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PROMOTING EDUCATION FOR SUSTAINABILITY THROUGH PLACE-BASED EDUCATION: A STUDENT LED AFTER-SCHOOL PROGRAM

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Abstract

Climate change is an unprecedented issue in that it is not only local, but also exists globally and impacts all of life on Earth. Without youth advocates and agents of change, the future progress of climate justice will be futile. However, before being able to become activists and allies for sustainability, students will need to understand the root causes of climate change, especially locally. This research focuses on the promotion of local sustainable resources through place-based education with the ultimate goal of engaging students firsthand in the need for critical environmental stances as well as how to become climate advocates. The overall goal is to engage students in learning experiences where they engage first-hand with the environment of their neighborhood systems. Without a localized understanding and appreciation for nature, students will not be able to embark on meaningful change and have lasting impacts within their communities and local systems. The purpose of this research is to use qualitative methods to improve student relationships with the natural world in local and global communities. I plan on implementing this mode of learning in my after-school club at the middle school where I teach, allowing students to learn about local systems in the community. The project specifically focuses on providing students with first- hand real-world experiences with nature through a raised bed gardening program. The perspectives and values gained will help further the goals of education for sustainability, developing students into active members of the community who care about their relationships with nature.

Table of Contents

Chapter 1

Introduction and Positionality

When I was an eighth-grade student, my science teacher created the most memorable project, one of which was a defining event in my young adolescent life. Every night for a month, I would go outside with my father to look at the stars and record my findings. On weekends, I would go to a nearby park with my friends, hang out, and discuss the constellations. I remember sitting in the bed of my friend's pick-up truck, sipping on milkshakes from Wawa, ecstatic because we saw a "shooting star," which I learned to be synonymous with a meteor. Years later, I can still identify some of the major constellations, tell the difference between a planet and a star, the difference between a plane and a satellite, and explain how and why stars twinkle in the night sky. One reason why this project was such a monumental learning experience for me was that I was not just reading or watching videos about the content, but rather, I was fully immersed and experiencing science first-hand. I was engaged with the world and nature, not just receiving information about the world. This project provided an opportunity for me to create memories with my friends and family in which we were learning through curiosity and asking questions together in the world. We were learning about nature through engaging with it firsthand.

As a science teacher, I have always been interested in the topics of environmental advocacy, sustainability, and climate change research, as well as how teachers can educate and shape adolescents into future environmental actors and advocates. My father, a doctor and science enthusiast, instilled a love of science and nature into my core values at an early age through our hiking trips, stargazing discussions, gardening, and harvesting our summer vegetables, amongst countless other experiences. While I am privileged to not have had firsthand

experiences of hardship due to climate injustice, I have always been interested in learning about climate change, its effect on nature as well as its impact on human existence.

Climate change will have significant impacts on every individual on our planet, no matter where they live, their race, socioeconomic status, etc. Everyone is negatively affected. Without youth advocates and agents of change, the future progress of climate justice will be futile. In my mind, one of the most powerful things that I can do as an educator is to prepare my students to become advocates for change and to educate them on the need for critical discourse. I believe that climate change is the most impactful threat that my students will face in their lives, and as such, it is my duty to promote critical discussions on how their lives will be impacted by it.

The middle school where I work is located in Downingtown, Pennsylvania; a middle-class suburban community. According to the National Center for Education Statistics (2020), in the school year of 2018-2019, the school had a student population of 80% white, with about 10% of the student population being eligible for free or reduced lunch. Here the topics of climate change, environmental sustainability, and environmental justice are not often discussed, even in science classrooms. Depending on the teacher, students briefly engage with sustainability and environmental education topics in sixth and/or seventh grade, and possibly in high school depending on the science courses they select. In our community, the topics of human-induced climate change are seen as political, making teachers hesitant to discuss it with our students out of fear of backlash.

However, our community recently learned that we are not immune to the impacts of global climate change. In the fall of 2021, our community was greatly impacted by the floods of Hurricane Ida. Many students and their families lost their belongings, businesses, and homes due

to the flooding. Many of the families who received the brunt of the destruction were in low-lying areas with cheaper costs of real estate, attracting people who have lower socioeconomic abilities. The flooding of Ida came at a time when the community was already dealing with the devastating health and economic impacts of COVID-19, further exacerbating the problem. As of Spring 2022, we still have numerous families living in hotels and shelters as a result of the flooding.

When originally thinking about my thematic concern and what topics I would like to focus on, I decided to poll my students about their knowledge of sustainability. As of 2019, about 90% of my students had not heard about sustainability and did not previously understand what it entailed. Many students thought that recycling and planting trees were the only actions they could take to help the environment, and did not believe that climate change was a significant issue since “4 degrees of a rise is not much” (an actual quote from one of my students). These discussions with my students, coupled with the lack of educational advocacy at an age in which my students are forming core values that they will hold as adults, allowed me to see the urgency of the issue and the need for meaningful environmental discourse and learning experiences. For my thematic concern, I will be focusing on the promotion of local sustainable resources through place-based education with the ultimate goal of engaging stakeholders firsthand in the need for critical environmental stances as well as how to become climate advocates.

Due to the many student misconceptions about climate change, the relatedness of the issue to my student's lives, and the many benefits that place-based education can provide, I decided to focus my thematic concern on place-based education for sustainability in the middle

school setting, particularly through a youth-led educational after school program. Specifically, I will be focusing on the creation of educational opportunities and experiences for students to learn about and engage with the systemic issue of climate change and environmental sustainability. This thesis project will address the preparation of students for life and world experiences, the evolution of environmental education in the United States, the benefits of education for sustainability, as well as how place-based education furthers education for sustainability. The mission of this club is three-fold: to inspire passion for, empower students to, and inform students on how to contribute to the health of local systems. I believe that middle school is one of the most impactful stages of a students' life because they are at an age in which their identities and passions are starting to be explored, and their future values as adults are beginning to be formed. Therefore, it is essential at this age that we introduce climate justice issues and guide our students towards awareness, advocacy, and action.

While I personally am very passionate and excited to learn about climate justice issues, I know that this is not the case for all students. Additionally, I know that as a classroom teacher, my control over the school curriculum and topics being taught is oftentimes related to standardized testing rather than student curiosity and interests. Due to these factors and other limitations imposed by standardized testing, I believe that in order for my thesis to reach its maximum effectiveness, it will need to take place in an after-school club where student choice, ownership, leadership, and authentic engagement are not only possible but also valued. Due to the nature of being a club, there will be no standards or curriculum guiding the learning experiences; instead, students will have a voice for what they learn, how they learn it, and how they will apply that learning. Additionally, by taking place in an optional after-school setting, the opportunity for place-based educational experiences becomes more possible and realistic.

To engage students in environmental sustainability causes, it is important to first engage them with the local systems, including environmental systems. Focusing the club around environmental place-based opportunities, students are able to learn and grow their environmental values and ideas directly in places of impact. Students will be provided with opportunities for authentic curiosity, as well as meaningful conversations and questioning, through different aspects of community and "getting their hands dirty." Through these learning opportunities, students are promoted to critically analyze, question, engage with, and understand the challenges of globalization and climate injustice. Sustainable education promotes and shapes a future that is willing to and has the tools necessary to face these challenges and hopefully mitigate its harm. By engaging our students with environmental sustainability, the club will be providing students with opportunities to become more active in their communities, promoting voice and agency in their local systems.

Focusing the club on environmental place-based opportunities involves students explicitly with the system which they are seeking to learn about. The learning of local systems will be attainable to our students because the goals and perspectives are distinct, known, and measurable. These interactive learning experiences are beneficial to students because they allow for the formation of personal connections and memories with the learning. As a result, the learning process becomes more real and relevant because students are actively involved in the creation of knowledge. There is no one in power forcing the content upon students, and instead, students are fully immersed. Students are able to pose real-time questions, participate first-hand, and reflect upon the actions seen together. According to Adams and Savahl (2017), involving oneself with nature, particularly for children, helps to develop deeper critical thinking skills while additionally allowing for creative experiences that they can apply to their future successes.

Learning in and with nature additionally has multiple benefits cognitively, physically, and mentally.

Climate change is a unique and unprecedented issue in that it is not only a local issue but also exists globally and impacts all of life on Earth. Before being able to become activists and allies for sustainability, students will need to understand the root causes of climate change, especially locally. In my opinion, the best way to accomplish this goal is to promote learning experiences where students are engaging first-hand with the environment of their neighborhoods. Without a localized understanding and appreciation for nature, students will not be able to embark on meaningful change and have lasting impacts within their communities and local systems. The purpose of this research is to use qualitative methods to improve student relationships with the natural world in local and global communities. I plan on implementing this mode of learning in my after-school club at the middle school where I teach, allowing students to learn about local systems in the community. The perspectives and values gained will help further the goals of education for sustainability, developing students into active members of the community who care about their relationships with nature.

Chapter 2

Thematic Concern, Conceptual Framework, and Definitions

THEMATIC CONCERN:

It has increasingly become apparent the impact of human-induced global climate change on all environmental, social, and economic systems in humanity's present and future. Climate change poses one of the greatest challenges to humanity and its future. As we face environmental, biological, and social catastrophes due to climate change, it is essential that future generations are prepared for the real threats they will face. As such, it is imperative that schools provide a forum to discuss environmental justice issues and guide students towards awareness, advocacy, and action. Through education for sustainability and place-based education, students learn about the values of the active citizenry as they develop into well-educated individuals, facing the challenges of today and tomorrow. The purpose of this thesis is to create an after-school program that provides educational opportunities and experiences for students to learn about and engage with environmental sustainability through a localized and community-centric approach. The goal of this program is to instill affection for Earth and places in it, fostering empathy for environmental systems and the desire to take care of them.

CONCEPTUAL FRAMEWORK:

1. How can we as educators prepare students for life and world experiences in a democratic society?

2. How has environmental education in the United States evolved over time, and what successes and limitations did those educational practices have within and outside of the classroom?

3. Is the teaching of education for sustainability possible, practical, and beneficial in today's education system?

4. How can educators promote education for climate sustainability through Place-Based Education? What are the benefits and implications of Place-Based Education?

DEFINITIONS:

Constitutive:

Banking Model of Education	"Knowledge is a gift bestowed by those who consider themselves knowledgeable upon those whom they consider to know nothing…the educator's role is to regulate the way the world 'enters into' the students. The teacher's task is to…'fill' the students by making deposits of information which he or she considers to constitute true knowledge" (Freire, 1993, pp.53-57).
Climate Justice	The idea that global climate change affects different populations (geographic populations, socioeconomic groups, cultural groups, etc.) disproportionately. Poor and vulnerable populations are believed to be affected greater than other populations. "Climate justice insists on a shift from a discourse on greenhouse gases and melting ice caps into a civil rights movement with the people and communities most vulnerable to climate impacts at its heart" (Robinson, 2019).

Education for Sustainability	"ESD gives learners of all ages the knowledge, skills, values and agency to address interconnected global challenges including climate change, loss of biodiversity, unsustainable use of resources, and inequality. It empowers learners of all ages to make informed decisions and take individual and collective action to change society and care for the planet. ESD is a lifelong learning process and an integral part of quality education. It enhances the cognitive, socio-emotional and behavioural dimensions of learning and encompasses learningcontent and outcomes, pedagogy and the learningenvironment itself." (UNESCO, 2022, para. 1)
Environmental Education	A form of education aimed at building "a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones" (Tbilisi Declaration, 1977, p. 3)

Place-Based Education	"Place-based education is the process of using the local community and environment as a starting point to teach concepts in language arts, mathematics, social studies, science, and other subjects across the curriculum. Emphasizing hands-on, real-world learning experiences, this approach to education increases academic achievement, helps students develop stronger ties to their community, enhances students' appreciation for the natural world, and creates a heightened commitment to serving as active, contributing citizens. Community vitality and environmental quality are improved through the active engagement of local citizens, community organizations, and environmental resources in the life of the school" (Sobel, 2004, p.7).
Problem-Posing Model of Education	"In problem-posing education, people develop their power to perceive critically the way they exist in the world with which and in which they find themselves; they come to see the world not as a static reality, but as a reality in process, in transformation" (Freire, 1993, p. 252).

Systems-Based Thinking	"An understanding of how the different components and stakeholders of a system interact and impact each other. Systems thinking goes further than mapping key stakeholders and institutions, and includes analysing formal and informal interrelationships, and how they influence the functioning of a system… it recognises more complex interdependencies and how multiple components may affect each other in different ways. It also helps to differentiate between the underlying issue and the symptoms of something deeper" (Ndaruhutse, Jones, & Riggall, 2019, p. 13).
Transformational Education	A focus on personal and social change, specifically with regards to ecology and system interdependence and interrelatedness with the environment. As a result, a transformational position views social change as one in which humans are in harmony with environmental systems, rather than in control of them. (Miller & Seller, 1985)

***Operative*:**

For the purpose of this paper, the following definitions will apply

Active citizenry	Providing educational opportunities that empower students to become active participants in their own communities and local systems. Providing the tools, knowledge, and skills necessary for students to transform their own worlds.
Critical Pedagogy	Developed by Paolo Freire, critical pedagogy is a method of education based on the value of freedom, where power structures within society are analyzed and questioned with the ultimate goal of liberation from oppression.

Chapter 3

The Narrative

Wake up in my room box. Take the bus box to school. Sit in my seat: the second chair in the third row of the classroom box. Be fed information from the keeper of knowledge. Spit out the information on a test. Go to my home box. Regurgitate information onto my homework worksheet. Watch my television box. Go to bed in my room box. Repeat.

This is a typical day in the life of millions of students in the American education system and has been since the mandatory public education system was put into effect by state governmental agencies. Since its inception, little has changed—students are provided information by authority figures, take tests on said information, and repeat until they are deemed capable citizens of the American capitalistic workforce. Stuck in cages, confined to small, indoor spaces, unable to engage with the world around them, students are prepared for a life lacking the most important quality: being human in, with, and of nature. According to Uhl and Stuchul (2011),

> Though we are one with Earth, all too often we live in isolation from Earth--separated into boxes, conscripted to the hollowness of 'economism,' deadened by objectivism, deluded by speciesism. In short, we live blind, deaf, and mute to the wonders of life. (p. 183)

As someone who has experienced the game of school through the lens of a student and a teacher, I believe the purpose of education in today's free, democratic society is the reciprocal experience of growing fully as humans and transforming our society towards the regeneration of knowledge in, with, and of planet Earth.

Preparing Students to be Human:

Reconstruction and Transformation Through Life and World Experiences

According to Freire (1993),

> To be human is to engage in relationships with others and with the world. It is to experience that world as an objective reality, independent of oneself, capable of being known. Animals, submerged within reality, cannot relate to it; they are creatures of mere contacts. But man's separateness from and openness to the world distinguishes him as a being of relationships. (p.3)

Our role as humans is to continually change, reflect, grow, and adapt. Education is a powerful force because the values taught and the experiences provided will become the experiences, values, and understandings of future societies. As argued by King (1947), "Intelligence plus character—that is the goal of true education" (para. 6). The role of a teacher is to guide students' authentic learning experiences with the ultimate goal of the co-creation of humanistic transformation and rejuvenation of world-systems together.

The world of the present and future is largely interconnected ecologically, technologically, economically, and socially. As such, the classroom community should not be seen as separate from the world and should be directly connected to, impacted by, and have an impact on the communities in which they take part. Teachers and students alike engage in the struggle of becoming more human through recognizing the humanity around them and must be involved with community affairs to understand their fellow community members. When students become active community members, they learn the tools necessary to question various community systems in place. Places of education must value and promote the struggle of democracy in communities and the world-at-large through questioning the systems and structures of local and global societies. These experiences include open and free dialogue, the promotion of

questioning through critical analysis, learning and growing through making mistakes (rather than being reprimanded for errors), and learning about the world through interconnected world lenses.

Schools need to have an invested interest in the overall life and wellbeing of their students, not just in the test scores, grades, and data points. Educational systems have the responsibility to prepare students for life and world experiences. This includes the knowledge of current practices through experiencing humanity firsthand. To be authentic and meaningful, learning experiences in schools should promote positive relationships with others, with nature, with the community, and with the world. Students must have opportunities to discover and explore their world, including aspects of identity such as passions, social beliefs, ethnic ideals, etc., with the ultimate goal of being aware of the world and their place in it so that they may transform their systems of involvement and shape their own realities. By promoting an awareness of the intersectionality of society and of the multiple aspects of identity and place in, with, and of the world, students are able to view the systems within the world through a critical lens. When we can comprehend the world, we can engage with it and transform it.

Education should be a microcosm for the community at large—one in which reconstruction and transformation are not only accepted but encouraged to flourish through experiencing humanity and the interconnectedness of humanity with the world. Marx, as cited by Engels (1888), argued that "philosophers have hitherto only interpreted the world in various ways; the point is to change it" (sec. XI). An important aspect of education for reconstruction and transformation is developing the awareness of identity. Students need to be aware of the world and their own place in it in order to change it to fit their needs and values. This includes embracing diversity and learning about differences in cultural backgrounds, values, and

practices. It is additionally important to pose questions and critically analyze these backgrounds in order to help shape identity and self-awareness in the world. We must first comprehend ourselves and the world and engage it before we are able to change it. The school system should be a major promoter of this search for self-awareness and identity through student-led discovery-based experiences that allow deep learning based on the selection of and engagement with passions and interests.

The role of education should be one in which learning is centered around the student-led choice of subjects of interest and where students can explore their passions. Students must have the freedom to learn, not freedom from learning. Saying this, students should learn how to think for themselves so that they may avoid relying on others for ultimate truths and knowledge. The ultimate goal is to promote questioning the world systems around us and changing them as such. Learning should be a social experience that has multiple modalities and takes the form of different types of experiences that may be faced in the world. If the goal of education is to prepare future generations of the world to be able to interact and change the world, authentic learning must take place. It is believed that a free person owns their ideas; an educated person is owned by them. While this holds true in our current model of education, an educated person should not be synonymous with one who has subordinated to outsiders' views of the world.

To own their ideas, learning can only take place when students are actively involved with the process of choosing the topics of interest and engaging personally with the learning experience. Curiosity should be the driving force of education in an environment of reciprocal trust between the student and teacher. By promoting choice within the sphere of education, students are able to connect ideas across subject areas and form authentic connections to the

learning. Rather than learning through rote memorizations, students are able to analyze, critique, and question the learning through the interconnectedness of topics and of the world. Students should be learning through engaging fully with the topics through real-life experiences, not simply having the content placed in their heads by external sources. By engaging with learning experiences fully, students are able to learn and model the skills necessary to become empowered humans in transforming the world with the end goal of becoming actively involved in the reconstruction of their own realities and of the world around them.

The core model of education in a just society should be centered around the value of empowerment; promoting activism, proactivity, and critical consciousness of the world around us. Reality must be shaped by the people, not for the people. Saying this, it is essential that we critically analyze and see the world for what it really is, not just seeing it as a product of others' decisions, but rather, a dynamic product of our own realities. Through interacting with the world, students become actively involved with and of the world, not merely in the world as passive bystanders. As teacher leaders, we need to encourage our students to become actively involved in this transformation as subjects of history, not objects of history. Schools should teach that the world is ever-changing, and it is the role of future generations to reconstruct and transform the world, ensuring a socially-just society, one in which citizens expect and accept nothing less.

Philosophy of Education from a Critical Perspective

Education is the cornerstone of a successful liberated society that promotes and maintains humanistic values. Because education impacts the world views of future generations, it can serve as a powerful weapon, one that promotes oppression or freedom. Throughout history, it has taken up both sides of that sword.

As educators, it is our responsibility to provide students with the tools, experiences, and opportunities to critically become aware of the world around them, with the ultimate goal of promoting free-thinking and providing the empowerment and agency necessary to become activists in their own lives. In order to accomplish these goals, education must become a space where students question the values, attributes, and identities that are promoted by a societal collective, and who benefits from the promotion of those features. This includes becoming aware of their assumptions of the world around them (conventional wisdom, societal norms, societal messages, intentions behind actions of authority, etc.). Some examples of assumptions regularly internalized by our students and society at large include but are not limited to assumptions of beauty standards, assumptions of material success, assumptions of happiness, assumptions of power, assumptions of career growth, etc. As some of my students would say, the assumptions of "life goals." While our society promotes countless assumptions, it tends to fall behind on questioning why those assumptions exist, how and why individuals and collectives may both benefit from and become harmed by them.

As Apple (2013) suggested, education has the power to transform the lives of individuals and to shape a community to embody the values of love, solidarity, and social justice, with the goal of creating a more "responsive and respectful society" (p. 3). For education to become transformative, the agency, creation, and ownership of knowledge must come from teachers and students alike. Freire's (1993) problem-posing education theory serves as a model due to its emphasis on instilling a liberating critical perspective of the world through discourse and reflection, where students are engaging directly with the learning. Education should embody this theory, promoting a two-way relationship between the teacher and the student where both participants are seen as the keepers of knowledge and therefore have something valid and valued

to bring to the discussion. In this sense, students have the tools to become independent and critical thinkers, understanding that knowledge is not simply given, but rather, worked upon, changing, transforming, and authentic. Knowledge is learned in the form and context of reality while humans are understood to be changing and transforming in relation to the world, with the world, not just in the world. Therefore, comprehension of content is critical and connected to reality, no longer alienated and static. When students engage in this form of discussion and reflection, it allows them to become the creators of knowledge through curiosity, furthering their humanity.

Education should be an exciting and passionate experience for students, one which inspires them to act and think critically about the world around them with the ultimate goal of freedom and liberation. The educational experience should promote authentic curiosity and questioning while centering around the freedom to authentically learn. By freedom to learn, this means that there should not be restrictions on learning experiences forced by outsiders. Curiosity should drive the learning experiences, allowing for the interconnectedness of topics of inquiry and content.

When curiosity is the driving force behind learning, students can be subjects in, of, and with the world, not simply objects in and of the world. Schools have the responsibility to serve as a model of a participatory democratic society for students, one in which lies a mutual relationship of creating and sharing knowledge, a two-way street, rather than simply the presentation and regurgitation of information. As Freire (1993) stated, “knowledge emerges only through invention and re-invention, through the restless, impatient, continuing, hopeful inquiry human beings pursue in the world, with the world, and with each other” (p. 53). By teaching

students to become active participants in their world, it prompts important discussions and questions of the systems that society at large currently holds in place, how to survive in a present-day world, in addition to being able to live comfortably within that world. For example, discussing with students current financial systems such as the spending of money for commodities, how to write checks and set budgets to maintain financial stability, etc. are important conversations to have in schools, but it is equally important to teach about why those systems were put into place and how those systems have an impact on communities. When we teach students to become subjects of the world, they can question why these systems were put into place in the first place, who benefits from these financial systems, and whose freedoms are limited as a result of these systems.

Through teaching students to be subjects with the world, learners have the ability to speak out about injustices in the world to transform the world. A continuation of this theory would focus on the importance of not just a human approach, but also a dialectical approach that sees in interpenetrations between human social nature, human biology, and the rest of nature. For example, where do the goods that are purchased come from? What are the living conditions of the people who create those goods? What are their working conditions? Are the items sustainable in nature, and what byproducts do they produce? How did this product reach me, and what was the effect on Earth from its delivery? Where did the money I spent go to, the individuals who worked hard to create the good or a corporation that funds systems detrimental to human health and societies? However, even though these are questions that I may have and that I may ask, it is equally important that the students are involved in the asking, sharing, answering, and analysis of these questions so that they may form a direct connection to the task-at-hand.

The Downfalls of the Conventional Classroom

Education is a powerful tool in society, one that promotes the values and perspectives of those who are in power. In Pedagogy of the Oppressed, Freire discusses the role of education in shaping and maintaining an oppressive society through the taking away of a person's ability to think, reflect upon, and discuss the world around them. According to Freire (1993),

> Education either functions as an instrument which is used to facilitate integration of the younger generation into the logic of the present system and bring about conformity or it becomes the practice of freedom, the means by which men and women deal critically and creatively with reality and discover how to participate in the transformation of the world. (p. 34)

In America, our educational model facilitates conformity due to its focus on curricular standards and test scores rather than high-quality learning experiences.

Historically, the educational model that is used today dates back to the industrial revolution, where students were given information and tested on it with the ultimate goal of preparing them to become "proper" workers in factories who understood how to listen, take instruction, and apply it to their work. Since its inception, not much about public education has changed. Students still sit in rows facing the board and are fed information by their teacher, which is recalled and later forgotten for the unit test. If we want schools to promote participatory classrooms that value true democracy, the current model of education has to change drastically from its roots. Magdoff and Williams (2017) stated:

> If we can't even imagine a different way of interacting with one another, the economy, and the resources we use and depend upon, then the struggle for a just and ecologically sound world recedes into the realm of utopian fantasy. (p.18)

Currently, the widespread model of education and teacher preparation has a slight goal shift with a focus on the training of students to become active consumers who are prepared to work in a

hierarchical capitalistic society. With advertisements being placed in schools and school-sponsored events, including sporting events and fundraisers, a consumer obligation is promoted as the path towards success and happiness. This model serves the purpose of those in power, but not the purpose of the betterment of humanity.

Part of this issue ties in with grading. Most students, parents, and educators alike believe that if you don't get an A or a B, you are not a good student. Success in the education system is extremely authoritarian and oppressive—you are a successful student only if you follow rules and do what you are told. That is why it is called behavior management—education's goal is to force students to fit into a mold so that they become manageable workers. Any time that you do not fit that mold, you are seen as a problem, removed from the regular classroom, and forced to learn how to better fit the mold. As Chomsky (1989) argued, "education is a system of indoctrination of the young." Schools create educated people, but they rarely create free people. If you are successful in the educational world, you are good at playing the game of school—following rules and doing what you are told. You do not question, you do not reflect, and sometimes, you do not even speak. We are not creating future generations of humans; we are creating future slaves.

A large part of authentic learning and of being human is making mistakes, reflecting, and learning. Schools constantly push for students to be college and career ready, but we don't prepare our students for the world and to be human. Making mistakes is punished, reflection is rarely welcomed unless it increases test scores, and learning is meaningless unless it is on a test. The reward of learning is no longer growth and transformation, but rather, the grade. The external reward has become much more important than the learning, and there is no point in

learning unless there is an extrinsic reward. In my own classroom, my students continually ask me whether or not something is graded, and do not want to engage with the learning unless a grade is to follow, no matter what the activity is. Grading and standardization downplay the importance of intrinsic rewards, internal motivation, meaningful reflection, and praxis.

By standardizing the educational system and basing learning on growth in assessments, we are continually preparing children for the next test and the next step in education. Students are taught that learning is only important for the test, not for the act of learning and improving humanity. They are not living nor learning in the moment, nor are they enjoying the learning process. There is no true nor meaningful purpose to the learning, teaching students that learning, questioning, and critical consciousness are not valued. Due to testing, what is seen as meaningful learning occurs only in the classroom setting and rarely in the real world and through experiences with society. Humanity is removed from the classroom—teachers and students feel powerless in the doctrine of standardization. They are unable to be creative beings and must shape themselves to fit the educational system, one which was created and implemented by people who have been successful in the current model of education.

Content is created by outsiders to the educational process, oftentimes connected to larger corporations with the goal of creating passive consumers. Learning and reality are mass-produced for us, not by us. These outsiders were successful in the current model of education and therefore refuse to make any meaningful transformations to improve the system. Changes that are made are oftentimes done so with the purpose of fitting the need within the outsiders' political agenda, furthering their control over future generations. According to Rousseau (1968), "man is born free and everywhere he is in chains" (p. 1). By restricting and mandating content

taught in schools, they are able to socially control the ability of future generations to ask questions, critically analyze society, and transform their own realities. Students become reactive bystanders, rather than proactive up-standers. The system is rightfully blamed for it, but no one admits to any fault, nor is anyone willing to transform the system. This only furthers the oppression and lack of true learning for our students, dehumanizing future generations into inactive passivity and submission. Students essentially are seen as creatures devoid of thoughts, opinions, and questions. They are simply told what to know, what to do, how to think, and to never question the system if they want to be successful.

For students, being able to get to the next step is the only important aspect of life, a mindset that carries into adulthood. After high school, you must go to college. After college, you must get a job. Then get married. Then get a house. Then get a dog. Then have kids. Then send your kids to college. Then… Then… Then… When does it end?! This carries into consumerism as well, with the general population continuously looking for the next "big thing," newest gadget, etc. We are seeing many adults who have difficulty with being present and mindful. People currently are living of the world, setting future goals continuously. It is rare to meet someone who is in the world, active and present in their mindset today.

One of the newest problems that are posed not just in education, but in society today, is the increase of digital technology. Digital technology introduces both benefits and drawbacks to the student learning process and is especially dependent on how the technology is utilized—whether it is based on sound pedagogy, and if the use of the resources is purposeful. While I do believe that overall technology poses many more benefits than drawbacks, there are still valid and dangerous problems included.

Digital technology can take away from the importance of creating, developing, and maintaining meaningful in-person social relationships. When hiding behind a screen, students do not learn the tools necessary to understand emotions, empathy, and in-person conversation. People lose their humanity and become controlled by the devices in their pockets. Additionally, due to the rise of social media and continual connection to the outside world, any problems that occur outside of the home are able to continue online/at home and vice versa. Cyberbullying has become a nationwide epidemic, and we are only now beginning to develop tools to teach students about utilizing technology in positive and responsible ways.

Mueller and Oppenheimer (2014) found that when placed in a traditional classroom (lecture style, encompasses the banking model of education), especially without a specific purpose, digital technology is less beneficial to student learning due to more shallow processing. This essentially takes an already meaningless learning experience and makes it even less purposeful. Additionally, due to the nature of digital devices, they oftentimes can be a distraction socially and academically. Information is readily accessible, allowing students to have immediate responses to their questions that are accepted as the ultimate truth. Rather than having to think, question, or analyze, students can just ask Google or other external sources. There is no need to learn if you can just find the correct answer to your question online.

While there are many different efforts in schools nationwide to increase "authentic learning" and encompass multiple learning styles, the standardization of content degrades the quality of education. With a focus on standardization of learning through assessments and curriculum, we have become teachers for data analysis, rather than teachers for humanity. "Progress" has replaced learning. We push our students to be college and career ready, we make

huge spectacles out of taking standardized tests, and we boast about having technology in the classroom, yet we forget about the true purpose of education—to prepare future generations to be social, compassionate and critically aware human beings who are willing, able, and excited to transform the world.

Standardization of content serves to further the interests of those in power due to its embodiment of superficial learning and the lack of true questioning, agency, listening, critical thinking, and awareness of the world and Earth. Additionally, because funding is based on test scores, it furthers cycles of oppression, allowing those in power to maintain the hierarchy of power. Education is seen as and treated as a business, hence the push for privatization and "school choice," allowing the choice of schools to the privileged few, while segregating those who are not privileged to what are deemed "lesser" schools. The inequity of funding furthers this cycle of power because of the continued investment in students who are more privileged, and therefore, less investment is accounted for students who come from "disadvantaged" backgrounds. When we fund based on property value and property tax, schools in poorer neighborhoods need to tax at higher rates, furthering a cycle of oppression and making it more difficult for schools to improve. This creates a vicious cycle of poverty and violence, promoting a school-to-prison pipeline because students' basic needs are not being met. When we have funding based on test scores, students, especially those who are most impacted by climate change, are stuck in cycles where they are not engaging with, learning about, or reaching awareness of the systems at play that is causing their suffering and oppression.

In conventional classrooms, content is posed in abstract ways outside of the spheres it influences, allowing for no true connections to be formed. Students who receive knowledge from

their teachers memorize the content, taking in information, but scarcely reflect upon nor question it as they recite it for the test. To help prepare students for the standardized tests, we take away discourse and reflection, replacing it with more testing and "data." If the student cannot conform to this system, they are labeled as disabled and are taught skills to conform to the system.

When and if climate change is taught in the classroom, this is the form it takes. No true discourse or reflection climate change is taught indoors in abstract means, rather than in the outdoor environment and engaging in the spheres it influences. There is no connection to Earth when we are stuck inside the confines of a classroom, as indoor space directly separates us from Earth. Therefore, we are raising indoor children who are unfamiliar with and sometimes afraid of the environment around them. This is the direct product of our indoor educational model, one in which students lack the experiences to comprehend the world around them.

As such, schools are creating generations of students who are stuck in their individual systems, with little hope of overcoming their own oppression and transforming their worlds. When there is a lack of agency in school, there is a lack of individual freedom and democracy, as students are treated as inanimate objects. Humanity is taken out of education when we focus on standardization, test scores, and data. This can be furthered into a lack of hope with, in, and of the world. Students have no true experience with decision making, knowledge-making, ownership of actions, and true thought, they only have the training to become proper workers who are told what to do, how to do work but never question why. We are left with a generation that is told to stand in line, sit in your seat, be quiet, raise your hand, never question, and always behave by not "causing issues" or becoming activists.

The systems of education ensure that the current capitalistic society will continue while producing a submissive generation of workers. Schooling serves the purpose of those in power, but not necessarily the purpose of the betterment of humanity. The system of education ensures that the current capitalist system will continue while producing a submissive generation of workers who lack analytical and critical experiences. In his book, *Can Education Change Society,* Apple (2013) states that in neoliberal education models, education is "seen as simply factories producing test scores and docile workers… it opens a space for certain identities and closes down others. It gives people one option of who they are. They are consumers" (pp. 4-7). Essentially, this is authoritarianism through capitalism, a system that creates those who have and those who have not, with materialism and wealth being the haves, ignoring culture and democracy which are the have nots. According to Freire, Clarke, Macedo, and Aronowitz (2001),

> I must respect the autonomy, the dignity, and the identity of the student and, in practice, must try to develop coherent attitudes and virtues concerning such practice is an essential requirement of my profession, unless I am to become an empty mouther of words...reflecting on the duty I have as a teacher to respect the dignity, autonomy, and identity of the student, all of which are in process of becoming, I ought to think also about how I can develop an educational practice in which that respect, which I know I owe to the student, can come to fruition instead of being simply neglected and denied. (p. 41)

The present form of education encompasses what Freire calls the "banking model" of education. In Pedagogy of the Oppressed, Freire (1993) describes the banking method of education as "an act of depositing, in which the students are the depositories and the teacher is the depositor" (p. 53). Teachers take information, fill the minds of students with it, and assess shortly after. Emerson (1883) described the realities of the banking model, "We are students of words: we are shut up in schools, and colleges, and recitation -rooms, for ten or fifteen years, and come out at last with a bag of wind, a memory of words, and do not know a thing" (p. 594). There is no real

or long-term learning taking place, just simple memorization, recitation, forgetting and moving on.

Unfortunately, classrooms that are based around the banking model of education, as most westernized classrooms are, do not respect these values and instead respect the systems of power and authority of the teacher. Schools should serve as models for the world, allowing for authentic questioning and reflection. “The more we practice methodically our capacity to question, to compare, to doubt, and to weigh, the more efficaciously curious we become and the more attuned becomes our good sense” (Freire et al., 2001, p. 41).

To improve democracy and freedom within our society, we need to relinquish our need for power and control and to allow our students the right to curiosity. “Genuine freedom, even rebellious freedom, in this context is never seen as a deterioration of order” (Freire et al., 2001, p. 66). When taking a critical pedagogy approach, according to Apple (2013), education “offer[s] ways of organizing curricula and teaching in powerful and personal ways, ways that call forth the voices of students and teachers as co-responsible subjects” and people are able to “build schools for their children to keep their past alive and to build a better future...all of them see people, not as consumers...but as co-responsible subjects collectively co-creating a present and a future” (pp.8-9). Through education, individuals are able to question and critique society, remembering and engaging with the struggles that have shaped the present to create a better future for all.

Politics and Education

Humans are present as biological, historical, and cultural beings. Because of this, knowledge is also historical, cultural, and political, and therefore, we cannot separate education from history or politics. Education favors the history of those who hold the power, silencing the

people and voices that do not hold the power. A critical perspective will provide a stage for those silenced voices, while also reflecting on the knowledge shared. It provides multiple modalities for knowledge as well: cultural in addition to what is viewed as traditional academic.

Additionally, a critical perspective takes the power from solely the teacher and provides it to all learners in the community, teachers and students alike. It recognizes that both teachers and students have the knowledge to share and deserve to have a voice. It gives humanity back to all learners, recognizing their perspectives, history, and identity as valuable. Until we can recognize the power and knowledge behind all identities and perspectives, our classrooms remain stuck in authoritarianism. Schools need to remember first and foremost that we aren't just teaching content, we are teaching humans, humans who have individual thoughts, feelings, perspectives, loves, and interests. Education should allow for the curious exploration of those thoughts, feelings, perspectives, loves, and interests.

In our present-day society, news-for-entertainment corporations are showing an up-in-arms reaction to Critical Race Theory, LGBTQAP+ allyship, and mask-wearing in schools due to the viewpoint of schools as non-political entities. As a result of these issues, since climate change is seen as a political topic, many teachers are afraid to teach about sustainability and climate change, let alone mention it in their classrooms. Giroux discusses that there is a difference between politicizing pedagogy in classrooms and political pedagogy in classrooms. Politicizing pedagogy is the assumption that by sharing our viewpoints with our students, our students will think exactly as we do. Political pedagogy, as defined by Giroux (2004), "teaches students through dialogue about the importance of power, social responsibility, and taking a stand (without standing still)" (p. 2). Political pedagogy promotes critical questioning, the

intersectionality of voices, the validity of culture and language, and the value of individual/community agency. A political pedagogy viewpoint such as CRT embodies aspects that Giroux views as essential for transformation: responsibility, questioning/critique/discourse, taking risks, and hope. Because it is seen as an anti-authoritarian theory/ a perspective of critical pedagogy, it has the potential to transform communities, question who is affected by action/inaction, and help to create a more equal, understanding, just, and welcoming society.

Education is not a neutral activity, and as such, we need to teach students so that they may have the tools and power to condemn and overcome injustices, exploitations, and authoritarianism across multiple systems. “Education never was, is not, and never can be neutral or indifferent in regard to the reproduction of the dominant ideology or the interrogation of it” (Freire et al., 2001, p. 71). Much like a critical race theory perspective, we need to examine the ethics of what we are teaching and why we are teaching it. Who benefits? Who is in power? How are different members of society affected? Why do those in power believe that this topic is important for the youth of our classrooms to learn about it? We and our students are a part of a world system, with many cultural and social systems included, and should learn about the many cultural and social perspectives as such.

Without the discussion of politics, education is without risk. Pedagogy of Freedom discusses that “to learn is to construct, to reconstruct, to observe with a view to changing—none of which can be done without being open to risk, to the adventure of the spirit” (Freire et al., 2001, p. 47). It is essential that as educators, we take risks both within and outside of the classroom as we continue to work on our unfinishedness of self and knowledge. This is a political statement, as knowledge and the construction of knowledge is a highly political process

in which we determine what and whose knowledge is important to know and is valid. Neutrality in education is therefore an oxymoron, especially in a democratic society. We live "in history at a time of possibility and not of determinism" (Freire et al., 2001, p. 51). If it were determined, then education would not be political, as all knowledge would be determined and finished.

As educators, it is our responsibility to foster classroom communities based on the true value of democracy: agency, questioning, equity, and justice. Giroux (2004) argued that "in the end, there is no democracy without informed citizens and no justice without a language critical of injustice" (p.10). When we take critical perspectives with our students, we play our part in helping our communities become more just and helping our students to have the tools necessary to make transformations.

We Teach Who We Are

The teachers employed at schools are human and are therefore biological, social, historical, and cultural beings. Because of the humanity behind our teachers, it is impossible to separate the identity from the self, and therefore, we teach who we are from a biological, social, historical, and cultural perspective. We reflect in our teaching our experiences within society. This includes what is told to us in society through media advertisements, social situations, from our own upbringing, and our own education. We additionally bring into our classrooms the values that we are told to have as well as an understanding of what identities are promoted to us. We need to question the messages that we promote, how we promote justice, democracy, and power outside of the classroom, as well as the assumptions that we have with regard to power in the classroom (i.e. classroom management vs. the classroom commons and sharing of knowledge). When teaching, we need to question our own self-identities and take into

consideration the honesty of the messages, values, and identities that have been told to us, and question who benefits from those perspectives.

Before we can authentically pose problems and question the systems in our world with our students, we need to look inward and question our own self and self-identities. What justice exists within the systems in which we live? How are people influenced by these systems, and who benefits from them? There are three perspectives that we can critique to help us answer these questions: biological and environmental, social, and historical.

From a biological and environmental lens, when questioning justice in our own systems, as well as the influence and benefits posed, we need to reflect upon our society's value of materialism, capitalism, and the history of imperialism. Magdoff and Williams (2017) discuss one way in which imperialism currently takes form from an ecological perspective is the imperialism of pollution. By outsourcing our creation of goods as well as pollution to other countries, we are devastating their ecosystems, harming the health of the environments and the health of all living beings in that area. As a result, the suffering and extinction of many different species have become the norm. When we hear the all-too-common news about different species going extinct, we no longer ask what can we learn from this, instead, we are asking ourselves which species will be next. Our lavish consumer lifestyle is not just wiping out entire species, but now we are wiping out entire ecosystems due to land-use changes, restricting nature to smaller areas, deforestation, and pollution. This in turn changes the food webs and other keystone environmental systems because species, including the human species, rely on one another. Unfortunately, because the pollution and environmental hazards we are creating aren't focused on in our nation, it becomes difficult for us to see it as a problem since we do not have the

firsthand experience of those that we are oppressing. Because we don't see that there is a problem, therefore, we do not have the passion and drive to make the changes necessary to better the systems and improve the lives of the millions of people and organisms our lifestyles negatively affect.

From a social perspective, consumerism, consumption, and materialism-based capitalistic society tells us through advertisements, media production, and other spheres of influence that in order to be happy, we need more products. This causes widespread destruction of our ecosystems as well as oppressing people from other countries who work in sweatshops to produce our goods. To combat these messages, we need to have a critical perspective on the systems and messages our society promotes. Having a critical social perspective that incorporates all voices and allows for the viewpoint as to how power and justice are both engraved and lacking in the society at large is essential to creating and preserving a democratic and social education. When more critical and inclusive models of education through the advocacy of inclusion for LGBTQAP+, gender identity, religion, race, socioeconomic status, etc. are incorporated, students have a more welcoming and worldly view where they are comfortable with who they are and accepting of those around them. It creates humans who are more humane, and in turn, a more humane society.

From a historical perspective, we need to question whose historical perspectives are being taught as well as those that are being silenced. According to Kincheloe (2012), "The most important social, psychological, and educational problems that confront us are untidy and complicated" (p.153). The questions of justice, power, and praxis have been asked throughout history and will continue to haunt us because the answers are complex and non-universal. There are multiple perspectives to the questions and problems that are faced, and we should celebrate

and voice all of those perspectives as we struggle to improve and become a democratic society. Because history is not predetermined, we have the power and the duty to have input into our own history. Forming this history requires that we understand where we are in the world biologically, socially, and historically.

> If we really had a clear awareness of our condition and its structural causes, we would see that it is not we who should be ashamed of where we live, but that those who live in comfort but do nothing to change the misery that surrounds them. (Freire et al., 2001, p. 57)

If we keep those requirements in mind, we can create transformative changes that benefit all people.

Caring for Self and Other Beings, Things that Really Matter

The goal of education in the modern world should be the liberation from the capital and improving the community systems both within and outside of the natural world. This perspective of education is community-centric where social commonality, allyship, and solidarity are formed with the ultimate goal of improving Earth and humanity. Education should provide the tools necessary for students to become active participants in their daily lives and communities, taking the power away from the capital and putting it into the hands of community members and those directly impacted by decisions made. An example of this would be school community gardens, where food is grown and harvested for people, not for profit. Growing food for yourself and your community provides agency and empowerment and allows individuals to rely on themselves and the community rather than corporations. It promotes the active involvement of your own life and destiny rather than a passive approach.

To promote a free society, our educational system must embody the ideas of praxis: to be free thinkers, reflecting and acting to transform the world. This includes the promotion of love in

and with Earth as well as promoting justice and hope. Apple (2013) shares his perspective that education needs to focus on love, care, and solidarity, and showing people that culture and life have value. By shifting the focus, value is taken away from the production of test scores and materialism and instead is placed on emotional capital, social understanding, culture, agency, and individual identity. Humans are unfinished beings just as Earth is unfinished and ever-changing. A place-based educational model allows students to engage with, in, and of the Earth by allowing them to firsthand experience local systems of nature and to witness how it "breathes" and changes.

Knowledge is taught in segregated classes and therefore no true connection across disciplines is honored. This teaches a false narrative of separation in the world. As explained by Uhl and Stuchul (2011),

> Nothing, absolutely, nothing, exists without being a part of a set or system of relationships. Any attempt to perceive things as separate and apart is an arbitrary and false separation… There are no such divisions in life. Life does not create boundaries, we do… Hence we create curriculum as if the world were made up of separate parts and we have come to believe the parts, and not the reality of the whole. (p. 2)

When students cannot form connections across disciplines, creating a meaningful connection becomes even more difficult.

Without real-life connections to learning, learners cannot relate to the problems posed and therefore cannot form true passion, agency, or action. As Cloud (2017) describes in one of the Education for Sustainability Benchmarks discuss how the medium of presentation and discussion directly correlate with the message at hand. If schools separate subjects and do not show connections, students assume that this is the true model of the world–separate entities, separate problems, and therefore separate solutions. We are providing false information to our

future leaders. The world is a complex system, filled with its own interdependent systems. Humanity's relationship with nature is one that is a complex system of interconnectedness. We need to prepare students to face the systematic issues that go across multiple domains. We teach them that problems in science are taken care of by scientists, problems in criminality are taken care of by the police, problems in health are taken care of by doctors. We forget that all of these systems are interwoven and complex, and teach our future leaders that every problem fits into a box along with a specific solution assigned to that issue. We need to shape students into well-rounded and flexible thinkers who see problems and solutions in the world as interrelated. We need to create critical thinkers and questioners who are active in their communities and systems. We additionally need to prepare students to be able to share their ideas and viewpoints, to listen to others, and to have an openness towards hearing new ideas.

Critical Pedagogy from an Ecological Perspective

Quality education is the 4th goal of the UN's 17 Goals for Sustainable Development. This prompts the question of what is characterized as "quality education," especially since those in power promote sustainable development by simultaneously attempting to ensure that we are able to continue with development and business as usual in a sustainable, non-transformative, or regenerative way. My interpretation of sustainability is that it is against ecological well-being due to its focus on sustaining development. We would still need multiple Earths for the UN's goals to be met. By pushing quality education for all, who decides what is quality? Why is westernized education prioritized over the education that is already in place: ecological, social, and cultural education? Quality education for all educates the world on how to be good workers/listeners, promotes authoritarianism/uniformity, and promotes consumerism, furthering

climate issues. The idea of quality education is subjective, and what is deemed quality is controlled by those in power, those who are responsible for environmental degradation. The quality education discussed therefore does not challenge the systems in place that are furthering inequalities. Instead of this quality education of sustainable development, we need goals that focus on quality education that focuses on local systems and is transformative and regenerative.

A regenerative and transformative education will allow for intersectionality and work with cultures, communities, and systems to collaborate with nature, instead of against it. We need a total system change in order to combat climate change, rather than a sustainable system. This includes a shift from oppressive imperialism, capitalism and consumerism to a more liberating system of ecosocialism and intersectionality of systems with a focus on the creation of quality human and nature relationships rather than material objects. Education should center around the promotion of meaningful democratic citizenship and must provide space to challenge the ways we think about government, institutions, and organizational principles. Naturally, this form of education will grow a generation of learners who are passionate about improving the Earth, democracy, and the lives of those around them.

The History Behind Education for Sustainability

In order for education to gain a more sustainability approach, it is essential to understand the roots of environmental education. A historical perspective allows for the viewing of successes and shortfalls, allowing us to learn from the accomplishments and mistakes and of prior educators.

The human-caused increase of greenhouse gas emissions that led to worldwide warming in the climate of the Earth's atmosphere began during the industrial revolution. Since the

industrial revolution, emissions have soared to new levels, leading to rapid changes in weather patterns and events, the melting of glaciers and the polar ice caps, changes in the agricultural growing season, etc. While this period of warming was induced by historical developments (i.e. the Industrial Revolution), current generations feed into this pattern through consumption, development leading to loss of habitat and land, and lack of education and self-awareness.

One way to limit the impact of global climate change is to use education as a tool to promote a culture and awareness of sustainability-focused altruism. This section will outline the history of Environmental Education and Education for Sustainable Development, which is an educational practice rooted in a body of resolutions that promote understanding, agency, and activism towards the development of an environmentally sustainable society. Additionally, this section will discuss the origins of Environmental Education, its evolution over time, and its influence on United Nations regulations and the United States laws that have followed these trends of Education for Sustainable Development.

Nature Study 1800's and Early 1900's

Prior to the Conservation Era of the 1930's and 40's, the idea of education about nature was a common theme in schools across the nation. In the mid-1800's, there was some concern from the scientific community about the status of the environment, particularly due to the industrial revolution, which was just then winding down. More appreciation and spiritual connection with nature were necessary, and education about nature became more prevalent due to the nature education movement. McCrea (2006) discusses how in 1891, Wilbur Jackman, an American Educator, wrote *Nature Study for the Common School* and defined the nature study movement within education. AFED (2019) continues this discussing by arguing that the nature

study movement focused on the importance of learning about nature and the environment, particularly through John Dewey's philosophy of education through experiences. The nature study movement tied together two goals: learning about nature and experiential learning. As cited by Tolley (1994), Lois Agassiz, another founding member of the nature study movement, argued that students should learn from nature, rather than solely relying on books for education. In the 1920's, as McCrea (2006) reported, ecology began to develop and be recognized as a separate scientific field, providing a "comprehensive view of the natural world and an integrated approach to its study" (p. 3). Ecology and nature study began to be taught in schools across the country.

Conservation Education 1930's to 1950's

The Conservation Era came to be as a result of the Dust Bowl droughts, soil erosion, and extreme weather events of the 1930's. The idea of Manifest Destiny as well as land and farming incentives at the time led to the migration of many inexperienced farmers to the western United States. There, the land was already semi-arid and not conducive to the "homestead" agricultural ways. After World War I, the demand for wheat increased, causing an increase in planting.

During the Great Depression, the cost and therefore financial profits of wheat decreased, forcing farmers to plant more wheat in order to make a livable wage. As the land was over-plowed, the Drought of 1931 led to a devastating erosion of the topsoil, causing many crops to fail. The Dust Bowl intensified the effects of the Great Depression as a result of a lack of crop production.

As a result of these events, the Conservation Era focused on better resource management, and the educational themes followed suit. For example, in 1935, Wisconsin had the very first

environmental education mandate in the nation, which required every preservice teacher to have a background and understanding of conservation education. The National Education Association took on a leadership role within education for conservation in America's schools through its promotion nationwide. McCrea (2006) states that in 1948, the term "environmental education" was first professionally used by Thomas Pritchard, the Deputy Director of the Nature Conservancy in Wales.

Environmental Education 1960's to 1970's

Throughout the 1960's and 1970's, progressive environmental movements were created upon the recognition of the ongoing impact that humans have on the global climate. Gough and Gough (2010) cite that as a whole, the environmental movement's concerns included "air and water quality (pollution), the growth in world population, continuing depletion of natural resources and environmental degradation" (p.1). Gough (2016) additionally identifies the goals of Environmental Education as being the introduction of environmental content at all levels of education and to make students aware of environmental problems. The objectives were vague and did not provide specific guidelines, causing many issues with its implementation.

In 1969, the National Environmental Policy Act was passed by the United States Senate to…

> …encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the nation; and to establish a Council on Environmental Quality. (section 2)

To further the goals of the environmental movement, there was a widespread focus on the importance of educating future generations about the environment. Stapp and Cox (1974) discuss

how the Deputy Superintendent of Toledo Public Schools, Lee R. McMurrin, identified a "comprehensive environmental education program" as being essential to the future of the world because "schools accept the responsibility for the education of our children and youth. It is through active participation...that the quality of living will improve in our villages, towns, and cities" (p.5).

Stapp and Cox (1974) go on to discuss how in 1969, Dr. William Stapp, who later became the first Director of Environmental Education for UNESCO, developed a definition for Environmental Education, as follows.

> The basic process leading toward the development of a citizenry that is aware of and concerned about the environment and its associated problems, and that has the knowledge, skill, motivation, and commitment to work toward solutions to current and projected problems. The goals of planned change for environmental education are to make all citizens knowledgeable about their surroundings and to help them use this environmental knowledge effectively to make their community, state, and world a better place to live. (p. 9)

In addition to these goals and definitions, the authors also outlined why Environmental Education was crucial to the environmental movements. They maintained that students learn that past environmental actions have only dealt with the symptoms of climate change. The only way to combat the issues of climate change is to "investigate, determine, and attack the root cause of the environmental problems facing society" (p. 11). These root causes he identified include individuals who over-consume resources and businesses owners who provide for the consumption. The authors additionally identify humans as being in a closed system with the environment, and that we as humans have developed economic systems that consume and overload the resources of the Earth with changes and waste. Climate change is a systemic issue, one which requires a systemic change and response. By educating individuals about all of the levels of responsibility within climate change, it promotes ownership over one's actions and the

consequences inflicted upon the environment. Stapp and Cox (1974) additionally argue that in order to prepare students as future environmental leaders and citizens, we need to "develop the awareness, attitudes, values, and skills of students in an interdisciplinary environmental education process where students and teachers work together to learn how to live harmoniously with the environment" (p. 11).

The 1970's were a very involved and crucial decade to the development of Environmental Education and environmental law. In 1970, the United States Congress passed the National Environmental Education Act. McCrea (2006) discusses how this act created the Office of Environmental Education (which was later eliminated in 1981), established a National Advisory Council for Environmental Education, and established a domestic grants program for professional development and the development of Environmental Education curricula. 1970 was also the year of the first Earth Day, a widespread Environmental Education event designed to be a teach-in on college campuses. As cited on the Earth Day (2021) webpage,

> Earth Day inspired 20 million Americans — at the time, 10% of the total population of the United States — to take to the streets, parks and auditoriums to demonstrate against the impacts of 150 years of industrial development which had left a growing legacy of serious human health impacts. (para. 5)

While politicians are in power to make laws, they must adhere to the comments of the general population to make those laws. Earth Day sent the message to politicians: they must act in order to help save our Earth. Earth Day allowed for the transition of education *about and in* the environment to education *for* the environment.

In 1972, the United Nations held the U.N. Conference on the Human Environment. As a result of this conference, the Stockholm Declaration was formed. The Stockholm Declaration was important because it was the first international declaration to recommend the establishment

of Environmental Education programs worldwide. The conference determined that education was critical in order to combat the worldwide climate crisis, and as a result, two recommendations were provided with regards to Environmental Education: Recommendation 96 and Principle 19. McCrea (2006) describes how Recommendation 96 calls for Environmental Education as a means to address environmental issues worldwide. This was the first formal and international proclamation that claimed the importance of Environmental Education as a necessary step towards combating climate change. Principle 19 of the Stockholm Declaration (1972) noted that the environment matters for the younger and future generations, not just the current and previous generations, and therefore, education is an essential step towards enlightenment, awareness, and respect towards the environment. It was believed that without education, the long-term successes of environmental policies would not be possible. Linke (1980) discusses this, stating that "education and training on environmental problems are vital to the long-term success of environmental policies because they are the only means of mobilizing an enlightened and responsible population, and of securing the manpower needed for practical action programmes" (p. 25). Gough (2014) identifies education as being deemed essential in the fight against climate change because it provided students with an awareness of the threats to humanity while stimulating critical thinking and discussion on the social and biological problems of humanity.

In 1975, UNESCO sponsored the International Workshop on Environmental Education. The Stockholm Conference created a feeling of urgency about the need for action to combat climate change. As a result, they ratified the Belgrade Charter, which was built on the principles of the Stockholm Declaration. The Belgrade Charter described the goals, objectives, audiences, and guiding principles of Environmental Education.

In 1977, UNESCO held another conference to build upon the Belgrade Charter and to better define the goals, objectives, and guiding principles of Environmental Education. The resulting document from this conference was named the Tbilisi Declaration. Many of the principles laid out in this declaration are still used today in Environmental Education courses. The Tbilisi Declaration defined Environmental Education as

> a process aimed at developing a world population that is aware of and concerned about the total environment and its associated problems, and which has the knowledge, attitudes, motivations, commitments, and skills to work individually and collectively toward solutions of current problems and the prevention of new ones. (p.40)

The Tbilisi Declaration (1977), built after the Belgrade charter, declared the guiding principles of Environmental Education as preparing

> the individual for life through an understanding of the major problems of the contemporary world, and the provision of skills and attributes needed to play a productive role towards improving life and protecting the environment with due regard given to ethical values. (p.24)

It described the goal of Environmental Education as developing

> a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones. (p. 3)

However, this definition and goal were seen as too vague and needed to be better defined through later declarations. Gough (2014) states that the objectives of Environmental Education as defined in the Tbilisi Declaration include awareness, knowledge, attitudes, skills, and participation. Hume and Barry (2015) explain that Environmental Education was introduced as being interdisciplinary since climate change affects biological, ethical, social, cultural, and economic aspects of environmental issues. The complexity of the issues, causes, and interdependence was also introduced as key elements.

Education for Sustainable Development 1980's Through Today

Ten years after the International Conference on Environmental Education occurred, the World Commission on Environment and Development published the Brundtland Report, one of the first publications to introduce the concept of sustainable development. McCrea (2006) states that the Brundtland Report focused particularly on the idea that environmental protection and economic growth are interdependent. In the report, as explained during the World Commission on Environment and Development (WCED) (1987), it was argued that the teachers of the world are essential to help the fight against climate change because they are able to help bring about the social changes necessary for sustainable development to occur and succeed. The Brundtland Report additionally created the first link between Environmental Education and Education for Sustainable Development. The WCED (1987) defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (p. 41). Rather than educating students solely on current issues with the goal of preventing new problems, Education for Sustainable Development educates students on how to live in the current world while ensuring the ability for future generations to be able to meet their needs as well. Education for Sustainable Development allows students to form their own connections, reflect on their own actions/inactions, and plan for future ways to act sustainably. The current Education for Sustainability standards from the Cloud Institute are based on the principles laid out in the Brundtland Report and have developed over time.

McCrea (2006) discusses how following the release of the Brundtland Report, the U.S. Congress passed the National Environmental Education Act of 1990. This act established an Office of Environmental Education in the U.S., created an Environmental Education and training

program, established Environmental Education grants and fellowships, amongst other initiatives. In 1992, the EPA expanded its environmental offices to include the Office of Environmental Justice, accepting the need for a multifaceted approach to sustainable development. Also taking place in 1992 was the U.N. Conference on Environment and Development in Rio de Janeiro. It was at this conference that sustainable development and education were discussed together for the first time. Chapter 36 of Agenda 21 placed a focus on shifting global education towards sustainable development with the ultimate goals of increasing awareness and trainings for sustainability. As discussed by The United Nations Conference on Environment and Development (1992) Principle 21 argues that the "creativity, ideals and courage of the youth of the world should be mobilized to forge a global partnership in order to achieve sustainable development and ensure a better future for all" (p. 4). This formally changed the focus of education from Environmental Education to Education for Sustainable Development. Instead of being viewed as an independent field of study, Environmental Education was now seen as being fully integrated within Education for Sustainable Development. Education for Sustainable Development became the goal for the next few decades and is still in place today.

UNESCO hosted the International Conference on Environment and Society: Education and Public Awareness for Sustainability in 1997. Here, the Declaration of Thessaloniki was accepted, where it continued on the goals, objectives, and principles brought forward in the Stockholm Declaration, Belgrade Charter, Tbilisi Report, and the Brundtland Report. The Declaration of Thessaloniki (1997) states that

> appropriate education and public awareness should be recognized as one of the pillars of sustainability together with legislation, economy and technology...The reorientation of education as a whole towards sustainability involves all levels of formal, non-formal and informal education in all countries. The concept of sustainability encompasses not only

> environment but also poverty, population, health, food security, democracy, human rights and peace. Sustainability is, in the final analysis, a moral and ethical imperative in which cultural diversity and traditional knowledge need to be respected. (pp. 1-2)

In the Declaration of Thessaloniki, only two of the twenty-nine statements made utilized the term Environmental Education. Instead, the focus was on Education for Sustainability and Education for Sustainable Futures, showing an international decrease in acceptance of Environmental Education in favor of the use of Education for Sustainability. The declaration suggests the change in the name Environmental Education to Education for Environment and Sustainability. This formally "closed the chapter" of Environmental Education worldwide.

In 2002, the United Nations declared 2005-2014 as being the Decade of Education for Sustainable Development at the Johannesburg Summit. Hume and Barry (2015) describe how every country was encouraged to incorporate Education for Sustainable Development into its educational systems. They also were encouraged to develop policies, practices, and standards to ensure its success. UNESCO (2004) shows that the conference had broadened the ideals from Agenda 21 from focusing on "the role of education in pursuing the kind of development that would respect and nurture the natural environment" to focusing on "social justice and the fight against poverty as key principles of development that is sustainable" (p.7). There was a shift in the dynamic from embodying respect and nurture towards the embodiment of a fight for justice and sustainable development. This led to a meeting of the UNESCO World Conference on Education for Sustainable Development in 2009, where the Bonn Declaration was accepted. Gough (2016) argues that the Bonn Declaration endorsed Education for Sustainable Development as a necessary part of education in order for the world to reach actual change. It describes in detail the educational action through formal, non-formal, informal, vocational, and

with regards to teacher education. The Bonn Declaration served as a guide for action throughout the Decade of Education for Sustainable Development.

The Arab Forum for Environment and Development (AFED) (2019) explains that by 2006, forty-four countries had national Education for Sustainable Development coordinating bodies, and by 2008 that number jumped to seventy-eight. In 2014, nearing the end of the Decade of Education for Sustainable Development, UNESCO held their next conference called the World Conference on Education for Sustainable Development. Here, they launched the Global Action Programme (GAP) (2019), with the goal "to generate and scale up action in all levels and areas of education and learning to accelerate progress towards sustainable development" (p. 24). According to UNESCO's *Issues and trends in Education for Sustainable Development* (2018), the GAP had two main objectives: "to reorient education and learning so that everyone has the opportunity to acquire the knowledge, skills, values and attitudes that empower them to contribute to sustainable development" and "to strengthen education and learning in all agendas, programmes and activities that promote sustainable development" (p. 37). The goals of the GAP were to advance the policy of sustainable development, to transform learning and training, to build the capacities of educators and trainers, to accelerate sustainable solutions at the local level, and to empower and mobilize young people towards sustainability.

Since the Decade of Education for Sustainable Development, more actions have been taken internationally to increase the prevalence of Education for Sustainable Development. In 2015, at the UNESCO World Education Forum, they created Sustainable Development Goal 4 called the Incheon Declaration of Education for All 2030. Goal 7 of the Incheon Declaration (2015) tied together Education for Sustainable Development and Global Citizenship. It accepts

the implementation of the GAP, and focuses on the importance of human rights education when it comes to Education for Sustainable Development. This was furthered in 2016 in the Paris Agreement, which emphasized the importance of "taking measures...to enhance climate change education, training, public awareness, public participation and public access to information" (p.16).

Throughout the past 200 years, education for and about the environment has evolved to conform to the practices, ideals, and goals of nature throughout time. Originating from Nature Education with the goals of encouraging students to go outside and appreciate nature, the focus then shifted to Conservation Education, which emphasized educating students on how to properly manage, conserve, and appreciate natural resources. From Conservation Education, the focus then shifted towards Environmental Education, which promoted bringing awareness to environmental issues and the promotion of ethical values to ensure that current and future problems will be faced. Environmental Education is then integrated into Education for Sustainable Development. Education for Sustainable Development integrates the objectives of the prior models while educating students on the roots of climate change, how consumption and current actions contribute to climate change, and how to ensure a sustainable future. The goal is to develop youth advocates into active citizens who have the knowledge, motivation, and tools to combat climate change to ensure a more sustainable present and develop the sustainability of the future.

Is Education for Sustainability Possible?

To ensure the development of youth climate advocates who have the tools necessary to become active citizens, it is crucial that the educational environment is conducive to

conversations on education for sustainability. Currently, education for sustainability is made possible through UN Declarations, state and national science standards, as well as other resources such as the Education for Sustainability Benchmarks from the Cloud Institute.

UNESCO (2019) states that teaching students about climate change and sustainability provides opportunities for our future generations to

> acquire the knowledge, skills, values, and the attitudes they need to build a green, low emission and climate-resilient future. The idea is to provide an education that will empower people to achieve sustainable development in its three dimensions: economical, environmental and societal. (para. 4)

As a result, as previously mentioned in this chapter, at the 2015 UNESCO World Education Forum, seventeen goals for sustainable development were identified. Each of these goals requires education in order to ensure their success because it is believed that through providing education, people are provided the tools, knowledge, and values necessary to make necessary transformations. Education is an empowering aspect that societies must all value. The fourth sustainable development goal identifies quality education as a human right, and therefore, promotes quality education for all children. UNESCO (2018) defines quality education as providing "appropriate skills development, gender parity, provision of relevant school infrastructure, equipment, educational materials and resources, scholarships or teaching force" (para. 1). Additionally, the UNESCO (2020) fourth goal centers around the need to promote education for sustainable development through an appreciation of diversity and global citizenship. Governments are the coordinating bodies responsible for upholding the fourth goal, which, in the United States, is translated through local and national standards.

On a more local scale, the Pennsylvania State Science Standards have been in place since 2002 and are currently being revised. According to the National Research Council (1996), the

current PA State Science Standards are based upon the National Science Education Standards (NSES), which were introduced in 1996. The Pennsylvania Department of Education describes the standards as having targets within the fields of Science in Technology and Environment and Ecology. Within these targets, conversations about climate change in the middle grades (6-8) are welcomed specifically within the topics of ecology, watersheds and wetlands, natural resources, agriculture and society, as well as humans and the environment. The standards additionally allow for reflection on the human impact on these systems.

While they are inclusive of environmental education, the current PA State Standards for science are outdated. In 2013, 26 states came together to create the Next Generation Science Standards (NGSS) (2013) as an alternative to the NSES. The Pennsylvania Department of Education announced in 2019 the need for a revision on the state standards in order to better align with current research practices. This change has overall been welcomed within the educational community due to the outdatedness of current standards. The new standards will align more with the NGSS, which specifically includes a subcategory of the topic of human sustainability. NGSS also has a focus on the interdependent relationships of humans and systems, particularly the ecosystem. According to the Pennsylvania Department of Education (2021), the new state science standards will soon be shifting their categories to encompass Science, Environment, Ecology, Technology and Engineering (Grades K-5); Science, Environment and Ecology (Grades 6-12); and Technology and Engineering (Grades 6-12). By updating the PA science standards to embody the NGSS and more modern research and practices, a more realistic and up-to-date picture of the effect humans have on climate change and global systems will be taught. Hardin (1968) argues that “education can counteract the

natural tendency to do the wrong thing, but the inexorable succession of generations requires that the basis for this knowledge be constantly refreshed" (p. 1245).

Downsides to the NGSS Standards

While the revision of the PA Science Standards is beneficial due to its probable increase in discussion about climate change, the NGSS are not without their flaws. First, state standards are still directly tied to the state PSSA testing. Teachers are required to make their way through all content and standards before testing begins in April, placing time constraints and limitations on the ability to interact in real-world experiences directly tied to the lessons learned. Testing does not provide the tools and critical thinking needed for active citizenry, and therefore, additional educational models such as place-based education are needed.

Moreover, the themes present in the NGSS provide an incomplete viewpoint on climate change and sustainability. According to the Feinstein, Weeth, and Kirchgasler (2015), the NGSS standards include three major themes regarding how sustainability is portrayed: universalism, scientism, and technocentrism. They describe the NGSS as portraying climate change and sustainability as universal because of its lack of focus on local spaces. Instead, they believe that the NGSS prioritizes the teaching of global systems while excluding global processes and local examples. This "portrays all humans as equally contributing to–or suffering from–sustainability challenges" (para. 3). The teaching of climate change and sustainability as universal takes away responsibility from the developed nations and places it on the global community, and "obscures the fact that sustainability-related problems afflict some humans more than others and that human actions, embodied in contemporary policies and social institutions, contribute to poverty, hunger, and environmental vulnerability" (para. 3).

The authors further describe the NGSS standards as having a scientism theme because of its promotion of natural sciences and qualitative methods of gaining information as being the best way to understand climate change and sustainability. By promoting these as being the best way of gaining understanding, the NGSS standards are identifying social, qualitative, and cultural knowledge as being secondary. “By not depicting sustainability as a complex problem requiring many different types of knowledge, the NGSS implies that sustainability is largely a scientific problem requiring scientific solutions” (Feinstein et al., 2015, para. 4). While science is a large part of the problem, social systems are equal, if not greater, part of climate change and need to be included in the education of sustainability as well.

The final descriptor used by the authors for the NGSS standards is technocentrism due to the embrace of engineering and technology, allowing technology to be viewed as a central factor for sustainability. Focusing on technical solutions to a scientific, systemic, social, and global problem oversimplifies the issues at hand, preventing true solutions and actions from being formed. They argue that in order to counter the issues posed by the NGSS standards, schools should promote an interdisciplinary approach to climate change, particularly between science and social studies. An interdisciplinary approach would allow students to have a more systematic and social perspective on the reasons why climate change was induced by developed nations, how certain populations are affected more than others, as well as the promotion of social knowledge and solutions as being equally as important as scientific and technological knowledge and solutions. (Feinstein et al., 2015).

Education for Sustainability Benchmarks

In addition to state and national science standards, The Cloud Institute for Sustainability Education (2017) offers education for sustainability benchmarks designed by forty-two scholars and practitioners within the field of education for sustainability. The benchmark's goals mention that in order to "create change at the source, not the symptom…it all begins with a change in thinking" (p. 8). To accomplish this, the benchmarks include *the Big Ideas, Thinking Skills, Applied Knowledge, Dispositions, Actions, and Community Connections that Define Education for Sustainability.* The benchmarks argue that since "thinking drives behavior and behavior causes results. The significant problems we face cannot be solved with the same level of thinking we used to create them" (p. 13). These benchmarks serve as a guide to promote conversations and activities about sustainability on a global and local level. The Cloud Institute also provides resources and example lesson plans for educators to assist with the implementation of the EFS benchmarks.

Applying Freire to Education for Sustainability

The current, traditional model of education focuses on the present moment and short-term goals through its practices of grading and standardized testing. Paolo Freire describes this model as a banking model of education, one of which provides a one-way narrative of knowledge. The teacher is viewed as the keeper of knowledge and fills students' heads with information. In this fashion, students become dependent on others as sources of knowledge, rather than creating the knowledge collaboratively or independently. Knowledge tends to be surface level, with little personal connection or connection to other subject areas and a lack of real-world context. Due to its lack of connection and critical thinking, the banking model of education promotes oppression and inhibits the freedom of the learners.

Freire (1993) defines freedom as the rejection of prescribed behaviors, replaced with autonomy and responsibility. To promote a free society, our educational system must allow for autonomy and responsibility through engaging and meaningful learning experiences. He argues that "knowledge emerges only through invention and re-invention, through the restless, impatient, continuing, hopeful inquiry human beings pursue in the world, with the world, and with each other" (p.53). Morgan (2017) argues that in order to properly prepare future generations to combat climate change its affiliated problems, schools need to become transformative places that have more long-term and future-thinking goals. Schools need to shift away from standardization towards experience-based learning.

Place-based education would fit well under Freire's problem-posing model of education because it promotes the creation of knowledge collaboratively through shared experiences, allowing students to invent and re-invent their own learning together in the community spaces. This model of education has a two-way relationship between both the teacher and the student, one of which both actors are seen as equal keepers of knowledge and therefore bring knowledge and experiences to the discussion. In this model of teaching and learning, students are promoted to become independent and critical thinkers, understanding that knowledge is not simply given, but rather, worked upon, changing, transforming, and authentic. Knowledge is learned in the form and context of reality, within systems that are ever-changing and transforming. Comprehension of content is therefore critical, meaningful, and connected to reality–no longer alienated nor static.

Shortcomings in Today's Education for Sustainability Models

Education has the ability to transform society and create possible solutions for current and future issues, such as climate change. Today's model of environmental education focuses on how individuals may become less unsustainable through individual actions. Actions taught include eating locally and organically, recycling, shifting from gas-operated vehicles to electric, etc.

Many potential solutions to combat climate change often include technological fixes, ignoring the full power of education. However, Selwyn (2017) believes that there can be little to no "technical fixes" to the social problems that are exacerbated due to climate change, such as injustice and inequity. Only solutions that involve social aspects can combat those issues; as a result, technology cannot be relied upon solely to fix the problems of climate change. Education can be of great use, allowing for the exploration of injustices and how to combat them.

As a result, schools should be places where students additionally learn about systemic solutions, rather than only individual and technological tools used to combat climate change. While there are many issues in the world that can be addressed with technology alone, climate change is a "game-changer" problem because it requires social, economic, and environmental solutions, and therefore cannot be addressed with only technological solutions. Selwyn (2017) states that

> They actually make it less likely that we will deal with our predicament at the level and with the urgency that it demands. The cruel paradox is that the more successful we are in making the existing game less unsustainable, the less likely it is that we will succeed at catalyzing a transition to a viable future… A game-changer entails incorporating this different theory of change into our visions of education. (p. 6)

However, education comes with its own inherent issues, most of which are not caused by technology and therefore cannot be fixed with the inclusion of technology. When we 'innovate' education, particularly with technology, who really benefits from it? Are students really learning practical life skills? Technology can have a role in education, but when it is the role of education, learning and community values take the back seat. Technology as the role of education serves its purpose of creating prisoners to the technology, promoting future consumers rather than thinkers. Place-based education can combat this because it allows learning to take place outside of the indoor, screen-ridden environment, in the world and with the world.

In addition to the need of addressing climate change systemically, there is also a need to shift from "business as usual" agendas. Selby (2015) argues that

> Mainstream sustainability education is too closely caught up in 'business as usual' agendas and assumptions and is more or less restricted to reforming or moderating the effects of unsustainable patterns, practices and ways of being in the world rather than seeking the root-and-branch transformation that our present and looming global condition calls for. (p. 37)

These agendas and assumptions that follow restrict transformative changes due to its values of keeping life "normal." However, it is these exact "normal" behaviors (consumerism, materialism, capitalism) that further feed into the impending storms ahead. Education should be a space that promotes a balance between being realistic about the problems that climate change brings while allowing for discussions of systemic and lifestyle transformations that the future may require.

Morgan's Educational Model for Sustainability

In Envisioning Education in the Anthropocene, Morgan (2017) argues that due to the present short-sighted, "business as usual" model of education for sustainability, a new model of

education is required. This model must avoid the fallacies that may come with sustainable education, such as the belief that by educating our students on sustainable practices, sustainability will automatically occur. Morgan argues that climate change is a new type of problem for humanity, one that encompasses all systems of life (biological, social, environmental, economic, etc.).

As a result of this new problem with new rules, our current model of education will not be successful. Morgan explains

> The greatest cataclysm to befall the Earth in 65 million years is not going to be addressed by leaving in place an industrial, consumer-driven, globalizing cultural system that has been reformed to place greater emphasis on sustainability in that same cultural system's educational institutions. (p. 7)

To create a new model of education, one that is equipped to face the new rules that climate change prompts, long-range thinking is necessary. A long-range thinking 50+ year educational model would allow students to reflect on how individual and collective actions will impact future generations and the future of humanity. Morgan (2017) describes this educational model as being "designed to gradually but systematically address the most problematic underlying assumptions (theoretical, institutional, curricular, pedagogical) while moving toward long-range sustainability goals" (p. 7). By gradually and systemically addressing assumptions and issues, this model maintains a balance of being realistic about the problems of climate change, while also avoiding beliefs of "inevitability" because with inevitability comes a lack of confidence, hope, and change.

Morgan's (2017) model for education in the Anthropocene additionally prepares students for potential social and environmental catastrophe. Without a personal, interconnected, and encompassing education, schools are not only taking away the right of future generations to have

a role in their own future lives, but are creating a submissive generation that lacks the skills, tools, and knowledge to save themselves and the world from utter catastrophe. Schools are assigned a major role in the combat on climate change, one of which educates for the future, acknowledging that catastrophe may occur and preparing the future generation appropriately. Understanding potential catastrophe allows for realistic conversations that promote transformative change because students have the knowledge to avoid worse-case scenarios while having hope due to the lack of conversations on inevitability. According to Morgan (2017), discussing potential catastrophes keeps the conversations realistic through "positive realism, not powerless determinism" (p. 7). Students are taught resiliency through collective transformative action and understand that while a global disaster is a realistic possibility, it is not determined and can be avoided through transformative and collective action.

A final tenant to Morgan's model of education is based on experiential and transformational education that allows students to learn with the world around them. Experiential learning allows students to gain an interconnected view of the world, understand dynamic and mutually dependent systems, as well as encourage a local and planetary perspective on global challenges. By providing learning opportunities where students critically analyze, question, engage with and understand the challenges that globalization and climate change encompass, we can shape a future that is willing and able to face these challenges and hopefully come up with new ideas to mitigate its harm.

A large part of this experiential learning includes conversations with diverse communities, both locally and globally, with the goal of forming an openness and acceptance of different assumptions of worldview. Morgan argues that shared visions created by those in power

are generally not shared by all. Those who have privilege typically want to maintain their privilege and therefore, oftentimes are blind to the oppression of others as well as the impact that their decisions have on communities and systems. Through experiencing diverse opinions and ways of thinking, students become more welcoming of opposing viewpoints. As such, schools should allow for an open and honest conversation where students can learn and grow from diverse opinions.

The Practicality of Education for Sustainability

While education for sustainability is possible in today's educational world, its inclusion in the classroom must also be practical in order to ensure its successful implementation. Classrooms must be conducive to the success of education for sustainability with the ultimate goal of influencing a future of change-makers who love and want to protect the future of humanity on Earth. As a result, education for sustainability is most practical when used in conjunction with place-based education. Place-based education enhances education for sustainability due to its promotion of connection with nature, allowance for real-life experiences in places where the learning topics occur, as well as its direct involvement with and impact on local communities.

In a traditional classroom, learning environments take place indoors, separate from locations in which the topics of learning occur. There is a segregation between classroom learning and life learning, with the former deemed equally, if not more important than the latter. According to the U.S. Environmental Protection Agency (1987), Americans, on average, spend approximately 90 percent of their time indoors, where the concentrations of some pollutants are

often 2 to 5 times higher than typical outdoor concentrations. Place-based education counters this by getting kids outside, learning about nature and natural systems in the places where they occur.

Furthermore, place-based education offers opportunities for real-life experiential learning that is relevant to student lives and community values. The XQ The Super School Project (2020) explain that lessons that are centered around a place-based educational model foster deeper learning and understanding because they connect students

> as a community of learners, empowering students to lead their own learning, contextualizing learning and relating it to young people's lives, reaching beyond school walls with partnerships and real-world experiences, inspiring and motivating students to customize their learning, making good use of technology as a means, not an end, investing in and committing to deeper learning as an integral part of a school and its curriculum. (p. 14)

Students are promoted to directly interact with the world that they are studying, for example, learning not only about plants, but directly from plants and biological systems in the locations where they live. Learning within community spaces and systems fosters deeper community connections and relationships while increasing democratic and community involvement in schools.

A Successful Local Place-Based Education Program

Radnor Middle School, located about 20 miles outside of Philadelphia, began its place-based education centric *Watershed* program in 1987. Since then, it has developed into a nationally and internationally recognized as a successful place-based educational model for seventh-grade students. The *Watershed* program is a full-day integrated learning program where students study a local watershed both inside and outside of the classroom and at the location of the watershed.

> Watershed is a research-based program, which focuses on scientific investigation through experimental design while incorporating data interpretation/analysis, math and reading skills to solve problems. Students are encouraged to gather, retain, interrelate, apply and communicate first-hand information about watersheds with special emphasis about what it means to live sustainably in the 21st century. (para. 2)

The overall goal of the *Watershed* program is to grow students into responsible members of the community of learners who have a strong sense of self and are encouraged to care for their communities and world. In order to accomplish this, the program's main tenants include *valuing students' questions as much as their answers, demonstrate the interrelatedness of all learning, and illustrate that education is best achieved when it is a cooperative venture shared by teachers, students, and families*. The program prides itself on its ability to "provide students with opportunities to see the relevance of their learning and their personal connection to the material" by demonstrating the importance of lifelong learning that reaches beyond school walls. (para. 7). The *Watershed* program is successful because it uses place-based education to allow students to see the interconnectedness of learning within and outside of the school building because the learning experiences are taking place both inside and outside of the classroom.

The Benefits of Place-Based Education

According to the Center for Geoscience Education and Public Understanding (2013), "only two states require a year-long earth or environmental science course for graduation from high school, while 30 require a year-long life science course, and 20 require a year-long physical science course" (p. 1). Coughlin and Kirch (2010) believe that this current lack of approach to teaching environmental sustainability in schools is alarming because it furthers a separation between individuals and nature, both in physicality and as an integral element of human existence. Place-based educational opportunities engage students with the materials being

learned, in places in the world of which they are directly related, reducing the separation between individuals and nature.

Learning in and with nature has multiple benefits cognitively, physically, and mentally. Unfortunately, due to the rise of standardization, educational technology, and "teaching to the test," real-world experiences are now becoming less prevalent in many schools nationwide, much to the detriment of our children's mental and physical health. Learning experiences take place indoors, oftentimes in front of a screen, while students sit at desks lined up in rows. According to the National Center for Health Statistics (2020), childhood obesity is at an all-time high, at 18.5%: an 85% increase over the course of the last 30 years. Additionally, the number of obese children in America has doubled in the past decade. Place-based education serves as a successful model to combat these issues of society due to its focus on incorporating real-world experiences, ones of which provide movement, active involvement, outdoor learning, etc.

As explained in the EFS Benchmarks (2017), "the medium is the message" (pp. 1-2). If schools separate learning topics and show a lack of interconnectedness, students will assume that this is the model of our world: separate entities, problems, and therefore separate solutions for problems are necessary. This proves to be quite untrue for our world. The world is a complex system, filled with its own systems that are interdependent. As described by Assadourian, Mastny, and Booth Sweeney (2017) in *All Systems Go! Developing a Generation of "Systems-Smart" Kids,* schools' traditional models of education are not preparing students to face the systematic issues that go across multiple domains. The traditional model of education teaches students that problems in science are taken care of by scientists, problems in culture are taken

care of by anthropologists and other culturally related professions, etc. Essentially, every problem fits into an individual box along with a specific solution assigned to that domain.

Place-Based Education: Education for Justice

Education is a powerful tool that promotes societal norms and expectations, allows for the continuation of oppression and freedom (depending on who controls the power of the educational system), and serves as a model for democratic systems. Apple (2013) explains that "there could be no respectful society without a functioning and democratized educational system for their children" (p. 5). In order to promote democratic values through education, students need to feel a sense of agency and ownership over their learning experiences. Place-based education places the power back into the hands of individuals because it allows students to become the creators of knowledge in the true places of learning. It promotes justice because students are able to form real-world connections, grow as leaders within their communities, and experience multiple forms of knowledge and ability. Ideally, place-based education allows for students to value their community commons, or the local places that they live, and act towards the improvement of its health. In her thesis, Hafer (2019) argues that "When students understand and appreciate the place they live, it inevitably improves the society's vitality and transforms communities into Democratic societies" (p. 36). Teaching about the environmental commons includes forming relationships with nature, understanding the importance of diversity in nature, preserving healthy environments, forming an environmental identity, and agency to protect the commons. Santagata, Bertacchini, Bravo, and Marrelli (2011) explain that teaching about the cultural commons includes discussing and reflecting upon social and intellectual resources within a geographic location. The cultural commons promote creativity, traditions, customs, and

shared community values. Learning about the environmental and cultural commons, their needs, and how to ensure their future health is an essential component of democratic and justice-oriented education.

Today's traditional education model allows students to learn about communities, traditions, belief systems, and values, however, only inside of classroom spaces. Students read textbooks, memorize information, and complete assessments about the perspectives the authors and teachers are placing in their minds. Orr (2004) asks "Why is it that those who contribute to exploiting poor communities and the earth's ecosystems are those who have BAs. MBAs, MScs and PhDs and not the 'ignorant' poor from the South?" (p.7). Education for sustainability through place-based education combats this because it allows for the creation of a more welcoming space for all due to the diverse cultures, ideas, and practices that students are exposed to. According to the EFS Cloud Institute (2017), "diversity makes our lives possible. Diversity is required to support rich complex systems (like us), to build strength, and to develop resilience in living systems. Biological diversity, cultural, gender, political and intergenerational diversity all serve this purpose" (p. 25). In the place-based educational model, students learn about their local communities by engaging with people and practices in their communities, opening conversations and reflections in democratic communities through engaging directly with those communities.

Through engaging directly with community organizations and members, students gain the social foundations necessary for local transformation and active citizenry. By taking an anti-business as usual and critical perspective, community involvement and the embracement of diversity allow students to engage with issues of local and global power, privilege, justice, and citizenry.

Ryan and Tilbury describe how The University of Gloucestershire promotes the education of sustainability because of its "embracing [of] social justice, enhanced quality of life, improved resource efficiency and ecosystem preservation" (p. 3). Place-based education promotes a sustainable mindset by creating a love for the places in which students learn. Wells and Lekies (2006) believe that it inspires an appreciation for lifelong learning and commitment to nature and Earth. Additionally, Sobel (2004) describes that place-based education is found to foster a feeling of stronger personal connection to communities, enhance student appreciation for nature, and empower students to become active citizens. Part of the active citizenry promoted through place-based education includes future thinking, critical and creative thinking, participation and participatory learning, systematic thinking, and partnerships with community members and groups.

In addition to the promotion of community involvement and active citizenry through diverse experiences, place-based education promotes the welcoming of individual identity through human experiences. Uhl and Stuchul (2011) argue that "the aim of a genuine education is to draw out our full humanity, helping us to create ever-more authentic and caring relationships with ourselves, each other, and the entirety of creation" (p. 13). Students are human beings, not human 'becomings,' and education must take students' multiple identities into account through the embracement of diversity. When students learn together with community members inside of community spaces, participants bring their own perspectives on the world with them. The *Talmud* argues that "we don't see things as they are, we see them the way we are." These perspectives should be shared and celebrated.

Nationwide, the traditional model of education is increasingly diverging from the embracement of diverse identity through anti-critical race theory and anti-gay agendas. For example, Florida's "Don't Say Gay" bill and Texas' crackdown on transgender students have forced many students "back into the closet," hiding their true identities out of fear of legal retaliation on themselves and their families. Lorde (1984) argues that "it is not our differences which separate [us], but our reluctance to recognize those differences and to deal effectively with the distortions which have resulted from the ignoring and misnaming of those differences." (p.122). Queer theory combats the anti-gay agenda through the promotion of diverse views on being "normal." It promotes the visibility of a wide variety of possible ways of being, living, and loving, allowing students to question normative binaries and categories. The lack of preservation of the individual, the constant focus on data for the future, and the lack of mindfulness and humanistic value take a toll on our children. According to the Center for Disease Control and Prevention (2020), "9.4% of children aged 3-17 years (approximately 5.8 million) had diagnosed anxiety in 2016-2019." while "4.4% of children aged 3-17 years (approximately 2.7 million) have diagnosed depression in 2016-2019" (para. 2). This data shows an increase over time, showing a mental health crisis amongst our youngest generation. If we don't change the purpose, values, and structure of the typical classroom within society, these statistics will only continue to get worse. A study by Bratman, Daily, Levy, and Gross (2015) found that after spending time in nature, there were "affective benefits (decreased anxiety, rumination, and negative affect, and preservation of positive affect) as well as cognitive benefits (increased working memory performance)" (para. 1). When we bring nature and the outdoors back into the classroom, we will bring back humanity. Schools must, therefore, shift the idea of success away from materialism, more towards empathy, caring, love, compassion, and working to better the world. Allowing the

identities of our students to become prominent, visible, and welcomed will further help shape their learning of climate change and sustainability. Viewing learning through experiencing diverse perspectives in environments outside of the traditional classroom will allow students to reflect and act through critical analysis and questioning. What multiple identities do we have and how do they intersect? How do they affect how we experience things?

As teachers, it is our duty to prepare students to be human by experiencing humanity firsthand. Freire (1993) explains that "to be human is to engage in relationships with others and with the world. It is to experience that world as an objective reality, independent of oneself, capable of being known" (p. 75). Through interacting with the world, students become actively involved with and of the world, not merely in the world as passive bystanders. Sipos, Battisti, and Grim (2008) and Williams (2008) believe that schools are should be teaching the whole person, the head, heart, and hands to promote empathy, develop skills and integrate multiple ways of knowing.

Knowledge is subjective and dynamic, so education must be as well, welcoming the multiple perspectives of knowledge and mediums of showing intelligence and understanding. The theory of ecofeminism promotes the viewpoint there exists no knowledge that is universal, yet schools promote the knowledge they teach as the universal truth. Social constructs on identity promote the perspectives and agendas of those in power, furthering oppression and discrimination. Current forms of education focus on declarative knowledge (knowledge that is declared through technical information or scientific facts) and procedural knowledge ("how-to" understandings). This promotes an educational environment where students are powerless in the creation of knowledge, and learning takes the form of rote memorization for assessments. By

shifting towards effectiveness knowledge ("perceptions about the desirability and the capacity to participate in various behaviors") and social knowledge ("encompasses subjective and local knowledge including the motives, intentions and actions of other people"), knowledge can be created together as a community of learners, a relationship with learning is promoted, and educational experiences become more applicable to student lives. Redman (2013) describes

> One of the central ways for enhancing effectiveness knowledge is by focusing on problems that are locally relevant and at a scale with which students feel empowered to act, while also examining the positive impact of individual and collective change. (p.9)

In addition to welcoming the validity of multiple ways of knowing, Caine and Caine (1997) describe how it is also essential that schools promote the intersectionality of systemic issues.

> There is simply no such thing as anything separate. Nothing, absolutely nothing, exists without being a part of a set or system of relationships. Any attempt to perceive things as separate and apart is an arbitrary and false separation…There are no such divisions in life. Life does not create boundaries, we do…Hence we create curriculum as if the world were made up of separate parts and we have come to believe the parts, and not the reality of the whole. (p. 61)

In today's educational world, students move from math class to science class to social studies class, so on so forth. The subject matter is deemed independent of one another, rarely connecting together. However, in the world outside of classrooms, true learning rarely fits into one box. As Lorde (1982) argues, "There is no such thing as a single-issue struggle because we don't live single-issue lives" (para. 15).

For instance, climate change is unique in that it is not only a community or nation-wide issue, but also exists globally and impacts all of humanity and life on Earth. Climate change is a systemic issue, but one which exists within and outside of many diverse sets of systems. It impacts the geography of the world and creates climate refugees, takes a toll on local and global economies, directly affects global food supply, and many other spheres of life on Earth.

Unfortunately, as argued by Picower and Mayorga (2015), the direct consequences will impact individuals and nations of whom are oftentimes contributing the least to the problems at hand. "People with control maintain power and opportunity by stripping it from already marginalized people… [they place] blame and success on individuals rather than the systems" (p. 5). Much like was discussed in the *Combahee River Collective Statement* (2012), the only way that humanity can have hope with the issues of climate change would be "collective process[es] and a nonhierarchical distribution of power within our own group and in our vision of a revolutionary society" (para. 30). Education, especially place-based education, allows for the coming together as a human collective to share responsibility and ownership, as well as act together to save our world.

Place-Based Education: Education for Empowerment

Middle school is described as the age where students search for their place in the world through exploring their identities and passions. Students in the middle adolescence level enjoy feeling ownership and responsibility for their life experiences and the creation of knowledge. Schneider and Vander Ark (2016) define place-based education as "an immersive learning experience that places students in local heritage, cultures, landscapes, opportunities and experiences, and uses these as a foundation for the study of language arts, mathematics, social studies, science and other subjects across the curriculum" (para. 6). Place-based educational opportunities engage students with the materials being learned, in places in the world of which they are directly related. As such, the middle school environment is ideally suited for place-based education because students generally are excited about active citizenry and engaging in democratic practices. Lukk, Veisson, and Ots (2008) argue that in order to "promote a more

sustainable future and society, this "will ultimately depend on the decisions individuals and groups make regarding their own behavior" (p. 36). Place-based education promotes authentic global and local citizenry by providing a strong sense of place.

Place-based education encourages identity development and growth based on skills, interests, and passions encountered throughout the learning process as a result of authentic educational experiences. Curiosity and inquiry are the drivers of the learning. From a sustainability approach, students are able to ask "How did we get here and where do we go from here?" Teachers are able to guide the learning experiences based on the challenges and questions held by the students. Student perspectives are valued and central to knowledge formation, an essential component of education for sustainability because the students are the current and future climate justice leaders.

Education for sustainability through place-based education additionally empowers students through its challenges on authoritarianism. Uhl and Stuchul (2011) describe that "with transmission-based education, the mere accumulation of information does not grant intelligence, much less wisdom or self-actualization" (p. 9). As mentioned previously, Paolo Freire believed in a problem-posing approach to education, one in which students pose questions and search for solutions together. The problem-posing method opposes the traditional/banking model of education because all members of the learning community are viewed as keepers and seekers of knowledge. The banking model of education is viewed as pro-authoritarianism due to its one-way approach to learning, whereas the problem-posing model of education is more liberating due to its two-way approach.

Through place-based education, students become empowered to hold active roles in their own lives, their own communities, and their own worlds. Counter to a place-based theory, the traditional banking model of education separates students from true learning experiences because students are stuck indoors, away from the environments where the knowledge is formed. Palmer (1998) describes that "when we distance ourselves from something, it becomes an object; when it becomes an object, it no longer has life; when it is lifeless, it cannot touch or transform us, so our knowledge of the thing remains pure" (pp. 51-52). On the contrary, because place-based education is experienced-based, students and teachers are able to share their own perspectives on knowledge, learning together on behalf of one another in the community. A place-based model welcomes the voices of all participants, allowing all students to have a say in their educational environment. Because students are the leaders, they have direct ownership of the learning ideas, goals, and experiences. When students take ownership of their learning, it becomes more meaningful, authentic, and remembered. Students are challenged to shift their perspectives of knowledge from passivity to more of an action taking through self-efficacy, agency, and a sense of accomplishment approach.

Redman (2013) explains that when students have a more active mindset towards knowledge, education for sustainability becomes practical. Within the topics of sustainability, students are able to build and grow their skills and knowledge through an interconnectedness of the multiple realms of education and across multiple content areas. Students are able to engage firsthand with sustainable practices because education for sustainability through place-based education positions sustainability as the norm and the goal.

Place-Based Education: Education for Resiliency

One main goal of education is to shape students into creative and critical thinkers who have the resiliency, confidence, and experiences necessary to become active citizens in a constantly transforming world. Stetsenko (2012) believes that the objective of education is to guide students to become citizens who are able to understand the world around them and are able to transform it through their direct contributions. They additionally argue that education should provide the tools necessary for individuals and collective groups to form relationships with, in, and of the world as they seek to become more fully human. The inclusion of sustainable environmental education, particularly through place-based educational means, not only provides necessary tools to guide this goal but will also excite students in becoming active in their own futures. Keeping the end goal of intentional, active citizenship in mind, schools can grow a generation that can transform the world into a better place than it has been left. Education can be a powerful tool in society, one in which the process of growing as humans is possible. By instilling a value of resiliency, perseverance, and confidence, schools provide students with the tools to become world-ready individuals who have an active part and control over their destiny.

Place-based education promotes resiliency because it allows students to have a realistic view of knowledge and learning due to the interconnectedness of its subjects of learning. In his speech *Christmas Sermon on Peace and Nonviolence,* King (1967) describes that

> All life is interrelated. We are all caught in an inescapable network of mutuality, tied into a single garment of destiny. Whatever affects one directly, affects all indirectly… we aren't going to have peace on Earth until we recognize this basic fact of the interrelated structure of all reality. (para. 6)

Schools must serve as microcosms for the world, including discussions about the interrelatedness of reality.

However, schools do not yet mirror this goal. Students move from class to class, topic to topic, with neither transition of topics nor interrelation of content. Blumstein and Saylan (2007) explain that traditional learning focuses on one-way methods of communication, methods of which are devoid of values and debate. In *All Systems Go! Developing a Generation of "Systems-Smart" Kids*, Linda Booth Sweeney (2017) describes the current model of education as being fragmented because its separatist approach "reinforces the notion that knowledge is made up of many unrelated parts, leaving students well-trained to cope with obstacle type or technical-based problems but less prepared to explore and understand complex systems issues" (p. 142). To ensure individual connectedness and understanding of the earth and human existence as an interconnected system, education of environmental systems is necessary. Place-based education is optimal for an interconnected educational practice because of its appreciation for systems thinking education.

According to Ndaruhutse, Jones, and Riggall (2019), systems thinking is an

> understanding of how the different components and stakeholders of a system interact and impact each other. Systems thinking goes further than mapping key stakeholders and institutions, and includes analysing formal and informal interrelationships, and how they influence the functioning of a system… it recognises more complex interdependencies and how multiple components may affect each other in different ways. It also helps to differentiate between the underlying issue and the symptoms of something deeper. (p. 13)

These systems may include but are not limited to local and global democratic systems, health systems, economic systems, and environmental/ecological systems. When aligning systems thinking to education, it allows for student reflection and complete analysis on these issues, promoting "critical thinking, problem solving, and social innovation frameworks, such as in the area of design thinking" (Assadourian, et al., 2017, p.152). Place-based education with a systems thinking approach promotes a more complicated worldview, allowing for the interconnectedness

of problems and solutions while positioning students to have a more active approach to learning and knowledge seeking. Systems thinking prepares students across the many domains and systems of life. Students are better prepared to deal with real-world issues because they have the skills necessary to analyze problems and solutions through a multifaceted approach.

All topics of learning exist within a system. Jickling, Sterling, and Orr (2017) describe a systems thinking approach as one of which "implies implicatedness–ecological, moral, political, economic–between what otherwise appear to be unrelated phenomena" (p. vii). As such, it is not possible for students to fully understand the learning content without discussion of the larger systems involved.

Sterling (2003) believes that change within the educational system must occur in order to support holistic sustainability education. Currently, many forms of environmental education focus on individual actions to combat climate change such as recycling, using electric cars instead of gas, buying local produce, etc. However, this offers a limited approach, where individuals are seen as being to blame rather than systems. Having a system thinking approach allows for a focus on changing societal systems, not just changing individual actions. The Education for Sustainability Benchmarks (2017) discuss that "a systems approach helps us understand the complexity of the world around us and encourages us to think in terms of relationships, connectedness, and context" (p. 22). The systems thinking approach to education compliments education for sustainability because it allows for a more complete understanding of how humans have impacted and continue to impact the environment. "To understand human impact on Earth's systems, we need to understand systems" (Assadourian, et al., 2017, p. 145). Additionally, systems thinking in education allows for an understanding not only of human

reliance on environmental systems but also the limits of those systems. As the Cloud Institute EFS 2012 Performance indicators (2017) state, “We are interdependent on each other and on the natural systems…healthy systems have limits” (pp. 7-8). When students are learning in the systems where these problems are taking place, human impact, environmental degradation, and ecological limits become more visible.

In addition to promoting student resiliency through a system thinking approach, place-based education teaches resiliency through empathy and community-centric involvement. When students are learning about the environment from the environment and for the environment, empathy and love for the local environmental systems will grow. Place-based education allows for the development of authentic relationships with nature and community. When students are engaging with the local community, they are able to act and reflect on their actions for the betterment of their towns. A systems thinking, critical service learning approach allows for an understanding of the historical precedents of the problem and the impact of individual actions, connecting student lives and actions with those of whom they are helping. It allows students to ask “Why do these problems exist in the first place?” “Who is affected by these problems?” as well as “What environmental and environmental-justice issues do we face in our community?” Place-based education allows for a more encompassing view of the world, empowering students through resiliency and justice to become changemakers in their own worlds.

Chapter 4

Design

Purpose

To promote place-based educational experiences in schools, I am proposing the curriculum of an afterschool, student-centered club. The purpose of this club is to connect students with nature and their local ecology through hands-on means while promoting active citizenry through environmental awareness and action. The club aims to be transformational, impacting students views of the world, providing stakeholders with the knowledge and power to analyze and impact local systems, specifically environmental systems. Miller and Seller (1985) describe a transformation position of learning as a focus on personal and social change, specifically with regards to ecology and system interdependence and interrelatedness with the environment. As a result, a transformational position views social change as one in which humans are in harmony with environmental systems, rather than in control of them.

The club will have two central goals, one of which that is societal, while the other is educational. The societal goal of the club will be to empower students and school individuals to create their own knowledge through their active involvement in community projects such as a community garden. When students are actively involved in the creation of knowledge, the knowledge becomes realistic, authentic, and applicable to their lives. The hope is that students will use this knowledge in their futures to become involved in their own local environments and ecological communities. The educational goal of the club will be to provide students with concrete and real-world experiences based on ecology and agriculture. Students will have the opportunity to take an active role in the betterment of the local environmental systems as a result

of their educational experiences in the club. Additionally, the club will center its approaches around the value of student agency, allowing for student-ownership in all projects, and ensuring that student voice is prominent in the decision-making processes. Students will learn about their local environmental systems by acting in and with those systems.

These goals cannot be obtained without the involvement of multiple stakeholders including students, parents, teacher leaders, and community members. Teacher facilitators will strive to involve multiple stakeholders throughout the school year with the projects of the club, ensuring that projects aim to improve the community-at-large. Through their involvement with the curriculum, students will become involved in the formation of a community of learners and nature advocates, position themselves as the makers of knowledge, and to grow as environmental leaders and change-makers.

Curriculum Theory

John Dewey (1916) describes curriculum as "the reorganization and the reconstruction of experience which adds to the meaning of experience, and which increases the ability to direct the course of subsequent experience" (p. 76). As discussed in the previous chapter, the current model of education in America places emphasis on a traditional, or as Freire would say, banking model of education–one of which knowledge is provided to students by the keepers of knowledge (teachers), and is later regurgitated on assessments. According to George Posner's (1995) work, *Analyzing the Curriculum*, this model of education places emphasis on an educated person being able to master basic computation and literacy skills, as well as other menial facts that are needed to support a set of societal values with the focus of "proper citizenship" (p. 65).

Dewey would be disappointed in the current traditional model of education because of its lack of meaning, democracy, and student construction of ideas. John Dewey believed that in order for curriculum to be successful, it needs to provide students with real world and democratic experiences. All curriculum is based on a set of values, and the traditional model of education is based on maintaining power for a select few. Dewey's approach to curriculum design provides students with their own power, allowing them to experience knowledge creation and apply that power to their own lives. The contemporary model of curriculum is similar to this because it is centered around the idea that values are the true beginning points of curricular decisions, not just endpoints or outcomes. Curriculum, therefore, is the result of multiple influences and aims that must be viewed holistically. As a result, the curriculum described in this chapter has been designed around the values of environmental justice through active involvement with Earth, while instilling a love for nature. The goal is to foster educational and social change through valuing all student voices and allowing them the opportunity to become involved in the design and procedure of their own learning experiences.

To be successful in instilling a value of environmental justice, active participation in community and Earth systems, and knowledge formation, Dewey states that the curriculum development must take place as close to the act of teaching and learning as possible. A place-based educational curriculum goes hand-in-hand with Dewey's model of curriculum design because it allows students to have practical, authentic, real world and lived experiences with the learning. This provides flexibility to the program because the curriculum may be adjusted to better meet the needs of schools and learners.

The curriculum of the club will contradict the traditional learning environment of which students are used to because all stakeholders will be directly involved in the knowledge formation, decision making, and knowledge application assessment projects. When students are the leaders of the curriculum, they take ownership of the learning because their voices have value. Because of its student led and place-based approach, the curriculum aligns well with an experiential mindset, as discussed by Posner (1995). Posner describes the experiential mindset as being based on experiences that match the interests and issues that the students face. These learning experiences, along with everyday life experiences, help to shape students into what are viewed as "good citizens."

Hamilton (1980) also discusses the experiential mindset in his work *Experiential Learning Programs for Youth.* He states that experiential learning's "objectives should be to increase the competence of youth in such areas as planning, finding and making use of appropriate resources; persistence at a task; coping with new ideas, conflicting opinions, and people who are different; taking responsibility for others' welfare; and carrying out commitments to others" (p.191). As a result, the curriculum will place emphasis on what Freire would call a "problem-posing education" where students are asking questions, analyzing and interpreting information, and creating solutions together. While the topic of the problem is going to be posed by teacher facilitators, ultimately the content and learning experiences of the club will be carried out based upon student interests. The curriculum created in this chapter serves as an example of activities that may be carried out by the club, however, in reality, the learning experiences may vary depending on student interests, particularly during the winter months.

Place-based education also embodies Posner's (1995) cognitive mindset because it allows students to create their own meaning and understanding of learning activities by drawing on their background knowledge. Students' background knowledge directly shapes their perception of learning experiences, and the learning as such, is up to personal interpretation. The learning posed in a place-based curriculum emphasize interpretation, collaboration, and problem solving, all of which require a higher level of thinking skills and cognitive awareness.

The club will be student run and led, giving students firsthand experiences with democracy through having a voice in many aspects of the club. A place-based curriculum allows students to form personal connections to the content being learned through creating first-hand experiences with the relationships in and between the systems. Students analyze why the learning experience and knowledge formation must take place and create a system of improvement for their local systems. They construct their knowledge through "getting their hands dirty," directly engaging with the learning experiences through working with the materials and information. As a result, learning becomes more meaningful, relatable, and authentic. As Lincoln (2005) describes, "the anthropology of lived experience takes meaning beyond the merely observed, beyond the inferred, into a far more transformational and performative interpretation" (p. 27).

The philosophical position taken in the previous chapter additionally aligns well with the curricular development theories centered around a "building approach," or an approach that focuses on the needs and interests of learners, with the ultimate goal of learning as a process of which students participate to grow as individuals. From this stance, education becomes transformative and reconstructivist, allowing students the power to critically analyze the world around them, changing it as they see necessary. This curriculum follows the building approach

because of its design of instilling a love of nature and environmental systems based on the individual interests of all stakeholders. My belief is that in order for the program to be successful, it is important to allow students the opportunity to connect firsthand with their local community and community systems. By designing the curriculum around these many different approaches to curriculum design, students will have the power to construct their own ideas and values in meaningful ways because of the learning experiences provided. The ultimate goal is to grow students as active citizens both within and outside of their school communities.

Content and Method

The curriculum detailed in this chapter is designed as a model for a first year of the program. Subsequent years will be focused on reflection and redesign based on lessons learned by stakeholders. Specific overall objectives include connection to local communities and nature, understanding the effect climate change has on local systems, formation of 21st-century skills through place-based education, as well as promoting student agency. The method of instruction will be designed around discussion, reflection, collective research, and place-based learning. The topics encompassed in this curriculum will take an interdisciplinary approach, touching on areas in science, finance, mathematics, social studies, family and consumer sciences, community service, among others. To best support the achievement of club goals, the main topics may include but are not limited to: composting and types of soil, seed germination, planting and harvesting, design and engineering, budgeting and grant writing, climate change and its effect on local systems, as well as recipe development. Potential specifics of these topics are outlined as follows along with focus questions, but may change based on student interest:

- Types of soil and compost: What are research best types of soil and fertilizer? What type of composting is realistic given our community needs? How will material be composted be collected? What are the pros, cons, and history of different forms of composting? How has local soil quality changed over time, and how does climate change affect this?
- Seed germination and planting: When can specific types of seeds be germinated? How are they able to germinate, in the ground or inside on trays? What kinds of plants can grow together, and what needs its own space? What are the pros, cons, and history of different watering systems such as trickle irrigation systems? When and how are different plants harvested? What percentage of crops will we donate to local food banks, and what will be used in school for Family Consumer Science (FCS) classes?
- Food security and sustainability: How has our local agriculture been affected by climate change? How are crops affected by pests? How are crops affected by an increase in climate temperatures? How do changes in water quality (local streams, rain pollution, etc.) affect our local agricultural systems? How has climate change affected the local, national, and global food supply?
- Design: What will be the design of our raised bed space? If making the raised beds, what materials are best? How can we ensure the accessibility of our raised bed systems? What is the location of different plants in our raised bed garden system, and how far apart will they need to be planted from one another? If needed, how can we keep away pests in organic ways? What are the benefits of planting native local pollinator plants nearby, and what of those will be best for us to plant?
- Budgeting and publicizing: How will we raise funds for supplies needed? What fundraising events will occur throughout the year both within and outside of the school?

What grants can be applied for, and what are the requirements of those grants? How will our program and program community events be publicized? How will we engage the community, both within and outside of the school, in our club projects?

- Recipes: What are some seasonal recipes from various cultures that may be cooked with our crops in FCS classes? What is the history and cultural significance behind those recipes?

Organization

The organization and order of the program will be based around seasons/time of the year, since the program relies heavily on the outdoor environment. A focus on research, design, and development will take place at the beginning and middle of the year, whereas a focus on planting and harvesting will take place at the end of year 1, throughout the summer, and at the beginning of year 2. The curriculum itself is designed to be somewhat vague, allowing for student ownership and involvement in the planning and implementation of lessons in the club. The ultimate goal is for students to develop their own knowledge throughout the year through discourse.

The model of the curriculum will be based on a spiral approach, as described by Posner (1995). Posner states that in a spiral design of curriculum, "concepts are internalized or 'represented' in different modes by children at different ages and, therefore, must be taught in different ways at different educational levels" (p.126). As students progress throughout the curriculum, information learned prior in the year will be able to be applied at deeper levels. Students will "progress through increasingly complex types of knowledge, skills, and attitudes as they work on their projects" (p.182). The main media structure of my content will take the

divergent approach, as described by Posner. Posner (1995) describes the divergent media approach as the "assumption that any activity leads to a diverse set of learning outcomes" (p.132). Because the curriculum is based on place-based educational projects, there are many possible outcomes of values and understandings that students may gain. Since club events and meetings are optional for attendance, it will be necessary for students to be able to miss a meeting and still be successful when they return. As such, the design of the club is one of which is more flexible with the sequencing of topics, other than those of which require alignment with the seasons (such as planting and seed germination).

Curricular Structure and Lesson Examples

The organization, structure, and topics of the club will vary greatly based on the needs and interests of students and community members. Specifics of the club will be a result of discussions and decision making of the students, as it is essential that the students are the leaders of the club to ensure student ownership and personal connection. As a result, lessons included in this thesis are designed to be flexible. The structure of the curriculum is intended to serve as a guide for future club advisors to see examples of what topics may be included in the discussion of sustainability and environmental involvement. Examples of possible lessons follow the curricular structure.

Season of Meeting	Topics and Activity Summary

Late Summer/ Early Fall (August, September, October, November)	• Plant fall crops, harvest late summer crops
	• Creation of recipes and a history of the recipe from various cultures that can be used in FCS with the late summer crops (for example, paella, vegetable curry, summer vegetable couscous, etc.)
	• Come up with fundraising ideas for the year (for example, a bake sale using summer crops)
	• Publicity of the program to the community for donations of supplies
	• Areas of inquiry/research:
	  ○ What grants are available for the year and when they are due
	  ○ What percentage of crops will be donated and what will be used in school for FCS?
	  ○ Design of raised bed space

	▪ If making the raised beds, what materials are best ▪ How to make it accessible

Season of Meeting	Topics and Activity Summary

Fall (October, November)	• Harvest fall crops
	• Creation of recipes and a history of the recipe from various cultures that can be used in FCS with the fall crops (for example, pumpkin pie, stuffed cabbage, vegetable tacos, etc.)
	• Come up with fundraising ideas for the year
	• Publicity of the program to the community for donations of supplies
	• Begin grant writing process
	• Areas of inquiry/research:
	  ○ Composting: types of compost, types of composters, how and where to get compost materials, what are the pros, cons, and history of different forms of composting?
	  ○ Irrigation: pros, cons, and history of different watering

	systems such as trickle irrigation systems

Season of Meeting	Topics and Activity Summary

Winter (November, December, January)	• Clean the beds out and prepare for the next year of planting
	• Gage interest for summer volunteerism (families, students, teachers and staff)
	• Create a list of materials needed for purchase, purchase when funding becomes available
	• Areas of inquiry/research:
	  ○ Planting options for the spring
	  ▪ What to plant
	  ▪ When to germinate seeds and how long germination takes place, does germination occur inside on heat mats or outside in the soil?
	  ▪ When to plant them
	  ▪ Where to plant them based on sunlight

	requirements as well as what can grow together ▪ What can native pollinators can be planted nearby in the ground ▪ How to keep away pests in organic ways o Soil: Types of soil and fertilizer. How has local soil quality changed over time, and how does climate change affect this?

Season of Meeting	Topics and Activity Summary

Late Winter to Early Spring (January, February, March)	• Start the germination of seeds indoors
	• Create and assign student roles for the spring planting season
	• Create a map of what plants will go where
	• Prepare the garden beds
	• Organize and set up the irrigation system
	• Areas of inquiry/research:
	  ○ Food security and sustainability–how has our local agriculture been affected by climate change
	  ▪ How are crops affected by climate change–pests, increase in climate temperatures, change in water quality (local streams, rain pollution, etc.)

	▪ How has this affected the local, national, and global food supply?

Season of Meeting	Topics and Activity Summary
Spring (March, April, May)	• Plant spring and summer crop • Harvest crops • Donate excess crops to the food bank • Creation of recipes and a history of the recipe from various cultures that can be used in FCS with the spring crops (for example Persian spiced rice, spring vegetable ramen bowls, fresh pasta with asparagus and pesto, etc.)

Season of Meeting	Topics and Activity Summary

End of School Year (May, June)	• Assign duties to stakeholders for over the summer
	• End of the year reflection
	  ○ What should change for the next year? What should remain the same?
	• Areas of inquiry/research
	  ○ How to dry herbs and save them for the next season?

Summer Needs	• Weekly harvesting and maintenance of the gardens • Donating all summer crops to the food bank

Lesson Examples

January Meeting #1 and 2

Objective:

Students will be able to apply research on seed indoor germination in order to successfully start vegetable and/or herb plants from seed.

Essential Question:

How do seeds grow in our climate zone?

What seeds germinate during different months of the year? What do they require in order to germinate?

Materials:

Library books on starting seeds if available, technology for research, a digital cloud driven drive where students may access, create, and share resources, grow lights, heat mats, seed starting soil, seed starting trays, seeds, baking sheet

Strategies:

1. Storytelling/Prior Knowledge Reflection: Students will discuss their prior experiences and knowledge about how seeds can grow in both indoor and outdoor environments.
2. Group Research: Divide students into research groups to investigate how seeds can grow indoors, and when they can begin growing for our climate area.
    a. Students will need to discuss what plants will be most successful with regards to:
        i. Growing in raised bed gardens
        ii. Growing in our particular climate (temperature, rainfall, and climate zone)
        iii. Will have a more desirable yield
        iv. Will have a well-liked taste across most community members
    b. Students will need to create a list of what materials will be needed in order to ensure successful germination of the plants.
3. Group Democratic Discussions
    a. The facilitator (teacher advisor or student leader) will lead a discussion on the decision making for the following aspects. The teacher advisor needs to keep in mind that while this is a student-led organization, they may "sway" the vote by providing their educated feedback based on student discussions.
        i. What are the roles and responsibilities that are required for the germination of the plants?
            1. Who will be responsible for the different roles and responsibilities?

2. How will we hold these members accountable?
3. What will happen if a member is unable to complete their assigned task?

ii. What plants will we start from seed this year?
1. What will grow the best for our climate? Our community?
2. When will these seeds be started? How will they be started, indoors or outdoors?
3. How often will they need to be watered? How deep will they need to be planted for germination?

iii. What materials will still need to be bought for seed germination, and how will we fundraise for them?

4. Assessment: Seed Germination Project
   a. Students will apply their knowledge towards the germination of their seeds. Steps of planting are below
      i. Arrange the heat mat on the baking sheet, directly under the grow lights.
      ii. Place seed starting soil inside of the seed starting trays
      iii. Place seeds inside of the soil
         1. IMPORTANT: Have students research how deep to plant the seeds. This will be different for each type of plant
      iv. Water the plants, place the trays on the heat mats, and turn on the grow lights
      v. Have the students water the plants every day (teacher facilitator may need to model how much water they need)

February Meeting #1 and 2

Objective:

Students will be able to explain how our local agriculture has been affected by climate change

Essential Question:

How are crops affected by climate change?

How do pests, increase in climate temperatures, change in water quality (local streams, rain pollution, etc.) affect agriculture?

How has climate change affected the local, national, and global food supply?

Materials:

Library books on climate change and agriculture, technology for research, a digital cloud driven drive where students may access, create, and share resources, poster boards and art supplies in case students want to present with a non-digital format

Strategies:

This lesson will take the format of a Self Organized Learning Environment (S.O.L.E.) project. For a S.O.L.E. project, students will answering a "big question" with their group, one of which does not have one correct answer. There will be many paths of which they can answer the overall question. Students will research topics together, record their findings, and present as a group to the club. Students may present in any way they choose, whether it is a digital presentation, poster, or student-led discussion based on research.

Day 1:

1. The teacher will display on the front board the overall question that students will be answering: "How has our local agriculture has been affected by climate change?" If desired, the teacher may ask follow up guiding questions to aid student research: "How are crops affected by climate change?", "How do pests, increase in climate temperatures, change in water quality (local streams, rain pollution, etc.) affect agriculture?," and "How has climate change affected the local, national, and global food supply?"
2. Students will self-organize into groups based on their interests as well as what path they plan on taking in order to answer the big question. The ideal group size rages between 3 and 5 students, although 6 is also acceptable.

3. Students will collaborate, research, and discuss their findings. Students may ask other groups to discuss their findings throughout their research–the sharing of findings throughout the process is encouraged.

Day 2:

1. Students will spend the first 5 minutes discussing any research they have found since the last meeting with their group.
2. They will then create a presentation to share with their peers. This should take no more than 20 minutes for students to create. It is important that the teacher facilitator emphasizes the importance of quality information, rather than appearance of the presentation.
3. For the last 20 minutes of the club, students will present their findings to the club. At the end, the teacher will lead a short discussion on how their research can apply to their understandings of growing food for their own community, and what actions need to be taken to ensure successful crops.

March Meeting #1 and 2

Objective:

Students will be able to design a raised bed garden system where crops are planted in optimal locations based on student research.

Students will be able to successfully implement a trickle irrigation system that self-waters the plants as often as needed, as per student research.

Essential Question:

What requirements do plants need in order to thrive? Sunlight/shade? Spacing? Water? What plants can be planted together? What plants need to be planted alone?

Materials:

Library books on vegetable gardening, technology for research, a digital cloud driven drive where students may access, create, and share resources, germinated plants, fertilizer (compost ideally), raised bed gardens (metal or wood), landscape fabric, soil, gardening equipment (gloves for participants, garden forks, spades and hand trowels, shovels, hose and hose attachments, etc.), trickle irrigation systems that has an automatic watering timer system, crop covers for cooler weather, graph paper and pencils for designing the location and spacing of crops in the beds.

Strategies:

1. Storytelling/Prior Knowledge Reflection: Students will discuss their prior experiences and knowledge about planting vegetables, either for an in-ground garden or a raised bed garden.
2. Group Research: Divide students into research groups to investigate the essential questions. Assign each group a topic: sunlight, water, spacing, planting together vs. alone.
3. Group Democratic Discussions: The facilitator (teacher advisor or student leader) will lead a discussion on the decision making for the following aspects. The teacher advisor needs to keep in mind that while this is a student-led organization, they may "sway" the vote by providing their educated feedback based on student discussions.
    a. What plants will need to be placed in full sun? What will need to be planted in more shaded areas?
    b. What spacing do each of the crops need?
    c. Using this information, what can be planted together, and what must be planted alone?
4. Application: After the group discussion, students will break off into their research groups to design the raised bed gardens, and decide what will be planted where. Part of the

design must include water usage so that the trickle irrigation system can be set up when planting occurs. After groups are finished with their designs, the teacher will project completed designs for the club to vote on.

5. Assessment: Setting up the beds and planting crops
    a. First, students will have to prepare the soil, filling the beds with soil and fertilizer. If this is the first time using the beds, make sure to line the beds with landscaping fabric. They will need to turn the soil, ensuring that the roots of the plants will be able to grow and spread. After the soil is ready, students will water the soil, making it easier to plant the crops.
    b. Students will plant the early spring crops, placing and spacing them out correctly based on the research and design voted upon by the group. After all crops are planted, the students will water them one last time. If any crops need to be covered due to temperatures, they will do so at this time.
    c. The final step will be to set up the trickle irrigation system. The ideal system will have a timer, allowing for plants to be watered on a specific schedule. This will ensure that plants will be watered during breaks and weekends, also limiting the amount of daily and weekly maintenance that is required.

Implementation

The curriculum will be implemented in a club that meets every other week after school for an hour each meeting. However, this design may change based on the needs of each school. The curriculum listed above is designed in a seasonal template, allowing for flexibility with activities and time. This flexibility allows for opportunities for students to take the reins and explore their own interests with the topics engaged with at the club. Changes to the curriculum will be made on an annual basis based on the needs and interests of stakeholders. For example, after the first year, research on types of beds and irrigation systems will likely not occur unless the club plans on expanding the garden or replacing old equipment. Future years will have more flexibility with time allotted to environmental experiences outside of the school and garden grounds, such as local river/stream studies, field trips to local farms and water sanitation plants, volunteerism with the distribution of donated crops, etc.

As discussed in Posner (1995), there are many framing factors that must be considered in the design and implementation of any curriculum, including: physical, cultural, temporal, economic, organizational, political-legal, and personal factors (p.181). Although they are not the only factors that affect the design and implementation of this curriculum, I will be focusing on a temporal, and economic framing position.

Temporal Factors

The curriculum has special scheduling requirements that vary based on the geographic location and seasonality of the school. The curriculum in this thesis is based on the seasonal environment of a Philadelphia suburban school district. Additionally, since schools have a summer vacation, that creates the need for summer volunteers or the ensuring of crops planted

are only for the spring and summer. If summer crops are planted and volunteers can help with harvesting on a weekly basis, the food can be donated to local community organizations.

When students take ownership of the club projects, less teacher time is required. By having students be the leaders of the club, the teacher takes a more facilitative approach. The time most schools allocate for the learning may or may not be adequate depending on the availability of teacher facilitators as well as the school's calendar and after school availability. Time allocated for teacher involvement depends on the allotment of club hours as determined by the school district, individual school, and club advisor's needs. The curriculum is based on a model of two hours of meeting time per month, with summer breaks off between the months of June and August. The time needed to prepare depends on the intensity of which the program is run. The toughest part of the curriculum for teacher time would be during the summer months if summer crops are planted because there would need to be volunteers harvesting throughout the summer. Additionally, if a trickle irrigation system is not put into place, there would need to be volunteers coming in during the summer to regularly water the plants. An automatically timed trickle irrigation system eliminates the need for daily volunteers to water the plants.

Physical Factors

The curriculum requires an outdoor area large enough to accommodate for at a minimum 2 but ideally 4 or more raised bed garden systems. If there is any space available for a compost system, this would also be ideal. If there ae no outdoor facilities available, this curriculum may be adapted for grow tables and microgreen systems. Schools will also need a place to store gardening equipment and other materials. The materials required for this curriculum are listed below, but may change based on the needs of the school.

Minimum requirements of materials for successful implementation:

- Raised bed gardens (metal or wood)
- Landscape fabric
- Soil
- Gardening equipment (gloves for participants, garden forks, spades and hand trowels, shovels, hose and hose attachments, etc.)
- Plants or seeds
- Plant supports (cages, wires, stakes, etc.)

Additional materials that are optional, but ideal to have for successful implementation:

- Automatic timer trickle irrigation systems
- Crop covers for cooler weather
- Grow lights, heat mats, grow trays, and starter soil if students will be germinating the plants
- Watering can
- Plant pots
- Composter (a raised tumble composter would be best to avoid pests and allow for easy turning of material)
- Worms and worm towers for worm castings

Economic Factors

Materials and equipment purchase costs will greatly vary depending on where materials are sourced. The extent of the project greatly depends on the amount of money that is available

to the club. It must be expected that the stakeholders and teacher leaders will need to apply for local, state, and/or federal grants and conduct their own school and community fundraisers in order to allow for the completion of the projects entailed in this curriculum. For the school district this club was designed for, planning, preparation, and club meeting times are $33 per hour, with 30 hours allotted for the school year. However, this particular club has programs implemented in addition to the gardening project, including local field trips and ecological study activities.

As designed in the curriculum, staff development should have a minimal cost to the club, but does depend on the knowledge already held by teachers and community leaders of the club. If the club is student led as designed by the curriculum, teachers and students will learn and develop the program together, cutting back on the time and finances required for formal staff development. Costs for the program will vary year by year, with the first year of the program being the greatest cost due to the amount of materials required for purchase. After the first year, the main costs to the club will be for seeds/plants, any replacement tools/other materials, additional soil as needed, and payment for teacher facilitators. Because the funding of the club relies heavily on grants and fundraising efforts, the amount of monies available to spend will also vary year by year.

Chapter 5

Assessment and Evaluation

Assessment and Evaluation

This place-based educational research project was designed to allow students to lead their own creation of knowledge, while connecting them with their community and environmental systems. The goal is to form a community of learners who are excited to become involved with and transform their local communities, specifically with regards to the environment. Through this curriculum, students participate in experiential, place-based learning activities through learning about environmental sustainability in their own communities. The gardening project allows students to analyze, understand, and directly benefit from their growth as learners and community citizenry. It takes a club-based approach, ensuring the flexibility of the program based on student and community needs, values, and interests. Students take an active role in the germination of seeds, growing of crops, harvesting of vegetables and herbs, cooking of these food items, and composting of dead organic matter. From start to finish, students are the leaders and change makers in this entire cycle. Posner (1995) would describe this learning system as experiential learning, one of which

> place special demands on schools and teachers. Generally speaking these curricula have the following characteristics: (1) the cross subject-matter lines; (2) the rely more on the community as a resource than on textbooks and other prepared instructional materials; (3) they require student-centered classrooms emphasizing small group, cooperative, rather than whole group, competitive student work; (4) they are organized around ongoing tasks, e.g., project , that take relatively long periods of time to complete; (5) they depend on a teacher who acts more as a facilitator and resource than as the person in control; and (6) they employ evaluation methods directed at the demonstration of competence in real world tasks, rather than on written tests emphasizing recall of facts and terminology. (p. 192)

As such, the curriculum is designed to be interdisciplinary, tying together history and social studies, mathematics and design, science, technology, family and consumer sciences, and writing. For history and social studies, students will be researching the history behind the problems they are learning about, as well as the history and cultures behind the recipes they find. Students will analyze relationships between humans and their environment, as well as identify and take an active stance in improving their own relationships with nature. For mathematics, students will be designing and spacing out plants, reviewing and planning cycles for germination, planting, and harvesting, as well as measuring materials required for plant growth. For science, students will be researching the life cycle of plants, requirements of life and sustaining life, the interactions and relationships of living things, as well as the fragility of the environment. For technology, students will be questioning and applying their knowledge of the best types of garden systems, compost systems, and irrigation systems, as well as their history and application worldwide. For family and consumer science, students will be designing and cooking recipes using their own crops and learning about their nutritional values. Finally, for writing, students will be taking an active role in the writing of grant proposals, as well as writing letters to local businesses for support and thanks. They also will be writing various materials for publicizing the project and clubs throughout the community.

The ultimate success of the program will be evaluated throughout the year with formative assessments, with a summative assessment survey taking place at the end of the year celebration. According to Posner (1995), evaluation is completed in order to provide critical information to the teacher facilitators and other stakeholders so that they are able to make decisions and changes to individuals or the curriculum itself (p. 224). Saying this, assessments will be utilized to reflect

upon individual goals, group and club goals, application of these goals, and changes to be implemented in the following meetings/years.

As a result of the flexibility of the program, assessments will need to be decided on by the facilitator to directly meet the needs of their students and schools. The summative assessment described in this chapter will serve as an example of what may be used for this curriculum, in addition to the formative assessments described in Chapter 4. Formative assessments implemented throughout the club year should be designed to check for student understanding and progress with materials, while also ensuring the club as a whole will be able to successfully complete the project in a timely manner. One implementation of a formative assessment may be the application of research to the project, such as the spacing of plants or the design of the gardens based on sunlight. Success of the garden may be translated into success of individual and group research.

While the assessment outlined below may take place in a survey format, I believe that a discussion format may also be worthwhile so that students may collaborate and build their answers together. Questions may be sent out to members after the meeting in case they would like to provide additional reflections. While formative assessments will take place throughout the duration of the club, ensuring student growth and club successes, the assessment outlined below is an example of a summative assessment to be used at the end of the school year. The ultimate goal of the survey would be for student reflection on the club itself, the impact of the learning on the students' life, and how the club projects impact the community. Assessments throughout the program will relate directly to the essential question(s) of the meeting (examples of which are

shown in the lessons of Chapter 4), designed with the ultimate goal of active citizenry and love for nature kept in mind.

Final Assessment Questions

1. What did you enjoy the most about how the club was run? What did you dislike about how the club was run?
2. What was your favorite topic learned about throughout the duration of the club this year? What did you like about it, and what did you learn from it?
3. What was your favorite activity that you participated in during club time this year? What did you like about it, and what did you learn from it?
4. How did becoming involved in this club change your perspective on nature and our (human) interactions with Earth? Has anything changed in your daily life as a result?
5. How did the projects of this club help to better our school community? Our local community?
6. If you had to describe this club to a friend, how would you describe it?
7. How will the lessons that you learned this year during the club help you in your future? For example, what did you learn that you can apply to your life as a teenager and as an adult?
8. What are your suggestions to improve the club? If you could change something about the club or do something differently from this year's activities, what would you change? Why would you change it, and how?
9. How has this club helped you to grow? This can be academically or not academically.
10. Is there anything else you would like to share that would help us to improve for next year?

Given that the curriculum is designed to be place-based and experiential, an outcome- based and intrinsic based evaluation will be utilized, as described by Posner (1995). The intrinsic based evaluation will be carried out through student reflections on their experiences, and how they plan on applying their knowledge in the future. For the outcome-based evaluation, Posner states that the facilitator will need to determine whether or not the curriculum met its goals based on the outcomes of the program. For a short-term outcome-based assessment, facilitators will be able to determine its success based on the discussions and research conducted by students. For a long-term outcome-based assessment, facilitators will be able to determine whether students were able to successfully apply their new knowledge and skills towards the project, and whether they are able to analyze their own successes and shortfalls with the application.

Conclusion and Next Steps

The design of this club and curriculum is to be reflected upon and changed based on the student and school community's needs on an annual basis at a minimum. Ideally, a "student board" of leaders will be elected at the end of the school year of older members who are able to reflect upon and share their learning from years as a "regular member." Additionally, a cloud-based drive should be formed for club members to see prior year's research, implementation, projects, reflections, and end of the year summative assessments with suggestions for club improvement. As a result, the club projects will be able to grow in its efforts, publicity, project size, and community involvement each year, with the ultimate goal of becoming a staple to the community's environmental educational outreach and involvement. While the curriculum designed in this thesis was designed for my specific school and school population, its flexibility allows it to be implemented in almost any educational setting.

In the future, I plan on continuing my education at West Chester University as a part of their Educational Doctorate program, specifically in Curriculum and Instruction. I plan on using what I learn through the program to better refine the curriculum designed in my thesis and implement it at my school. I plan on using qualitative data from this curriculum in my school's ecology club, transforming it from a club originally designed to educate students on whales and wolves to a club designed to excite students about becoming involved in their local ecology and environmental systems. My usage of the qualitative data will be to show a relationship between place-based education and student community involvement and activism, all while allowing students to apply their knowledge from various fields of education to a real-life and meaningful experience. I hope to show that involvement in the environment, specifically through place-based education with regenerative values in mind can enhance student active citizenry, increase critical thinking and problem solving, as well as promote creativity through collaboration and communication skills.

I hope to conduct more research on the present models of education for sustainability, particularly education for environmental regeneration. While education for sustainability forms a foundation for students to learn about the history and causes behind climate change, sustainability in and of itself has many flaws. For example, if we teach students that sustaining humanity's current track, specifically with regards to life styles, is possible and practical, I believe that we are doing our students a disservice. Change is necessary to get humanity off of the track towards disaster, and a transformation in society tied with environmental regeneration is required.

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