and pride that might otherwise be overlooked if they were in the classroom. Looking at a pilot assessment I conducted I found that the students felt pride in what their environment should look like. I wanted to see, initially, how my students would respond to a simple assessment of their feelings towards specific environmental situations and places. The pilot assessment was conducted using qualitative data with two sets of photos.  The first set had shown several series of photos with every other one being a picture of a peaceful nature area (quiet wooded trails, oceans, brooks etc.). I also used a few pictures of their town such as the local rail trail and river. After each nature picture is a picture of an industrialized area (smokestacks, polluted waters etc.).  With each picture, a small list if emotions for the students to choose from that closely resemble how they feel (relaxed, happy, angry, sad, anxious etc.) was provided. For the most part, the results from this data collection were not surprising, one student who said that the water in the river was dirty and that it stresses them out. The picture itself did

not appear to be that of dirty water but the student recognized it as the river in the area. There are warnings not to swim in the water due to past issues with pollution. A fire at a waste-paper plant had invoked stress in the students because they vividly remembered how awful the air was to breathe that week (this fire happened over a year ago). The students were making connections (verbally) to the pictures of their town which made me think that they were already connected to nature-based areas.

Based on the findings of my research that I have had from this project I found that there is a need to implement more of the outside environment into everyday activities into the district. This work of a nature based classroom can benefit the wellbeing of the teachers as well. Another pilot assessment was conducted with another set of pictures on a template of varying building spaces (3 biophilic design and 3 conventional design) and they choose which classrooms they like best and explain why they chose that room(s) with details why they like it (was it the windows?, the plants, the type of plants? etc.) I feel this way they can display an innate connection to nature. I administered this to both students (where they would like to learn) and to the teachers (where they would like to teach/work). I was actually surprised as to how smoothly these pilot assessments went. The students had shown an almost tranquil state when they were looking at the pictures. Staff in the classrooms had also noticed a decrease in adverse behaviors for the rest of the afternoon with the students. The main theme that I noticed to the students was the word "relaxing". This I felt is important to my students because they are all considered behavioral and for them to pick out a place because it is relaxing tells me that they can form a connection to nature to help them learn as well as provide a therapy they desire. Most of the students had made the connection of how it would be to work in classrooms that had the nature-based connection to it. They had even verbalized how they wanted to just be in that room at that

moment. The descriptions as to why, Birds chirping, wind blowing, fresh air, oxygen, less stress etc. were a way for them to show the specifics of why they feel connected to it. They had been describing the "being away" concept as mentioned by Burnard and Kutnar (2015). The teachers wanted to partake in the activity as well. The teachers were observed having a sense of relaxation than implementation of instruction could also lead to less stress in these environments as well. Their responses were similar to the students, key words such as relaxing, bright, clean, light, and even how the fresh air could enhance student focus.

**Professional application and benefits**

I will be communicating my results through staff development opportunities with my administrators, co-teachers and assistant teachers. I plan to show the results of the student's work, the productivity they performed the assignments but also show the results of their behavior data. The idea that the results will hopefully demonstrate that changing a classroom design to a nature based classroom can offer the therapeutic benefits that may be lacking for what the student needs. Showing the results can demonstrate a positive reason to steer away from conventional learning terms and implement more STEM style activities in all classrooms. I think sharing my results with other education departments will give the opportunity to collaborate ideas and create more cross-curriculum activities in the school environment and create a stronger sense of community within the school itself.

I also want to communicate my results to local communities businesses as well. This way I can show how their contribution and involvement benefits the students in their community. The community would also include the parents as well because the skill sets that the students will learn from creating their own nature based classroom they can also utilize in their home as well.

The benefit to my profession with this project has allowed me to explore strategies on

how to teach environmental education. It allows my passion for this field to be exploited and expressed to my students and teach them ways to be custodians to the environment itself. This will give me new ideas to create hands-on lessons to the natural world with real world applications

**Summary**

I am excited to use this project with my students and actually see it in the full context of its use. I believe there is growth in recognition that a student must be involved in the learning process in order to have effective learning opportunities. This goes along with the idea that any environment that can engage a student in active learning should also be able to connect new information with existing information. I know that the lessons will offer long term benefits for the students to different situations. Allowing the students to be part of a unit plan that makes the connections to the environment into their classroom is a reason why I wanted to get into environmental education. I want these lesson designs to be used in every situation and I created them so that they can be modified. As long as I have been teaching, I feel that I learned more about myself as a teacher and even became more invigorated in what I wanted to do and teach.  I ultimately wanted to explore the idea of biophilic classroom design and with this project. Not only can I explore it, I can also create the classroom without walls that I have wanted  for  17 years.

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