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Globalizing Sustainable Education: Environmental Literacy Connecting Cultural Literacy

Sofia Maciel
California State University, Monterey Bay

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Sofia Dorais Maciel

California State University Monterey Bay

Abstract

This Capstone project aims to increase the integration of both a sustainable and globalized education. This is an important issue for students and teachers worldwide because without a more globalized and environmentally aware educational focus in schools, there will be little to no improvement in the suffering and changing climate of the planet. It is argued that after decades of neglect, nations are finally becoming aware that the natural health of the earth is in a delicate state. We are all stakeholders facing the risk of environmental dangers, but for this project the focus is on teachers and students. These stakeholders were chosen because teachers are responsible for educating about necessary changes and students are responsible for taking this knowledge and applying it to their communities. After interviewing two educators and two students at a local sustainable after school program, three action options were developed in hopes of fixing this lack of holistic education. Education is our most important tool to combat climate change and how we use this tool will make all the difference.

Keywords: Globalization, Sustainability, Education, Communication

Globalizing Sustainable Education:

Environmental Literacy Connecting Cultural Literacy.

The decision to become a teacher was not an easy one. It is not an easy career choice. There are numerous reasons why becoming an educator is a difficult choice and as we get older and smarter it only becomes harder. My passion is the environment and that is what pushed me toward education. In my second year at Cal State Monterey Bay, I took a Sustainability in Politics class. This class was taking place during the 2016 election and focused very much on big businesses and national impacts on the world resources that we are exhausting in America and throughout the world. This was my call to action. This class taught me that the most effective thing that I can personally do to answer back to these environmentally unjust acts, is to educate the public about it. Three years later, the drive to educate about sustainability and environmental relationships is still my driving passion in life. I have learned so much, however; in the connections that teaching has within the world and the connections that it makes capable among students. One of the most important things that I have learned in terms of education is that connection and communication among people is key. Global connections can and should be being made between people around the different cultures of the world. Each day humanity becomes more connected through technology and at the same time more distant through media.

The excitement that came with starting this project was based on the idea that every person in the world can relate, if not understand, the current separations of the world that we are facing today. National tensions of neighboring countries are at an all-time high today. Even without a full-blown war, we still have hostile relationships throughout the world based on stereotypes, cultural differences, and individualistic priorities. This action project aims to elaborate on the importance of Interglobal connections and fair and united agreements among nations. This seems almost impossible to us, that in 2019 we would be so far from having a fair understanding of the global and environmental importance in the relationship of humans with the world. Education is the solution. Education is the solution to all problems, as is communication (which is just another form of education). I wanted this project to express the importance of multicultural education which will teach students how to manifest global connections on an international scale. While this seems difficult considering the time strain in most schools today, it is entirely possible with the support of a national shift in hopes of valuing education over differing global issues that are draining tax dollars. By educating children first on their local

environment and continuing to expand their knowledge outward to reach beyond country borders, students will gain a sense of environmental wonder and engagement from different cultures and regions of the world. As students grow older and more aware of the world, they do the same with culture, language, and economic stability of their home and country and then outward to others. It does not take much time to simply have students consider the culture and nature of other countries and the positive impacts that come with this developed awareness is by far worth the effort in pushing this integration of international education.

The aim of this project is to illustrate what I believe could be the driving influence of their passions and connections to planet Earth. This research project emphasizes the importance of global connections and how that connection can help the growth of students to reflect a more considerate and connected world. These aspects and priorities can be integrated into every school, state and subject. The following questions can be incorporated into a classroom lesson and help students understand another level of connectivity. Teachers can ask how student's homes are unique such as; what types of trees and plants grow in your area? What types of animals live in your neighborhood and what do they eat? By understanding their own natural surroundings, students acquire the tools that allow them to analyze the unique capabilities of differing regions. Including class level questions along with each section of this global connection analysis will aim to uncover what sort of growth and discussions students can have in a classroom that talks about our current and past global relations. Each of these aspects of the planet are in danger of increased tensions, decreased connection and lack of empathy when they should all be working in unison. Education best takes place when it is made personal in the perspective of the learner and his/her peers to solve a problem for the greater good.

This mindset is one that I hope to establish within the everyday classroom. With a shift in curriculum and environmental emphasis in the education system, changes can occur. While these changes seem very far away and difficult to accomplish, they can be made with a collective voice of concerned individuals. From adults, to students, to kids, to college students, a simple email to your state education representative can make a large difference in the focus on education. Making for a more sustainable education will lead to a positive loop of energy throughout education that balances knowledge and connection between humans and nature.

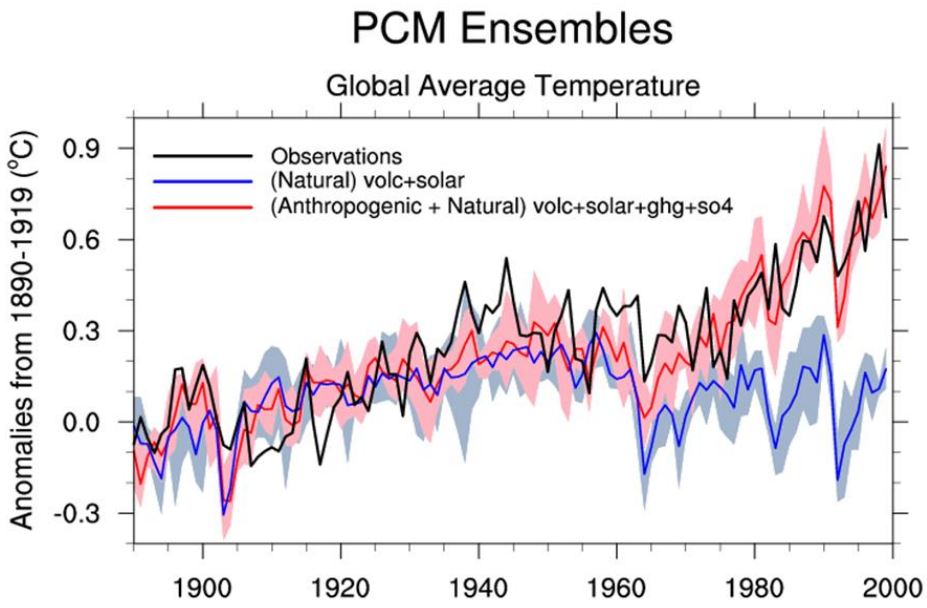
Literature Synthesis & Integration: Building Positive Relationships with Nature

Sustainable education is a topic that has been researched, emphasized and discussed for years among academic scientists and educational administers. The reason for that is because it is a subject that impacts every country, state, community and person. The planet is affected by every consumer decision we make from international trade to in home recycling. That is why intellectuals have urged the public to become more educated in sustainable habits and prioritize the global efforts of sustainability. This directly connects to the importance of globalization being integrated into education as well. The best way to achieve a sustainable, connected and well-educated public is to normalize a more global education that connects different parts of the world to create a stronger world view and world connection. This process will all come down to education, to the future generations and to the priorities that we choose to teach them within schools.

The problem

The lack of educational awareness around the world not only leads to the deterioration of our climate and ecosystems, but also to the security of human safety on a global scale. Gibson, Rimmington, & Landwehr-Brown. (n.d.) back up this claim with research emphasizing globalizations ability to increase global interdependence, interconnectedness and cultural diversity. Science has proven the increase of carbon monoxide and other greenhouse gases changing and suffocating the world at abundant rates since the industrial revolution. According to the Parallel Climate Model (Figure 1) from Henson's 2014 book on climate change, natural disasters are increasing at the same rate as the rising temperatures of the planet's atmosphere as well as the human and natural causes (regarding solar, greenhouse gasses, ozone depletion and more caused by human action).

Figure 1. Parallel Climate Model



Note. Retrieved from; *The Thinking person's guide to Climate Change.* Robert Henson, 2014.

It was not until natural disasters started becoming more prevalent and consistent that politicians and governments really began to act toward this issue. Even today, in 2019, climate change is still not taken seriously as the threat level that it is. Gutek (2006) states in his studies of American education in a global society "After decades of neglect of a deteriorating natural environment, nations and peoples are finally becoming conscious that the natural health of the earth, as a biosphere, is in a delicate and hazardous condition." (p. 11). The question continues to become more relevant; why are we letting this damage to our planet continue? In 2007, scientist, Blumstein exposed the constant conflict of environmental negligence in education and in the world. He connects the problem with the lack of environmental integration within schools which causes the failure for people to connect their individual actions to the environmental condition. The environmentally damaging trends, such as, increasing fuel consumption per capita and an increase in fossil fuel use are small examples of how our careless consumption of resources is dramatically increasing greenhouse gas emissions since the industrial age. In relation with Blumstein's point, Radbourne (2016), goes on to criticize the albatross that is the system.

Radbourne writes about the difficulty that teachers face while working with the systems standardized tests, curricula, pedagogy, and national assessments in classes. Teachers are overwhelmed, being forced to use these state standard testing methods to close educational gaps between high- and low-income schools and prepare children to become critical thinkers within our economic system. The standards in place are not in support of the world we idealize. Education is meant to connect us and lead us to a more balanced society of fair and democratic union. Education is also meant to connect us to our planet and aid in balance with its ecosystems and health. Each continuous act of natural deterioration becomes a positive feedback loop to another. As these trends continue to not only thrive in America but grow with corporate determination more harmful results follow. For example; acid rain, industrial pollutants degrading woodlands and lakes, deforestation, expansion of deserts, prolonged droughts, famine conditions in sub-Saharan, increasing oil spills (*Exon Valez)*, damaged plant and animal life, explosion and meltdown of the Soviet nuclear reactor (*Chernobyl)* : all weakening the planet's ecological balance and cannot be a concern limited to a single country or region. Gutek states the following in correcting the damage done to the environment; “Environmental issues are global in scope; their solutions need to be global as well." Education can play a primary role to not resolve but to mitigate the problems of ecological deterioration. Gutek goes on to state: “Conservation in all of its aspects plays an important part in informal and nonformal education as well as in the school’s formal curriculum” (p. 11).

The emphasis on the importance of global conservation in our resources has gotten lost in consumerism. The lack of global awareness in the U.S. alone is proven to be shockingly low. A National Geography survey reveals the lack of geographic literacy in America. Trivedi (2002) states in this survey, “About 11 percent of young citizens of the U.S. couldn't even locate the U.S. on a map. The Pacific Ocean's location was a mystery to 29 percent; Japan, to 58 percent; France, to 65 percent; and the United Kingdom, to 69 percent.” (par. 5). It is not the student’s fault that they are undereducated. They will listen to what they are taught, and they will copy what they consume. Due to commonality in society, single waste plastics are consumed on a regular and excessive basis. Not only would it be worth wild to educate children in sustainable behavioral habits but also to expand their thinking beyond their own community to develop a worldview of the environment. Since 1976, California schools have required to include instruction that connects humanity as a part of the Earth's ecological system and emphasize the

importance of protecting the environment (San Diego County Office of Education, 2019). According to Henson (2014), there are many contributors to the 40% increase of greenhouse gasses in the atmosphere in the past two centuries, all of which were human caused and economically driven. From deforestation to oil extraction to raising cattle, these carbon-dioxide and methane pumping acts are continuing to grow in order to make a profit only to feed the destruction of our natural planet as we know it.

Why is it an issue?

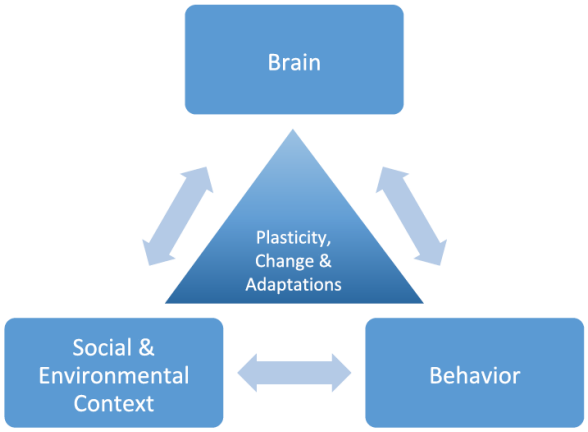
In 2002, the California Department of Education (CDE) "Education and the Environment" report noted, "…the health and welfare of our citizens demand that all Californians understand and value the environment in which they live." Since that report was published almost two decades ago, climate change has proven that it is a matter that faces the world. Climate change relates to the world's usage of energy, water, waste, pollution, and transportation, things that are influenced in everyone's everyday life. This relation to our changing climate has only made it more abundantly clear that the world requires an educated population with the skills and tools that will allow them to analyze and understand the complex issues facing the world. Through education, students should be capable of discussing and composing ideas to mitigate the changing climate regarding our water use, plastic production, resources, and more. In a 2015 executive order to designate that California's greenhouse gas reduction will target 40% below 1990 levels by 2030, Governor Edmund G. Brown states; "taking climate change into account in planning and decision making will help the state make more informed decisions and avoid high costs in the future." Governor Brown went on to state that climate change will ".... disproportionally affect the state's most vulnerable citizens." Low income communities are often most impacted by natural disasters and economic disparities which continues the expansion of the achievement gap. This statement clearly highlights the need to increase environmental literacy for all students and all people in order to tackle this issue. Those in high economic standing and low must reach an educated dialogue of discussion to sustainable change the course of climate change.

Education starts from the moment cognitive development begins in a child's brain. The developing brain works in mysterious ways. Our understanding of child development makes for an adequate argument as to why important skills, such as geographical and environmental,

should be introduced at a young age and built upon for better knowledge development. To prove this statement, I've researched a neurological study at Virginia Tech called Adaptive Brain and Behavior (ABB) education. ABB education relates to this study in illuminating studies of the brain's functions and how it works in different areas of understanding. In this case, I felt that Figure 2 (below) shows a perfect example of how a student's brain is being guided when learning any subject in school. Students can be taught to practice sustainable habits inside and outside of school, but they will not actually be able to pick up these habits unless they see their environmental context following these practices as well. This means that the actions of parents, teachers and other influences in a child's life have a much larger impact on a child's thinking and development than they may know. The figure below illustrates the cycle that the brain develops and how it shifts toward change. This is relevant to the current issue we face today in a lack of environmental and global awareness as more of the normal behavior society is based on media and consumerism rather than holistic values and environmental connection.

Figure 2.

Adaptive Brain and Behavior (ABB) Education



Note. Retrieved from Virginia Tech (n.d.)
https://www.provost.vt.edu/destination_areas/areas_of_focus/da_abb/abb_education.html

The figure above directly connects to today's reality of younger generations growing up with a heavy influence of social media. The role of media consumption is overtaking America's younger generations and preventing a true concept of globalization to be available to young people. According to Vishranti & Prafulla (2016), excessive media influence prevents children from developing a true face-to-face connection with peers. Their research goes on to describe the distractions that media causes for children, impacting their behavioral and social environmental development and in the pattern displayed by Virginia Tech. In turn, this research continues to support that there is a lack of global awareness that is prevalent in today's education system. "Schools tend to reflect the world outside their doors." Radbourne (2016, p.103), states. This statement is true not only for schools, but for individuals as well. Students and people reflect what is going on around them whether they know it or not. What is occurring across the world in Africa and China is affecting us here in U.S. more than we are taught to be aware of. The truth about the world and what certain people around it are dealing with is not discussed or even taught to the students in America. The truth is that the disparities of living are substantially different around the world. Some people are living in clean cities or communities enjoying a decade or more of education and extensive access to food, water and consumption. Others are suffering in third world countries facing starvation, lack of access to clean water, illiteracy and more. As the population increases, the latter group becomes the majority and the world continues to shift on a global balance of equity. According to Gutek (2006), "the population of the U.S. is expected to increase by 20% in the twenty first century. Nigeria's population, by comparison, is estimated to increase by more than 100% in the same period" (p. 14). Gutek goes on to explain how the underdeveloped nations lacking in technology and economic stability suffer from more endemic diseases such as AIDS, unstable infrastructure, ethnic strife, and quality of life overall. Global literacy is something that is not taught in schools when in reality, it relates to us all as humans. According to Nair, Norman, Tucker, and Burkert describe global literacy as a sustained opportunity to learn about the human imagination, expression, and the products of many cultures. Being exposed to this form of learning can allow the student and people to create interrelations within and among global and cross-cultural communities and overall teaching the values and histories underlying US democracy. Environmental literacy can be a gateway to global and holistic education. By educating students how and why they should understand environmental importance on a global scale their worldview expands immensely. According to scientist

Blumstein (2007), since 1970 the U.S. has improved on scientific literacy exposed to the public, but only 20% of the public is considered scientifically literate. While the access to the data and information is abundant the public's understanding and awareness of the environmental problems are low.

What should be done?

The term *globalization* is one that is newly introduced to the 21st century vocabulary. The term describes a type of colonialism concept that derives into our history with colonial conquests. Colonialism, in this sense, means a practice of domination, or subjugation of one people over another (Radbourne, 2016). Globalism, in contrast refers to the interconnectedness of the country, using media, common problems and interests, and education to expand our home from our community and town outward on a global perspective. Understanding the world on a global scale is impossible for one individual. It is too large and there are too many perspectives. In a more realistic sense, it is the understanding that each individual is globally connected. Living in California, there are many options for environmental education to be found and practiced for students. Local non-profit MyEarth[1], based in Carmel, CA, for example, offers many different programs that allow schools, parents, students and local participants to come visit their 10- acre property and learn about sustainable growth, the central valley watershed, local bird species, organic gardening and so much more. This program opportunity is one that offers students the chance to connect with nature by getting hands on with the organic garden and understanding what makes these natural delicacies grow to feed our bellies. Former CSUMB graduate Elizabeth Chagolla, expresses in her capstone study of 2011, that students must be exposed to environmental awareness inside and outside of a classroom at young ages. In order to get an established thought process to be continuous for students, establish a personal empathy and connection toward nature. Chagolla touches on how environmental education has been approached in the past, using books and lectures inside classroom walls. While it is good to include factual and scientific information about nature and its functions, it is also important to develop a personal and tangible connection with the environment to help us to understand that it is surrounding us and plays a consistent role in our everyday lives (Chagolla, 2011). Globalized multicultural education allows for children and people to have a deeper understanding of what

[1] This name is a pseudonym of the original name of the organization for privacy purposes.

cultures are like around the world and why. Practicing a global and holistic education of the world can allow humans to be connected by more than just media's biased influence. Students can understand why certain parts of the world operate in certain ways in relation to their surroundings and how that relates to them at home. According to Banks (1999) there are four approaches to education that can reform schools to a multicultural curriculum. The first approach being the "Contributions Approach" which reflects on the involvement in multicultural education using select books, activities, traditions and holidays in certain cultures. Studying and reading about Dr. Martin Luther King Jr., for example, would introduce a culturally diverse literature, context and perspective to students. Next is the "Additive Approach" which utilizes certain concepts, themes, and perspectives to form how the literature is examined and understood in terms of the diverse cultures within the curriculum. In other words, students will analyze minority stories in history to gain more understanding of each perspective. Also, the "Transformation Approach" which changes the structure of curriculum and encourages students to view problems, concepts, and issues from several ethnic points of view. Students can study Thanksgiving from a Native American perspective, for example, in order to understand the effects of an event on different cultures than their own. Lastly there is the "Social Action Approach" which combines transformation approach with activities to strive for social change. Students are taught how to understand social issues and how to act upon them within their community first and then within their states or country by writing letters to senators, Congress, and newspapers editors to express their opinions about policies that may resonate with them (Banks, 1999). Holistic educator, Flake (1991) constructed a statement of what education should be. The principles included in this statement are truer today than over two decades ago when they were written. This book has a total of fifty-nine principles explaining forms of holistic education that call for a sustainable and just shift in education for all the world's well-being.

Flake goes on to justify the following assumptions:

> (1) education is a dynamic of open human relationships, (2) education cultivates an awareness that allows the learner to relate more morally, culturally, ecologically, economically, technologically, and politically to the world, (3) all persons are capable of vast amounts of potential, (4) holistic thinking allows students to be more creative, intuitive and connected to ways of knowing, (5) learning goes beyond schooling, it is a

> life-long process, (6) learning is a process of self-discovery as well as a collaborative activity, (7) learning is self-motivating and fuels the human spirit, and (8) holistic education involves integrating community and global perspectives. The collective point taken from each of these educational assumptions, is that education is meant to connect us. From inside our communities, outside to other countries, education should be a holistic experience that aims to tie people closer with communication and understanding. (p.6)

Along with the realization of the climate's rapidly changing state, many new innovative techniques are being developed to do just what is needed; strengthen education in terms of global awareness. One of the most influential ways of doing so has been through the classroom practice of Place-based education. According to Radbourne (2016), place-based education is a tool used to transform schools into a democratic culture and helps students to learn how to become agents of change in the world and why. "Place-based education (PBE) is a unique educational approach that centers the curricula in the local or regional community in which the school and students are located." Radbourne states. She goes on to explain how this method of education is redesigning the school curriculum by focusing on engaging the students in their communities and developing a concept of social organization that leads to understanding of acceptance and cooperation within difference (Radbourne, 2016). Place-based education is an adaptation to the world we live in now. The world that our parents grew up in is very different from the world that the coming generations are experiencing. Education needs to shift and adapt to these changes and utilize what information we have exposed today. The place-based education structure places children in a position of citizenship and allows them to consider their own voice within the community. According to Hayward (2012), children are interacting with the community, economy, politics, ecology, science and other complex experiences each day. While these concepts are focused on the actions of adult influence, our society has factored out the influence of children on each of these factors. "We rarely take the complex ecological reality of a child's world seriously." state's Hayward, "...we don't really try to understand the perspectives of a child or the complexity of interaction and relationships that confront them." (p. 3)

The relevance of time becomes more of a factor as pollution continues around the world. The California Department of Education is aware that changes need to happen quickly within the

education system to make environmental concerns a more prevalent point of discussion amongst educated individuals. In 2013, the California State Board of Education adopted the CA NGSS California science curriculum framework and a statewide science implementation plan to be developed for schools. The CA NGSS states expectations for each grade level of core ideas and concepts that should be developed through their curricula in Science and Engineering Practices. Kindergarteners for example; should be able to communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment. High Schoolers should be able to create a computational stimulation to illustrate the relationships among the management of natural resources, the sustainability of the human population, and biodiversity (California Department of Education, 2002). The California Department of Education went on in their blueprint for environmental literacy to state; " Given that key environmental literacy concepts are already so much a part of the CA NGSS and that new science curricula will be required by law to address the Environmental Principles and Concepts (EP&Cs), California has an unprecedented opportunity to integrate environmental literacy as an essential aspect of science literacy."

Another method to answer the call for sustainable education is the IDEO Green school approach to learning. As described by the California Department of Education, environmental literacy is becoming more of a requirement within curriculum, the question is, however; how effective this will be when it is still using the same common core system outline and technique to teaching. IDEO green schools have a new way of teaching children that increased their sense of responsibility and confidence when it comes to science. They are using a project-based learning system that relies on technology, sustainability, and responsibility. According to Makovsky (2018), students at the Nueva School, in Hillsborough, California, grow vegetables, tend chickens, and build tree forts in the forest surrounding their campus. Makovsky goes on to explain how these lessons and activities follow the students into the classrooms where they are taught how to become good stewards of the environment. One of the most interesting aspects of this method using green schools to educate is that the building itself can be part of the curriculum. Using the functions of solar panels, green roofs, water conservation systems, the students can have hands on interactions with tangible sustainability at their school. As Murgnaghan and Shillington (2016), elegantly states; "...if we take *connectedness to nature* as an element of everyday life to which all urban inhabitants are guaranteed, then we might argue that

by maintaining ample *natural* public space, a municipality has provided its inhabitants with *access* to nature."(p. 122) By this statement, the authors refer to the importance of connectedness to nature. Efforts to increase environmental literacy are increasing with each generation.

Flake's (1991) Principle IX. Educating for Earth Literacy, emphasizes strongly that:

> The planet, and all life upon it, form an interdependent whole. Economic, social, and political institutions must engender a deep respect for this interdependence. All must recognize the imperative need for global cooperation and ecological sensitivity, if humankind is to survive on this planet. Our children require a healthy planet on which to live and learn and grow. They need pure air and water and sunlight and fruitful soil and all the other living forms that comprise Earth's ecosystem. A sick planet does not support healthy children. (p. 8)

Every scientifically and/or holistically literate educator can agree that these two subjects of environmental and globalized multicultural education should be more prioritized within schools. The integration of policies and protection laws would benefit not only each nation immensely, but every person and our whole world. Blumstein (2007) lists seven ways to improve environmental education. They are straight forward options that most have heard before; incorporate environmental literacy and actions into the curriculum, teach sustainable consumption habits, make personal connections to the circle of life, understanding how the government plays a role in environmental protection, critical thinking, and more. One option that he lists directly relates to this topic of globalized environmental education is how important it is to teach a worldview to increase American's geographical understanding. Blumestein's ideas are supported by a National Geographic (2002) poll of 18–24-year olds in nine western countries, ranked the US next to last in geographic literacy. As Blumstein smoothly states, "A greater appreciation of the diversity of cultures and peoples in the world should help us realize the selfish consequences of our consumption." (pa. 4, Box 1).

Conclusion

Communication is our greatest tool as human beings. Having the ability to understand grand concepts and use our abilities of communication and collaboration to make for a better world should not be undermined. The environment gives us everything that we need to survive

and thrive on a sustainable scale. Over time we have come to realize that every action directly affects us all. While contradictory to the research, it is obvious that no one truly has the capability to think globally. The world is too large and there are too many factors to generalize one place any direct terms. What is meant by "global" education throughout the research, in contrast is the idea that we are all connected. Throughout the world we are all connected through one commonality that is our Earth in which we all share. Thinking globally will allow us to consider cultures around the world to not be so far and different than us but to be connected to us through nature. The more cars we produce, the more fossil fuels we exert, the more nuclear bombs we create, all influence how our planet's health is maintained. For the sake of our future generations and the future of humanity in general, it is vital to influence students to think globally to consider their influence on the planet in every decision they make.

Methods

For this Capstone Project the researcher has investigated how schools can implement a sustainable education that builds global connections and awareness.
Teachers and students help me to understand the benefits and challenges of how their program includes a global understanding of the environment and sustainability. Based on an analysis of the data from other international resources and the relevant research literature, including global and sustainable benefits in classrooms, the researcher has used what she learned to formulate an action that responds to the focus issue in a way that inspires, informs, or involves an audience of educators and people.

Context

MyEarth is a non-profit organization that helps students on the central coast of California to connect to themselves, their communities and their environment. This nationally recognized outdoor learning center includes extensive grasslands, bird habitat, monarch butterfly habitat, a pond, an outdoor amphitheater, a LEED-certified culinary classroom, outdoor kitchen with wood-fired oven, organic vegetable and herb gardens, heirloom fruit orchard, off-grid solar greenhouse, and native plant nursery.

Participants and Participant Selection

I will invite two groups of stakeholders to participate in this study from MyEarth, an environmental program based in Carmel, CA. I will be interviewing program educators as well as student participants. This group of prospective participants were invited to participate because of their relevance and experience in global and sustainable learning in our local area.

Researcher

The reason that this project means so much to me is because I have learned that nature connections as well as human connections around this world are important for a basis of trust and understanding among humanity. No relationship can work without communication and willingness to learn and connect. The reason that a more global education on sustainability and culture needs to be more relevant in schools is so that students can grow up with a connection to more cultures' pasts and traditions than their own. This project is geared toward the hope of a more connected future for the world to thrive on.

Informants

M. McKenzie (Stewardship Educator MyEarth)

M. McKenzie is a Stewardship Educator at MyEarth, Carmel. She grew up attending the sustainable programs at MyEarth and always felt a personal connection to the planet and her personal self. McKenzie earned her B.A. in Sustainability with an emphasis in Recreation & Tourism Management at San Diego State University in May 2019. McKenzie has served as an environmental educator in a variety of areas along the west coast, including Point Lobos, National City and Seattle, where she has encouraged youth to become stewards of the environment through emphasizing the beauty and wonder of the natural world. Her goal at MyEarth is to promote students to create an open discussion about sustainability with their families and peers in order to create healthy, empowered communities around Monterey County. (MyEarth Staff, 2019).

T. Chung (Stewardship Educator MyEarth)

T. Chung is a Stewardship educator at MyEarth, Carmel. Her goal is to connect the

people of the world with a shared love of food. She graduated from UC Berkeley with a degree in Chemical Engineering, she served in the Peace Corps in Mozambique as a science teacher, and she worked for a pharmaceutical research project all before becoming an educator at MyEarth. Tiffany helps the students at MyEarth to gather sustainable and organic ingredients from the MyEarth garden to create unique and tasty foods for students to sustainably make.

Semi-Structured Interview and Survey Questions

Staff interview questions:

1. What are your concerns regarding sustainable and environmental education in our current public-school systems curriculum?
2. What is your program currently doing to improve more widespread sustainable education? By whom?
3. What do you think should be done to make environmental education in the school systems more of a priority?
4. What do you think are the obstacles to changing the program at MyEarth towards a more globally and sustainable emphasis?
5. Is there anything else that you would like to say about the integration of and improvement of global and sustainable education?

Procedure

- Participants will be interviewed.
- All interviews will be done individually with staff and with a teacher or adult present with students.
- When it is not possible to interview participants in person, they will be invited to complete a phone interview or paper and pencil survey of the same questions.
- Face-to-Face interviews will take less than one hour, be audio-recorded (with participant consent), and take place in the school of study.
- A semi-structured interview format will be used for face-to-face interviews, to allow for follow-up questions to unclear, interesting or unexpected responses.
- All interviews/surveys will be scheduled at the convenience of the interviewee and

should take no more than 20 minutes to complete.

Data Analysis

The researcher will conduct interviews with students as well as educators using the stated interview questions. After transcribing each acquired interview, the researcher will develop three plans of action towards fixing the issue at hand. Each action plan will be created from the analysis of the interviews and developed from the collective consensus of what interviewees and researcher have agreed on as the best and most effective possibilities for resolving this issue.

Results

For this Capstone Project, students and educators of non-profit program of sustainability, MyEarth, were interviewed to see what they think could be done to improve access to globalized and sustainable education. MyEarth helps to increase a sense of connection to nature in young students by integrating outdoor education and hands on experience in connecting with nature as well as the community. By nurturing the relationship that children can have with nature, MyEarth is establishing the ability for these students to grow up with an expanded view of the world's functions and how the Earth provides for us all that we need. California's Central Coast students may be lucky enough to participate in an after-school program, taking place October 24-December 5 of 2019, that allows them to chef up with MyEarth's freshly harvested produce from their 10-acre land and sustainable organic garden. Students will develop healthy culinary skills while having a deeper understanding of how the ingredients occurred naturally. In contrast, low income schools are not as fortunate in having programs such as MyEarth next door to their campus, therefore they are less able to have a connection to environmental learning in programs such as MyEarth. Based on an analysis of the data and the relevant research literature three themes emerged (see Table 1). Evidence-based decision making required evaluating each potential Action Option by the following criteria: effectiveness, time, and realisticness. Effectiveness is important because some methods of education today are proving to be ineffective in developing a social, global, and even educational basis for students out of the school pipeline to success. Time was evaluated due to the urgency of climate change and the necessity to respond before it becomes too late. Lastly, realisticness is important because reshaping education is a daunting concept that may not pass all the policies, laws, and practices that have already been established within schools and their communities.

Based on the evaluation of each Action Option an action will be recommended and justified.

Table 1

Evaluation of Action Options

	Effectiveness	Time	Realisticness
School Gardens w/ Curriculum	Moderate	Low	High
Place-based education	High	High	Moderate
Green Schools	High	High	Moderate

School Gardens integrated into Curriculum

This method of action was most suggested by the educational stewards at MyEarth. When they teach children how to think with an eco-friendly mindset, they do it using a large garden growing all sorts of vegetables, herbs, fruits and more. They can maintain such a successful and flourishing garden year-round with the help of local volunteers from the colleges, community, and students that are eager to learn how to rotate crops and yield soil for consistent access to organic, homegrown foods. According to Maddie (personal communication, November 16, 2019), a Stewardship educator at MyEarth, "Pairing garden education with nutrition and cooking lessons, allows students to see how their food is grown and healthier ways of preparing their own meals. Through the process of harvesting, washing and preparing fresh produce students can become better stewards of the planet, their community and themselves." She went on to explain how imperative it is to invest in the implementation of outdoor classrooms/programs within schools. This task is not low maintenance, however. Maintaining a garden can be a lot of work and requires a deep knowledge of each species of plant being grown and techniques that differ for each stage of every seed that is planted. The reason that I listed this action plan as a moderately effective method to implementing environmental and globalized education is because it is not big enough. It does not change the way the student is being taught and does not directly face the issue at hand. According to Murnaghan and Shillington (2016), "young people are more

often than not very well aware of the social, political, and environmental circumstances in their neighborhood and the world more broadly. However, it is quite clear that awareness only provides a limited understanding of the issues" (p.115). This quote refers to the lack of educational discussion based in social justice and environmental justice. Garden based education is a great start to the conversation of these issues and would benefit individuals and groups in any setting. At MyEarth's non-profit organization for students, educators are working with teachers in schools to share and combine curricula. Maddie described a lesson in our interview called the *tres hermanas*, or the three sisters (corn, squash and beans), in which students learned of giving to the next generation of students through seed saving of the Cherokee Glass Gem corn and a variety of beans. This lesson allowed students to have a hands-on history lesson of Native American traditions. Another curricula connection that she described was the teaching of culture through gardening. Students learning Chinese, French, or Spanish can learn how to cook traditional meals for the region of the language they are learning. This allows students the opportunity to harvest produce that is grown around the world and immerses them in a new culture beyond learning the language. These examples are part of the reason why I listed this action plan as a low in the time aspect of implementation. By using the curriculum already integrated in the school, gardening has a plethora of ways to connect to history classes, science classes, art classes, and more with just a hint of creativity. That is the same reason why I ranked this method at a high level of realisticness. The likeliness of this method being doable is high. With just one educator who understands gardening, this method of teaching sustainability can be implemented with little expense to the school budget or a large portion of class time.

Place-based education

Place-based education is a new trend in education that is tackling the issues of our system from the root (Radbourne, 2016). This transformative form of educating is placing more responsibility and emphasis on the opinions and thoughts of students as part of a community. More specifically, place-based pedagogy is different than what we are seeing today. It is an educational approach that values, embraces and recognizes the connection of knowledge, community and connection for students (Radbourne, 2016). Place-based education was deemed highly effective in connecting schools and community to redesign curriculum and enable students to learn from hands on experience in social activism, community service, and self-

recognition. This method also utilizes local geographic and physical environments as teaching contexts within curriculum which expands to community-based opportunities for students to contribute to the local economy. This approach of education, just like any, has some sides that make public schools resistant to adopting their ideals and policies. Public schools as most of us know them today have reflected a colonial mindset. Curriculum and standards that are seen in early 21st century education is written by the dominant voices of power and underrepresenting voices of minorities. This issue directly related to issues such as the achievement gap among races and differing economic statuses as well as the interpretation of globalism and world view. Chung, stewardship educator states that; "it is very important to start this (sustainable) education young in order to empower students to think about the larger picture of living on Earth in their future and equip them with the tools to not only make changes in their lives, but also make changes on a larger policy level" (personal communication, November 19, 2019).

This process takes time to implement. Writing and establishing a re-evaluated system of standards that are much more focused on a student's ability to comprehend politics, culture, and climate on a critical level is no easy task. This is why I have also rated this method to be low/moderate in realisticness. The reality is that as long as education is not the priority in the U.S. there will not be enough resources, people, or funding to make a large shift like this happen. However, it is important to remember that these schools and these systems of education already exist. The effectiveness of this type of implementation would be well worth the work, we know this because it has been successful in Canada, New England, and Maine (Radbourne, 2016). Why should the U.S. public schools continue teaching students on a colonial basis that does not engage them personally and socially with their surroundings? Greenwood (2013), makes a great point in stating that placing the educational focus on a small place does not preclude interest in the larger world. By this he means that you do not have to understand all cultures in all parts of the world to gather a global awareness, rather than connect more closely with local places and understand your developmental relationship to it in order to expand your understanding of a global perspective of people and the environment. The give and take of redesigning the standard curricula would be a newly fragmented system of inter-generationally connected people who are able to communicate, engage and recognize system structures and work together for a sustainable culture.

Green Schools

A smart education is a changing education. One that adapts and reacts to the changes that are constantly occurring around us. A space that is prepared for change can harbor learning that is prepared for change as well. A green school not only promotes facilities that create a healthy environment but also serve to produce a consensus process of planning, design, and construction that considers saving energy, resources and money in a span of at least 50-60 years. Green schools are able to meet the needs of the present without compromising the ability of future generations to meet their own needs by embracing the concept of sustainability and teaching it as an attainable tool for all students (Ramli, Masri, Zafrullah, Taib, & Hamid, 2012). According to McKenzie; "Increasing the availability of outdoor areas at schools and granting students more access to experiencing the natural world throughout the school day is imperative and can further environmental awareness and appreciation for the environment in students" (Maddie McKenzie, personal communication, November 16, 2019). The benefits of implementing a green school have been represented in every green school around the world. From energy cost savings, emissions reduction benefits, water and wastewater benefits, health and learning benefits, and long-term financial benefits, it has been proven that green schools cost are lower and more effective for any stakeholder involved in its success (Ramli, Masri, Zafrullah, Taib, & Hamid, 2012). Thomas L. Wells public school, for example, created a new Canadian primary school that aimed to harvest green energy. Although this school cost over $12.5 million to construct, it was sure to feature low-tech and accessible energy saving strategies such as solar harvesting and passive energy harvesting that would payback and add to its own investment within 15 years after construction. By maximizing sunlight, green space and natural heating and ventilation systems, efficiency of the building increased beyond expectation. In 2017, the building consumed 40% less energy than a traditional building (5% better than projected). Best of all, the Principal Ruth Jory informed the board that "...test scores improved significantly from one year to the next due to the indicative of a good learning environment." (Makovsky, P., Pedersen, M. C., Cameron, K., & Greenberg, R. 2018). This is just one of thousands of positive examples of green schools. There are endless creative and innovative ways construct or move toward implementing a green school and while the initial cost is high in this transition it pays off more quickly than projected and often provides and outstanding effectiveness in learning outcomes. Much like school gardens, this method of learning can be incorporated into the curriculum.

Learning how solar energy works, how the green roof grows, and how energy moves can become a first hand and personalized experience within this method. While budgets for schools are low, I rated the realisticness for this project as moderate because I believe it is a quality give and take operative that pays for itself in multiple aspects over a short period of time making it more efficient than a non-green school.

Conclusion

All the presented ideas are recommended within my research. My number one recommendation between these three action plans would be to implement green schools into our school systems. This is my most suggested option because it most accurately incorporates every action plan on a more united and efficient basis. While this option does take the most time and money, it would be the most efficient, productive and rewarding option to implement on a small and a large scale at any location in the world. This option benefits the most stakeholders. From students, to teachers, to communities, to energy producers, to the planet itself. This option is a combination of the other two options and allows the greatest outcome for all stakeholders. The reason that the other two are not the primary suggestions is because they are both incorporated into the implementation of green schools. Green schools use the resources of the building such as solar power panels, wind turbines, roof gardens, and more to enhance the depth and connectedness of the curriculum. The reason that I did not choose school gardens as my primary recommendation was due to its lack of directional change within the foundation of education and its curricular basis. The reason I did not choose Place-based education is due to its lack of environmental consciousness. While this method does allow children to have a more community-based education that does develop a secondary relationship with nature, it does not quite incorporate the holistic value of nature.

The limitations of Green Schools vary widely in the factor of realisticness. The initial cost of implementing a Green School most often goes beyond the budget of a school district. While the payoff of Green schools surpasses the initial spending on the implementation within energy and infrastructure life, cost is still a major roadblock in the institutionalization of sustainable technology. Recreating a curriculum around the functions of the school would also take time and dedication to implement into school life. While these are barriers have been overcome in many different schools, cost and time are still some of the largest factors that holds all schools back

from investing in this technique of energy saving and educating. If developed correctly, this method would not fail. By using sustainable structure and following the methods of professional architects, this action plan is one that has worked in schools around the world. Green schools are a form of connection that allows students, teachers, school staff and community to benefit from the structure of the school inside and out. The structure of this action plan involves more than just the curriculum of students and integration of the school's architecture, it allows students to understand how to take on the role of sustainability within their personal lives and their surroundings.

Action Documentation and Critical Reflection

Introduction

The focus issue of this research project is to raise awareness in the lack of environmental education within American schools. This issue has created a lack of global awareness for both students and adults. Within this study, I did multiple observations at a local non-profit that aims to educate young students about how organic gardens, bird migrations, and animal adaptation can relate to them and their learning experience. This innovative organization, MyEarth, gives students hands on experiences within nature. These experiences teach them how they can cook, play and grow sustainably. After conducting interviews with the Educational Stewards at MyEarth, and reviewing my collected literature analysis regarding the issue, I was able to come up with three action options that would aim to increase environmental and global awareness throughout schools in the United States. These action options included the implementation of school gardens, place-based curriculum, or green schools. Each option was put through an analysis in the components of time, effectiveness, and realisticness. I chose green schools as my most effective and ideal option due to its ability to implement all the best outcomes for schools, teachers, communities, and students. This option, however, is low in realisticness in terms of money and time that it takes to implement. Luckily school gardens are a smaller version of this method that can be available to schools of all socio-economic status.

Action Research Project Documentation and Reflection

Through my action research project, I had the help of my handy friends to show me how to create a homemade hydroponic grow tower. According to D'Anna (2019), hydroponic is a form of gardening that uses no soil, instead plants grow in a solution of water and nutrients that flows throughout the roots. With a couple of visits to the local hydroponic store and home depot plus one day spent to assemble it, we were able to create a fully functioning hydroponic water system for less than $100. As depicted in the step-by-step tutorial I have included in Appendix A, the steps are easy to follow in creating your own Hydroponic system. Hydroponic systems allow plants to grow 20-25% faster than if they were in soil. This means that a farmer can yield 20-25% more with Hydroponic than with soil (D'Anna, 2019). Another great aspect of having a hydroponic grow tower is how little resources it requires. This system of growing is a constant flow of recycled water and fertilizer solution. There is no soil necessary, no runoff produced, and no need for an excessive space to grow. Another one of the best parts about using a hydroponic growing system is how many ways there are to make one. YouTube, for example, shows handfuls of video tutorials on how to make a hydroponic system, each one being different from the next. The one that we made worked well and we were surprised to see how quickly growth started for our plants. After conducting more research on harvesting from hydroponics, we soon learned that we needed to make some changes to the systems structure. The piping that we used for our first hydroponic system was a simple PVC pipe from home depot. Through research, we learned that it is not entirely safe to grow food producing plants with these pipes because the plant absorbs the harmful chemicals within the pipe walls. Once this issue was fixed with a visit to the hydroponic store, we were back to growing. As you can see from Figure 2 and 3 (below), the hydroponic plants came out better than we predicted. They were full of nutrients and deliciously fresh. The best part of this experience has been watching the process and learning about plant growth on an entirely new perspective.

Figure 1. The finished product galore! A working and handmade Hydroponic system for planting

Figure 2. The plants grew quickly, starting with the roots that reach down to the water.

Figure 3. Bok Choy These massive plants are ready to eat!

Figure 4. The hydroponic system can grow all types of plants. The type of fertilizer you put in the water affects the nutrients that your plant absorbs.

Synthesis and Integration

Throughout the process of my undergraduate degree, here at California State University Monterey Bay, I have learned what it means to become an educator. I have learned that it is more than just teaching, testing and grading. It is about being a guide and an advocate for your students and leading them in a direction that allows them to find their own path and development. My coursework throughout the years has taught me how in depth this profession can go in terms of reach and effect on the community in which we are teaching in. This future

career that I have chosen has allowed me to develop a new personal responsibility to try and make education something that students, teachers, and parents can enjoy.

MLO 1: Developing Educator is a Liberal Studies standard that aims to teach us how to critically consider the responsibilities of a California educator in the classroom, community and state. This standard was met in CSUMB courses such as LS277s (service learning), and LS398. In these courses I learned the pedagogical structure of schools in relation to the state of California and what teachers are held accountable for keeping said structure. These classes were able to show me how important it is to value teachers due to their importance in the system. MLO 2: The Diversity and Multicultural Scholar standard is one that incorporates cultural experiences as influenced by social ideologies of the world. Students aim to critically examine the value of diversity and how it can impact the structure of a classroom. This standard was met at CSUMB in LS277, LS394, LS242s, LS362, and LS391. In these classes I learned how many teachers are struggling today to create a space that is comfortable and safe for all students of all cultural backgrounds. I also learned how in the past, education has been rooted towards a specific demographic causing the educational pipeline to be easier for some students than others, depending on their culture, gender and race. I am thankful to have been taught about these disparities in my education here at CSUMB. MLO 3: Innovative Technology Practitioner is a standard that allows students to use technologies effectively for collaborative discovery. While most of my classes incorporated technological exploration and research, the classes that most related to this standard were LS383 and LS350. These courses taught me how new innovations within education are being created each day to provide better education for anyone who may not fit into the standard system. MLO 4: Social Justice Collaborator aims to teach Liberal Studies students how to combine their life experiences and knowledge to create a reflective perspective of how they can become ethically and socially responsible educators. Students reach out to the community and learn what social disparities there may be within the system and critically collaborate as to why and how they can change it. This subject was very interesting to learn about in my undergrad because it is an important topic to be brought up within education. Courses that taught this standard were LS380 and LS386s. I believe, now, that all educators should be taught how to become advocates for equity within education because education is a right that should be given to all. MLO 5: Subject Matter Generalist which allows students to demonstrate a complete competency in what demonstrates a successful practice in California

public education. This standard was taught throughout the course of my 4.5 years at CSUMB. I was able to learn in depth how education connects to all the contexts of life and most often roots back to the start of all controversies. I have been able to understand that education is our greatest tool for communication and collaboration. This standard also helped me to pass the CBEST on my first try which touches on math, reading a writing.

My next steps in education will take me to get my master's degree in the state of Oregon in Fall 2020. There, I will work to get my teaching license and my masters in the Arts in Education. I plan on taking the tools I have acquired from CSUMB to incorporate a new California perspective on the Oregon education process. I plan on becoming more comfortable with speaking and understanding Spanish, so that I can connect with more students and be a relatable source of help and support. I believe that throughout my undergraduate, service learning has been the most rewarding and educational experience. Working in a classroom with another teacher, hands on, has been my favorite way to learn and connect with students to see what they allow to bring joy into their education experience. Even after I am done with my masters and graduated from school, I know that my education will continue to grow, and passions continue to thrive through learning.

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Appendix A: Hydroponic Step-by-step

How to Build a Hydroponic Grow Tower

What is Hydroponics? Hydroponic growth is a system that allows plants to grow without the use of soil. By having plant roots float in water, they are able to absorb the necessary nutrients. This method enables plants to grow three times faster than traditional soil farming.

Fact: In the time that it takes to grow one head of lettuce with traditional soil farming, a hydroponic system would grow three heads of lettuce in that same time.

Why should you use Hydroponics? This method is a more efficient way of farming in terms of water usage, cost, and space. It is easy to add fertilizer and pesticides to the system for safe growing. Hydroponics don't produce any runoff.

How to build a Hydroponic tower:

Materials:

- Two 10-foot Food safe U-PVC piping
    - from your local hydroponic store (NSF-51 approved)
- 8 U-PVC elbow pipes
- 2-inch diameter Hydroponic net plant cups
    - from your local hydroponic store
- Piping glue
    - from your local hydroponic store
- Rockwell foam cubes
- Liquid fertilizer
- 5-gallon Bucket
- 1/4-inch pump hose
- Submersible Water pump
- Wood for frame
    - One 4x4
    - One 2x4
- Seeds
- Duct tape

Tools needed:

- Drill (2-inch whole saw bit)
- Hand saw
- Tape measure
- Screws

Procedure:

1. Saw the 4-inch U-PVC pipe into eight 2-foot sections.
2. Drill holes 4 inches apart throughout pipe sections.
3. Layout the sections of pipe and the elbow joints to form two squares with the drilled holes facing up.
4. Using pipe-safe glue, attach pieces.
5. Pipe squares aside, build a wood frame and secure it to the top of the 5-gallon bucket.
6. Place the pipe squares around the frame, one on top and one on bottom.
7. Secure the squares to the wood with duct tape.
8. Drill a 1/4-inch hole into the top pipe square between any of the 2-inch holes. Do the same on the bottom pipe square.
9. Place the water pump in the 5-gallon bucket.
10. Connect one end of the pump hose to the water pump and other end to the top U-PVC pipe (secure hose in the ¼ inch hole).
11. Drill another ¼ inch hole in the bottom of the top pipe square.
12. Connect the hose from the top pipe square to the bottom pipe square, which will allow water to flow down to the bottom pipe square's ¼ inch hole.
13. Drill another ¼ inch hole in the bottom of the bottom pipe square, allowing the water to flow back into the bucket.
14. Insert mesh cups into the 2-inch holes.
15. Add Rockwell foam cubes to mesh cups and place the seed in the cubes.
16. Fill the pipe squares and bucket with water and the labeled amount of fertilizer
17. Begin your hydroponic experience!
18. Don't forget to have fun! There are a lot of ways to get creative with this project