Effective Environmental Education

The Way to a Greener, Brighter Future

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By Amber Bailey

The personal, religious, philosophical, or political positions found in this project are solely that of the student, and do not necessarily reflect the views or opinions of the committee or Liberty University.
# Table of Contents

Abstract 7

Chapter 1: Introduction 9

Chapter 2: Research 15

Chapter 3: Visual Solution 67

Chapter 4: Final Solution 89

Chapter 5: Conclusion 101

Bibliography 105
Abstract

Green spaces provide many benefits to local communities, including improved mental and physical health and stronger, safer communities. They also provide sustainable ecosystems for wildlife. These benefits provide a better quality of life for the people in the community. However, some communities cannot experience these benefits due to a common issue among green spaces: degradation in the forms of littering and vandalism. Despite efforts in environmental education, this problem persists. The aim of this project is to contribute to keeping green spaces greener. To study potential solutions for the continued degradation, an analysis of relevant literature is conducted on the scope of green space benefits, the causes of the degradation, and the problems with current environmental education. Case studies and visual analyses are used to inform a potential solution which takes the form of a practical project. The outcome is an educational scavenger hunt that more effectively influences individuals’ decisions to behave in a more environmentally friendly way than established environmental education methods.
Green spaces are important to cities and the people inhabiting them. They can provide a better quality of life to the people who use them and live near them. However, green spaces continue to experience degradation in many forms, including vandalism and littering, even though environmental education on preserving natural areas has been used for decades. The presence of this inconsistency is an interesting phenomenon that should be explored. The degradation and overall disuse of green spaces prevents people from experiencing the benefits that can be gained from the green spaces. The benefits include better mental and physical health, stronger and safer communities, and sustainable ecosystems for wildlife. To find ways to maximize the potential of green spaces, this thesis examines established methods of environmental education.

On a more personal note, this topic is important to me primarily because I care about the environment. In Alabama there is a vast amount of biodiversity and open, natural areas. It is heartbreaking to see them polluted and destroyed. Another reason this topic is important to me is because green spaces affect communities. Areas like parks directly impact people by providing a setting for people to make connections, participate in recreational activities, and hold city events. If a city does not have a setting for such events, people will miss out on connections and community involvement. Lastly, this topic is important
to me because of the littering, vandalism, and lack of upkeep in the local parks in my city. I have personally experienced what it is like to love a place and watch it become unusable and undesirable to visit. I chose this topic to help work towards a solution to this research problem.

The structure of this thesis is straightforward. Chapter 1 outlines the research problem, knowledge gap, and significance. Chapter 2 encompasses the research conducted for the thesis, which includes a literature review, case study reviews, and visual analyses. Chapter 3 describes the creation process of the design solution. This includes elements like mood boards, sketches, and iterations. Chapter 4 contains the final design solution to the research problem as well as the explanation of the research-informed design decisions. Lastly, Chapter 5 explains how the solution specifically works to solve the research problem.

Research Problem

Established methods of environmental education struggle to influence people’s decisions to act environmentally consciously, preventing people from experiencing the benefits of green spaces. This problem is important for several reasons. First, experiencing the benefits of green spaces, including improved mental and physical health and reduced crime in a community, increases quality of life. Second, if current environmental education and communication cannot influence people to act in a more environmentally friendly way, then the
The methods used are ultimately not serving their intended purpose. If the environment is not being positively impacted by current environmental education methods, the established methods need to be examined and revised to create a better world with happier and healthier people.

**Objectives**

The overall objective of the thesis is to produce a more effective, research-based method to educate and communicate with the public about the environment. Other developmental objectives include specifying the benefits that can be experienced from green spaces, clearly defining the problem of continued degradation, investigating the issues in current environmental education, and ascertaining the most effective way to present the intended type of information to the public. Each of these objectives plays an important role in reaching the desired outcome of more effective education. Clearly defining the problem of continued degradation and investigating the issues in current environmental education will allow for an accurate evaluation of the problem in order to move toward a solution. Specifying the benefits that can be experienced from green spaces will help to validate the significance of the problem and solution. Lastly, ascertaining the most effective way to present the intended type of information to the public will inform decisions made while developing the solution. Compiling the information from the smaller developmental objectives will help achieve the overall objective of producing a more effective, research-based method to educate and communicate with the public about the environment.
Research Questions

- What are the most effective strategies to improve established methods of environmental education in order to prevent degradation of green spaces?
- What are the different types of degradation and what are their implications?
- What are the problems with current environmental education?
- What are the legitimate benefits gained from green spaces?
- What can be learned from current environmental education efforts?

Knowledge Gap

The gap in current knowledge that the research hopes to fill is how to make previous methods of environmental education more effective. Making environmental education and communication more effective is essential in improving the state of green spaces and would enable educators and communicators to better influence people to act in more environmentally conscious ways. A higher volume of pro-environmental behaviors leads to a greener, healthier state for the environment. The evidence of continued environmental issues, such as the degradation of green spaces, despite educational efforts proves that this is a knowledge gap that still requires research.
Significance

The significance of this research is multifaceted. Individuals will experience higher levels of learning and engagement in their surroundings from the more effective method of environmental education which will influence them to make more environmentally conscious decisions. If individuals have a nicer, cleaner green space to enjoy, they will theoretically use the green space more. While using green spaces, people experience improved mental and physical health, stronger and safer communities, and more sustainable ecosystems for wildlife. On the institutional level, having nice green spaces increases the value of a community, which benefits the surrounding neighborhoods and local real estate companies. Businesses around the green space will likely experience more business, and sponsors for the green space or for the teams that use the green space benefit from more exposure. City governments benefit from the research because they can use fewer resources and less time and money to clean and restore the local green spaces and because they have better knowledge on how to implement effective communications. This benefit is magnified on the national and global scale.
Research

Research Rationale

The fact that established environmental education methods do not always succeed in prompting more environmentally friendly actions requires investigation. Despite current education efforts, degradation continues, proving that current research on how to make environmental education more effective is lacking, at least in implementation. Examining the causes behind the research problem helps to identify, define, and solve the problem. Ascertaining the best way to present the intended information will help develop a new method of environmental education that will better impact environmental decisions. The benefits of green spaces will also be identified to validate the significance of the problem.

Research Methods

The research methods utilized to conduct the in-depth investigation on the research problem are a literature review, case studies, and visual analyses. The literature review examines pertinent academic literature relevant to the research problem. The topics in the literature review include green space benefits, common types of degradation, the broken window theory, and issues in current environmental education. The case studies and visual analyses review existing projects relevant to the research problem, including informational signs in natural areas, educational signs at arboretums, and a waste disposal system at national parks.
Literature Review

Degradation of green spaces can take many forms, from littering in national parks to graffiti on a playground. This type of damage, neglect, or general degradation is a complex problem with multiple attributions, one being insufficient education. Established methods of environmental education struggle to impact people’s decisions to act environmentally consciously, thus preventing people from experiencing the benefits of green spaces. This failure in education leads to the eventual degradation of green spaces, which negates the benefits of green spaces, lowering the quality of life for people in a community. To define the complex problem at hand, green space benefits, types of degradation, and issues in current methods of environmental education will be examined.

For the purposes of this analysis, the definition of the term “green space” comes from the Environmental Protection Agency, which defines a green space as “land that is partly or completely covered with grass, trees, shrubs, or other vegetation. Green space includes parks, community gardens, and cemeteries” (EPA). Most cities or urbanized areas have some form of green space that is meant for public use, and the benefits that can be gained from them are greater than common knowledge suggests.

Green Space Benefits

The benefits of green spaces are numerous both for humans and for nature. They can range from providing a habitat for wildlife to improving a person’s mental health. There have been many studies conducted to discover if these benefits truly
exist and how a small patch of nature in an urbanized area can improve a person’s quality of life. The benefits that were targeted for this examination are improved mental and physical health, stronger and safer communities, and sustainable ecosystems for wildlife.

**Mental Health**

The best known benefit of green spaces for humans is better mental health. The idea that regular trips into nature have a positive impact on a person’s mindset is not a new one. MacKerron and Mourato, Vanden Berg et al., and Dallimer et al. all examine the relationship between mental health and green spaces. In their study “Happiness Is Greater in Natural Environments,” MacKerron and Mourato created an application to collect surveys on people’s moods when they reach a certain place during a certain weather condition (1). The purpose of this study is to find the link between green spaces and mood (MacKerron and Mourato 1). They concluded that in all circumstances, people are generally happier in nature than in the city (MacKerron and Mourato 7). MacKerron and Mourato state this finding by saying, “Amongst study participants, happiness is greater in natural environments, even after controlling for a wide range of potential confounders” (7). The discussion by Vanden Berg et al. titled “Preference for Nature in Urbanized Societies:
Stress, Restoration, and the Pursuit of Sustainability” studies urbanization and the benefits of nature in cities (1). Van den Berg and their colleagues’ purpose is to improve urban life psychologically and sustainably (1). After a discussion on the legitimacy of health benefits that can be drawn from nature, the authors conclude that nature is beneficial (Van den Berg et al. 9). Van den Berg et al. explain this conclusion by saying, “In general, the findings from this experiment support the widely held belief that natural surroundings can better aid the psychological restoration of people living in cities than an urban environment relatively devoid of nature” (9). Lastly, the study by Dallimer et al. titled “Biodiversity and the Feel-Good Factor: Understanding Associations between Self-Reported Human Well-Being and Species Richness,” studies people’s preference for biodiversity (1). Dallimer et al. state that the findings show the following, “Urban greenspaces therefore offer city residents opportunities for improving both their physical health and their psychological well-being, the latter potentially through the development of positive emotional bonds, a sense of identity, and facilitating reflection and recovery from mental fatigue” (2). All of these studies share the idea that nature (or green spaces) is beneficial to a person’s mental health.
Physical Health

Besides mental health, another relatively well-known benefit of green spaces is improved physical health. This makes sense since green spaces provide a space for recreational activities like walking or playing Frisbee. The analysis of two studies on the link between green spaces and physical activity will shed some light on the possible benefit that exists. Mytton et al. study whether green spaces cause more physical activity (Mytton et al. 1). Mytton et al. express this intention when they state, “Green space may be one such environmental influence promoting physical activity by offering a safe, accessible and attractive place for exercise, such as walking, running, cycling or playing ball games” (1). From a different perspective, the article by Jennings and Bamkole titled “The Relationship between Social Cohesion and Urban Green Space: An Avenue for Health Promotion” studies the link between green spaces and social cohesion (1). While their article will be discussed again in relation to green spaces promoting stronger communities, Jennings and Bamkole also aim to find how green spaces promote physical health with the goal of improving overall health for people living in cities (1). Jennings and Bamkole explain their intention by saying, “Understanding the relationship between social cohesion
and urban green space is important for informing holistic approaches to health” (1). These studies are similar in their approach and findings, and the implications from the studies are worth discussing. Mytton et al. conclude their findings by stating,

Our study found that people living in the greenest areas of England are more likely to achieve recommended amounts of physical activity, both before and after adjustment for individual and environmental variables. No positive association was found with measures of types of physical activity that may be more strongly linked to green space. (5)

In other words, people who have access to more green areas do more physical activity. Jennings and Bamkole conclude,

Along with the positive association between use of green space and physical activity, social cohesion is often negatively associated with levels of stress. This underscores the potential for well-designed urban green spaces to enhance the social environment by supporting an increase in social capital, more visitors to green spaces, and greater physical activity. Thus, understanding the role of urban green spaces upon the social environment can support interventions for health concerns such as obesity and psychological health challenges. (4)

The findings of both articles support the idea that green spaces are associated with higher levels of physical activity, and therefore, better physical health, but the articles disagree
on where the physical activity takes place. Mytton et al. note that higher levels of physical activity are associated with green spaces, even if that activity is not happening in the green spaces (7). Gardening and DIY projects are discussed as being possible causes for this discrepancy (Mytton et al. 7). Another explanation for the discrepancy is the opposite of the original conclusion (Mytton et al. 7). Rather than green spaces promoting healthy activity, healthy people may choose to live in greener areas (Mytton et al. 7). Mytton et al. state, “Those who like to be physically active choose an environment that is green because it is perceived as important for supporting physical activity” (7). On the other hand, Jennings and Bamkole claim that green spaces bring people out to do activities which then lead to social interactions: “Thus, various activities and health promoting behaviors in urban green spaces may cultivate social cohesion and vice versa” (Jennings and Bamkole 2). This difference in conclusion of where the physical activity takes place is an interesting inconsistency. Nevertheless, the sources agree that green spaces are linked to better physical health.

Stronger Communities

Another, possibly lesser-known, benefit of green spaces is stronger communities. Articles by Arnberger and Eder, Jennings and Bamkole,
and Maas et al. provide more information on the legitimacy of green spaces fostering stronger communities. “The Influence of Green Space on Community Attachment of Urban and Suburban Residents” is a study by Arnberger and Eder to examine a potential connection between green spaces and community attachment (1). Jennings and Bamkole’s article, discussed in the previous paragraph, searches for a link between green spaces and social cohesion (1). “Social Contacts as a Possible Mechanism behind the Relation between Green Space and Health” is a study by Maas et al. to discover if better social connections in communities with green spaces are the link between green spaces and better health (1). Each of these articles uses different psychological concepts to find relationships between green spaces and community. While the studies are similar in nature, the concepts discussed differ slightly. Arnberger and Eder use the term “community attachment,” which they define as, “Community attachment considers connections between residents and their communities, describes the emotional bonds to a community and is an indicator of one’s rootedness to one’s community” (1). Jennings and Bamkole use the term “social cohesion,” which they define as,

Social cohesion, a key construct used to characterize the social environment, has been defined in many ways, yet it often refers to interpersonal dynamics and/or collective efforts that may be used to assess quality of life. Social cohesion can also involve feelings of trust, belonging, acceptance, and connectedness which often relate to positive social interactions. (1)
Maas et al. use the term “social contacts” which they define as,

Several terms have been used in studies of the health-enhancing components of social relationships, such as social support, social network and social integration. In this paper, we prefer to use the container term social contacts for all of these terms. Social contacts can take many forms, including having a conversation, undertaking joint activities and paying visits. (1)

All three of these terms deal with the general connectedness of a person to their community. Although the studies looked for slightly different connections, they come to similar conclusions. Arnberger and Eder determine that a higher perception of a green space’s value does correlate to a higher feeling of community attachment: “This study found a positive relationship between the perception of green space environment and community attachment of urban and suburban residents” (Arnberger and Eder 8). Jennings and Bamkole explain their conclusion that green spaces do promote social cohesion:

For example, social interactions in urban green spaces can provide opportunities to bond with others, develop their sense of community, and regroup from the demands of daily life. Increased social contacts can cultivate a sense of community and other factors that inform our sense and perception of social cohesion. (3-4)

Maas and their colleagues summarize,

Concerning the relation between green space and
social contact, our results show that people with more green space in their living environment feel less lonely and experience less shortage of social support, but they did not have more contact with neighbors or friends in the neighborhood and they did not receive more social support. (8)

In other words, despite not actually being better off, people who live near green spaces perceive a stronger sense of community (Maas et al. 8). The consensus of the articles is that green spaces help to facilitate stronger, more connected communities, even if the effect is only perceived.

**Safer Communities**

Along with stronger communities, green spaces also promote safer communities. A study by Kuo and Sullivan and an analysis by Shepley et al. show evidence of less crime in communities with green spaces. The article by Kuo and Sullivan titled “Environment and Crime in the Inner City: Does Vegetation Reduce Crime?” is a study on police reports from a group of apartments to find if more vegetation leads to less crime (2). The article by Shepley et al. titled “The Impact of Green Space on Violent Crime in Urban Environments: An Evidence Synthesis” is an analysis of literature to find out if green spaces influence crime rates (1). These two articles are similar in character, but they are testing two slightly different things. Kuo and Sullivan’s study discusses the general vegetation in an area, while Shepley and their colleagues’ analysis is on the green spaces in a community. Despite this difference, they both concluded that more greenery or the presence of green spaces do lead to less crime in a community (Kuo
and Sullivan 19; Shepley et al. 12). Kuo and Sullivan state this conclusion with, “The greener a building’s surroundings are, the fewer total crimes; moreover, this relationship extended to both property crimes and violent crimes” (17). Shepley et al. state their similar conclusion by stating, “Based on the 45 quantitative and qualitative papers summarized here, we can deduce that the presence of parks and other green space reduces urban crime” (12). Both articles have theories to explain why this phenomenon occurs. After all, it is at least slightly unexpected that something as simple as more vegetation can make a community safer. Kuo and Sullivan attribute the lower crime rate to “[increased] informal surveillance of neighborhood spaces” and “[mitigated] mental fatigue” caused by the presence of vegetation (6). Alternatively, but not entirely dissimilarly, Shepley et al. describe their explanation behind the lower crime rate with, “In the process of our review, we extracted multiple mechanisms from the literature that may account for the impact of green space on crime, including social interaction and recreation, community perception, biophilic stress reduction, climate modulation, and spaces expressing territorial definition” (12). While some of their reasonings are different, most overlap between the two articles. The presence of people, less mental stress, and intentional use of
landscaping are among the similarities. In short, these articles are very similar in their ideals and findings, and both found that more green space leads to less crime in a community, showing that green spaces do promote safer communities.

**Sustainable Ecosystems**

The last benefit of green spaces to be discussed is that of sustainable ecosystems for wildlife. This is an intriguing benefit that might need some explanation. The study by Dallimer et al. titled “Biodiversity and the Feel-Good Factor: Understanding Associations between Self-Reported Human Well-Being and Species Richness,” discussed in a previous paragraph, explains the benefit of an ecosystem on people. Dallimer et al. studied whether people were more pleased with a green space if it had more biodiversity (1). Dallimer et al. clarify the importance of this study with,

To date, in research on the benefits to health and psychological well-being that humans gain from urban nature, the natural environment has generally been treated as uniform, often characterized simply as the amount or proximity of greenspace. This approach largely ignores the biological components that are typically measured in urban ecology, such as species richness. (1-2)

The study found that the perception of higher biodiversity led to higher satisfaction, although there did not actually have to be more species of plants or animals present (Dallimer et al. 7). As long as people believed the biodiversity was high, the people being surveyed experienced higher satisfaction (Dallimer et al. 7). Dallimer et al. discuss these findings with, “Our findings show a positive relationship
between three aspects of psychological well-being and greenspace users’ perceptions of species richness, perhaps demonstrating the worth of biodiversity to the general public. However, there were no consistent interactions between well-being and actual species richness” (7). As well as accommodating a human preference for more biodiversity, sustainable ecosystems also provide ecological services. Such ecosystem services are discussed in articles by Dearborn and Kark and by Green et al. The article “Motivations for Conserving Urban Biodiversity” by Dearborn and Kark discusses reasons to have green spaces in urban cities, and the article “Adaptive Governance to Promote Ecosystem Services in Urban Green Spaces” by Green et al. is a proposal on how cities can take care of green spaces (Dearborn and Kark 2; Green et al. 1). Dearborn and Kark discuss some of the ecological services by stating,

In an urban context, even small green spaces can provide high-impact ecosystem services, if they are well planned. For example, small wetlands can improve urban hydrology by absorbing contaminants or buffering against flooding, and vegetated rooftops can reduce the heating and cooling costs of buildings and slow runoff during rainstorms. (5)

They mention another benefit of ecosystems: “improving some aspects of air quality in urban areas” (Dearborn and Kark 5). Green et al. discuss multiple similar benefits of maintaining ecosystems, saying, “Regulating services shape the climate, water and air quality, along with the animal-mediated processes of pollination and pest control (i.e., biological control),” and “As such, these urban reserves can support
and enhance biodiversity, provide crucial ecosystem services, and establish connectivity between more traditional reserves (e.g., county and state parks, national forests) that are mostly located outside the urban core” (4 and 2). Dearborn and Kark and Green et al. list several ways that having ecosystems in urban areas benefits humans and our quality of life. The articles discussed in this paragraph all come to the consensus that sustainable ecosystems for wildlife also provide benefits to people who visit the green spaces.

**Degradation**

Without nice green spaces to enjoy, citizens of a community cannot experience the benefits that come from a green space. This would negatively influence the quality of life of a community in a potentially significant way. To define the problem, it is important to find the extent and implications of the degradation.

The two main types of degradation that are analyzed are littering and vandalism.

**Littering**

Littering is a problem that reduces the value of any outdoor area, but it is a particularly common problem among green spaces like parks. An article focused on littering in Malaysia, titled “Public Perception to Littering in Greenspaces: A Case Study in Bintulu, Sarawak, Malaysia,” states, “Problem [sic] with littering in paths, parks and other public spaces has become a vast issue in our communities. Littering is unpleasant from the view of city cleanliness, harmful to people and animals, and contributes to horrible odour in the environment” (Abdul Aziz et al. 2). Another article, titled “Subjective Reasons for Littering: A Self-Serving Attribution Bias as Justification Process in an Environmental Behaviour Model,” discusses
the littering problem in Switzerland, saying, “The littering of waste in urban and natural settings reduces the aesthetic and ecological quality of the environment” (Hansmann and Steimer 2). The authors agree upon the fact that litter is a problem (Abdul Aziz et al.; Hansmann and Steimer). Another point Abdul Aziz et al. and Hansmann and Steimer agree on is that littering creates an unnecessarily high cost to make the green spaces beautiful and useful again (Abdul Aziz et al. 3; Hansmann and Steimer 1). Abdul Aziz et al. state, “Littering is a bothersome behaviour that causes high and unnecessarily costs and efforts for cleaning-up” (3). Similarly, Hansmann and Steimer state, “Littering is an annoying behaviour that causes high and avoidable costs and efforts for cleaning-up” (1). It is interesting that the articles contain nearly identical sentences. Since the high cleanup cost is avoidable, both teams of authors aimed to discover the cause behind the littering to shed some light on how to prevent it (Abdul Aziz et al.; Hansmann and Steimer). Abdul Aziz et al.’s focused on general information, such as who is littering, what is being littered, and why (4). Hansmann and Steimer’s approach was to uncover the reasonings behind the behavior in order to change it (1). The conclusions to both articles are similar, but with key differences. Abdul Aziz et al. found that attitude is the main cause to which people attribute
their littering (7). The term “attitude towards littering” is defined as “an individual’s psychological tendency to evaluate or respond with a certain degree of favouritism or dis-favouritism towards the throwing of wastes on bare ground” (Abdul Aziz et al. 4). Because the term “attitude” can be ambiguous, a clearer term might be beliefs or biases. Hansmann and Steimer found that people maintain a self-serving bias when it comes to littering (8-9). Hansmann and Steimer conclude that, while people attribute their own littering to infrastructural problems, such as a lack of garbage cans, they attribute others’ littering to ignorance or a lack of character (8-9). Both articles conclude that people do have reasonings behind littering, which is why it continues to be a problem that leads to the degradation of green spaces.

Vandalism

Another type of degradation that is common in green spaces is vandalism, which can take many forms, such as graffiti or carvings. An article by Samdahl and Christiansen titled “Environmental Cues and Vandalism” describes the scope of vandalism, listing, “damage to restrooms, gates, fences, and other facilities; graffiti on picnic tables, walls, rocks, and trees; litter; theft; and general disregard for rules and restrictions” (2). In an article about graffiti prevention titled “Utilising Urban Gamification for Sustainable Crime Prevention in Public Spaces: A Citizen Participation Model for Designing against Vandalism,” Mohammed and Hirai wrote, “Moreover, graffiti is considered as the most common type of vandalism worldwide that threatens not only our public and private properties, but also our social environment,” to
describe the problem of graffiti (2). Like littering, vandalism is a preventable problem that can be costly to repair (Samdahl and Christensen 2; Mohammed and Hirai 5). Mohammed and Hirai explain the severity of the implications of vandalism:

There are three main negative effects of graffiti on the physical environment: first, the high cost of dealing with it making it a very expensive threat that swallows money from people’s pockets every year. Secondly, based on the broken window theory, graffiti brings more crimes and offenses to the neighbourhood making the overall environment unsafe. Thirdly, graffiti affects the image of the neighbourhood making neighbours in discord with their surrounding environment. (5)

Samdahl and Christensen discuss the same severity of implications:

This concern by managers may reflect an increase in the occurrence of such acts and may also stem from the growing dollar demand on meager recreational budgets that must be spent on repair, replacement, education, or other strategies in response to those problems. Effective and cost-efficient methods to reduce depreciative impacts are necessary. (2)

In order to avoid these preventable repercussions, the two studies were conducted (Samdahl and Christensen; Mohammed and Hirai). Mohammed and Hirai’s article focuses on a policy change in a community aiming to reduce graffiti and therefore reduce crime (7). The overall goal of the article is a safer community. In contrast, Samdahl and
Christensen’s article focuses on the cause of vandalism on picnic tables in parks in the hopes to prevent it (2). The overall goal of the article is for park managers to spend less time and money on repairs and cleanup (Samdahl and Christensen 2). Their approaches to the problem were not the only differences between the two articles. Mohammed and Hirai discuss the broken window theory and uses it as a basis for the plan to improve the community (5). While Samdahl and Christensen do not directly mention the broken window theory, their findings and conclusions align exactly with the concept of the theory. Samdahl and Christensen’s article concludes that the highest indicator of new carvings on a picnic table is if the table already had some carvings, which represents a version of the broken window theory (10-11). In practice, the two articles use the theory inversely. Mohammed and Hirai use the broken window theory as a preventative measure; Samdahl and Christensen, on the other hand, use it as an explanation of the vandalism (Mohammed and Hirai 13; Samdahl and Christensen 10-11).

Another area in which the two articles contrast is that Mohammed and Hirai base their proposal on the assumption that citizens can prevent crime in their community simply by being present and watching for crime (2). This differs from Samdahl and Christensen’s findings, which show that having an interaction with
a manager is not the biggest factor in whether or not people choose to vandalize and which therefore suggest that more witnesses do not necessarily deter crime (11). Despite their differences, both articles discuss how vandalism continues to be a problem.

**Broken Window Theory**

The broken window theory is a simple concept in criminology that helps to explain why vandalism persists and why more run-down parts of a city experience more crime. It can also explain why people choose to continue to litter and vandalize green spaces even though they know it is wrong. An article by Berg and Kim titled “Economics of the Broken Window Theory” does a deep exploration of the effectiveness of the broken window theory (1). Berg and Kim define the theory by writing, “A broken window when left unrepaird makes a building look uncared for. The appearance of being left uncared for by owners and law enforcement strengthens perceptions among lawbreakers that laws are unlikely to be enforced. In turn, vandals are attracted and break more windows” (Berg and Kim 2). It may be surprising that something as insignificant as the appearance of a building could make it more likely for a crime to occur, but according to the broken window theory and the authors, it is true (2). Berg and Kim explain, “To summarize: the broken window theory proposes that lawbreakers become emboldened in parts of a city that appear comparatively run-down, which leads these lawbreakers to rationally commit more crimes (in number and severity)” (2). The article explains that crime rates are self-fulfilling in nature, which can work positively or negatively (Berg and Kim 1-2). In other words, if citizens of a community believe crime rates
are high, crime rates will rise, but if citizens believe crime rates are low, there will be less crime in that area. These ideas also apply to vandalism. If people see that a park is already experiencing some degradation, it is more likely they will contribute to the degradation as well.

**Environmental Education**

As stated at the beginning of this analysis, the topic being discussed is a complex one with multiple layers. A lack of proper education on global environmental issues may lead visitors to contribute to the degradation of green spaces. Established methods of environmental education struggle to influence people’s decisions to act environmentally consciously. This difficulty might be caused by other problems in communication, such as lack of regulation, use of emotional tactics, and untapped potential of behavioral science.

**Visual Education**

First, due to the visual nature of the thesis project, it is important that the research provide background on visual approaches to environmental education. A study titled “Harnessing Visual Media in Environmental Education: Increasing Knowledge of Orangutan Conservation Issues and Facilitating Sustainable Behaviour through Video Presentations” examines the effectiveness of video and slideshow presentations in conservation efforts for orangutans (Pearson et al.). Another study, “Interpretive Media That Attract Park Visitors and Enhance Their Experiences: A Comparison of Modern and Traditional Tools Using GPS Tracking and GIS Technology,” considers the most effective type of interpretive signage for outdoor areas like national parks (Wolf et al.). It compared traditional media, such as pamphlets and signs, with modern media, such as audio
tours and GPS-triggered multimedia tours (Wolf et al.). Lastly, an article titled “Confronting Environmental Collapse: Visual Culture, Art Education, and Environmental Responsibility” explains how art can be used to make progress in global environmental issues (Hicks and King). The article discusses different art pieces that either bring awareness to and inspire solutions for environmental issues or solve an environmental problem in a practical way, like filtering water (Hicks and King). In other words, the existing types of visual environmental education are video or film, slideshow presentations, pamphlets, signs, technology-guided tours, and art installations. However, the issues in current environmental education span across these visual methods.

**Lack of Regulation**

Lack of regulation in environmental education may cause a problem in the communication of accurate facts on the topic. A study conducted by Allgaier titled “Science and Environmental Communication on YouTube: Strategically Distorted Communications in Online Videos on Climate Change and Climate Engineering” examined the content of YouTube videos on climate change (1). The purpose of the study was to discover the accuracy of the information shared on YouTube because it is a common platform that people use to learn about topics they are unfamiliar
with (Allgaier 2). Allgaier explains the popularity of information-gathering on YouTube, saying, “Around half (53%) of YouTube users say the site is at least somewhat important for helping them understand things that are happening in the world—with 19% saying it is very important to them for this reason. Online videos have become an important global information source, also for environmental and scientific issues and topics” (2). This is a significant finding because it shows that inaccurate information in YouTube videos could lead to people being misinformed about important environmental topics. The study found that many of the videos did contain information that contradicted common scientific beliefs and that many videos spread conspiracy theories about climate change (Allgaier 1). The author goes on to explain how this type of misinformation is being shared:

Social media websites and video platforms without editorial control, such as YouTube, provide a very fertile ground for conspiracy theorists and opponents of mainstream science because there are no gatekeepers and hence no quality control is taking place on such channels. This means virtually everybody can upload contents no matter if they are accurate, verifiable, and truthful or not. (Allgaier 11)

This study shows that a lack of regulation leads to the spreading of misinformation about important environmental issues (Allgaier 11). This is one of the problems with the established methods of environmental education.
Emotional Tactics

In addition to the lack of regulation, the use of emotional tactics has also been shown to create problems in environmental education. There are three articles about emotional tactics in environmental education that shed light on the issue. An article by Schneider et al. titled “Positive Emotions and Climate Change” examines the cycle of positive emotions in relation to environmental issues (1). Schneider and their colleagues’ purpose is to discover whether positive emotions influence environmental action in hopes to have a larger impact on helping environmental issues (1). An article by Chapman et al. titled “Reassessing Emotion in Climate Change Communication” discusses the issues in environmental communication with the goal of improving the field (1). An article by Ettinger et al. titled “Climate of Hope Or Doom and Gloom? Testing the Climate Change Hope Vs. Fear Communications Debate through Online Videos” conducts a study on short-format videos that are meant to evoke emotion (1). Ettinger and their colleagues aim to find out which emotional response, positive or negative, more effectively causes people to take environmental action (2). While all three of these authors differ in their approach and purpose, they all come to similar conclusions. Schneider et al. state,

...Although the evidence base suggests that positive affect and certain discrete emotions are often positively associated with productive climate change engagement, this is not always the case nor does it necessarily follow that ‘more positive emotion’ equates to ‘more engagement’ in a straightforward, predictable manner. (4)
Chapman et al. conclude their discussion by stating that “Emotions should be viewed as one element of a broader, authentic communication strategy rather than as a magic bullet designed to trigger one response or another” (1). Lastly, Ettinger et al. conclude their findings with, “Overall, neither the hope video nor fear video was associated with significantly different effects on climate change risk perceptions, likelihood of climate activism, or likelihood of behavior change to reduce individual emissions (excluding a single outlier)” (15). All three studies show a singular emotional encounter will not impact individuals’ decisions in a significant way. This similarity in their findings is interesting, but it is not the only noteworthy similarity. Two of the articles, by Schneider et al. and Chapman et al., mention how emotions are not “levers”; while Ettinger et al. do not use these exact words, their intentions are the same (Schneider et al. 4; Chapman et al. 1-2; Ettinger 15-16). Schneider et al. mention emotional levers when they state, “Perhaps most fundamental is the conclusion that (positive) emotions should not and cannot be treated as mere ‘levers’ or ‘tools’ of behavior change...” (4). Chapman et al. discuss emotional levers with,

Rather than treat emotion as a lever or switch to be directly calibrated and pulled for a desired effect, the climate change communication community should adopt a more nuanced, evidence-based understanding of the multiple and sometimes counterintuitive ways that emotion, communication and issue engagement are intertwined. (1)

Lastly and most imprecisely, Ettinger et al. discuss the concept by stating, “These largely null results suggest
that the impacts of a single hope or fear appeal can be overstated and caution against claims that a particular type of emotional appeal is necessarily superior for climate change communication” (15-16). These findings show that emotional tactics in environmental education represent potential problems.

**Behavioral Science**

Along with the use of emotional tactics, the fact that the potential of behavioral science is untapped could be a possible problem in environmental education. An article written by Velez and Moros titled “Have Behavioral Sciences Delivered on Their Promise to Influence Environmental Policy and Conservation Practice?” reviewed 21 papers written between 2015 and 2020 on how behavioral science influenced environmental policy and conservation practices (2). Velez and Moros’s purpose in conducting this analysis is to discover whether behavioral science has had the anticipated effect on the decision-making process around environmental issues (2). They state, “After four decades of refining our understanding of decision-making processes, a form of consensus has developed around the crucial role that behavioral science can play and changing non-cooperative decisions and promoting pro-environmental behaviors” (Velez and Moros 1). After conducting the analysis, Velez and Moros conclude that even though the factors have been put into practice, the full potential of behavioral sciences has not been met in regard to influencing people on environmental issues (4). They expand on this finding by stating, “There is great potential for scaling-up programs and interventions, but there are still challenges for research and practice” (Velez and Moros 4). In order to have better environmental education and more effective outcomes,
behavioral sciences could be used in a larger capacity in the methods for education (Velez and Moros 4-5). Lack of regulation, use of emotional tactics, and untapped potential of behavioral science could all potentially cause established methods of environmental education to be ineffective.

**Conclusion**

The degradation of green spaces is a complex topic. By examining the benefits of green spaces, types of degradation, and established methods of environmental education, this thesis has gained several insights into the problem. Improved mental and physical health, stronger and safer communities, and sustainable ecosystems for wildlife are all personal benefits of green spaces. Littering and vandalism are common problems for green spaces, and the broken window theory can exacerbate the issue if the degradation is not remedied quickly. The readings confirm that a lack of regulation could be responsible for the spread of inaccurate information about environmental education and that the use of emotional tactics in environmental education is not straightforward in effectiveness. Lastly, behavioral sciences have not been fully utilized in environmental education.

This analysis contributes to defining the problem of green space degradation and establishing the legitimacy of the problem, which is unresolved and affects quality of life in many vital ways. The explanations behind continued degradation and the potential issues that cause ineffectiveness in current methods of environmental education have been revealed. The discovery of the causes of the problem will help to move toward a solution. The findings suggest that a more effective method of environmental education
is both possible and necessary. Future research could be conducted on finding specific ways to make environmental education methods more effective. With the problem thoroughly established and examined, specific examples of previous environmental education and communication efforts provide insights into this project’s design.
Case Study 1

The Study

The first case study to be examined is titled “Investigating the Impact of Interpretive Signs at Neighborhood Natural Areas” by Shawn K. Davis and Jessica L. Thompson. The subject of the study is 23 interpretive signs split between two natural areas in Fort Collins, Colorado (Davis and Thompson 2). The study notes the self-paced and self-motivated nature of learning from interpretive signage systems. It is conducted with 475 qualitative observations and 46 interviews split between the two natural areas. The objective of the study is to discover how this type of sign is pre-judged, received, and experienced by visitors of the natural areas. As issuing signs for a public area is costly in proportion to the budget allocated for such areas, the study aims to find the impact of the signs to reference for future budgets. Factors like attention grabbing, learning retention, and favorite features are considered (Davis and Thompson 3-4).

Sign Aesthetics

The study begins by discussing the impact of interpretive signage on visitors’ learning (Davis and Thompson 2). Several claims are made. First, the longer a sign is viewed, the higher levels of interest and learning are. Second, including some form of interactive element tends to increase the level of attention given to a sign. Third, visitors are more likely to read larger text that is broken into easily consumable sections. Fourth, signs that include both images and text are remembered more easily. Fifth, including questions on signs promotes visitors to learn more about the subject. These claims are considered when
interviewing the visitors on their knowledge and impressions of the interpretive signage systems (Davis and Thompson 2).

**Results**

The study found that one of the major indicators of whether visitors paid attention to the signs was the type of activity they were participating in on the trail (Davis and Thompson 10). Visitors who were walking were much more likely to stop and read the signs than visitors who were cycling or running. In terms of the visual aspects, the results show that visitors favor three-dimensional elements, large text, and images or information on local wildlife on the signs. The study summarizes the findings by recommending the addition of a three-dimensional feature, an image of local wildlife, and a large title to any signs being created. It also recommends placing them at a natural resting place if possible, depicting something that cannot usually be seen by visitors (like prairie dog tunnels), and creating a different collection of signs that are easier to read for runners and cyclists (Davis and Thompson 10).

This case study’s conclusions about interpretive signage, the way it impacts visitors’ learning, and the recommended visual aspects inform the solution to the research problem. For example, since the study found that it is primarily walkers who interact with interpretive signage systems, the solution will be designed for visitors who are walking through the green space. Additionally, some elements that would lend to a more effective method of environmental education and communication are a three-dimensional feature, an image of local wildlife, and large text on the signs. Based on the findings of the study, it might be beneficial to add a visual representation of something the visitors could
search for as well. A less obvious piece of information that is helpful in informing the solution is that the natural areas and walking trails in which these signs are presented are unstructured in nature. This helps support the idea that green spaces do not need to be a structured park in order for educational signs to be effective or appreciated.
Visual Analysis 1

Background

The visual analysis accompanying this case study is on the two signs found to be favored by the visitors. The signs are titled *A House in a Town* and *Prairie Survival – Go Underground!*. The case study does not attribute credit to the artist behind the creation of the signs, but it mentions that the signs in both natural areas are created by the same artist. After using the reverse image search feature on Google, I found the image in the online portfolio of ECOS Communications, the company behind the design of interpretive signage system. I not only found clearer photographs of the signs to analyze, but also was delightfully surprised to discover the artist behind the signage system. Through this search, I also found the company behind the commission of the signs: it is likely the City of Fort Collins Natural Areas Program, as their logo can be found on several of the signs throughout the natural areas. Unfortunately, I only found a higher quality image of *Prairie Survival – Go Underground!*, so the image of *A House in a Town* remains very blurry. The two signs will be visually analyzed below.

To begin the visual analysis, I would like to provide some context for the content being assessed. First, the signs seem to be a large size. I would estimate they are, on average, about one foot by two feet. However, some signs are significantly smaller and larger than that estimate. Secondly, I believe the signs are a part of a larger campaign by the City of Fort Collins Natural Areas Program. The total number of signs is unknown, but the case study states there are 23 signs total within the two natural areas the authors studied. Thirdly, the design and
format of the signs were found to be favorable by visitors. Lastly, some of the signs include three-dimensional interactive elements that are not pictured in the photographs. These elements add interest to the signs that cannot be taken into account in this analysis.
Sign 1

The first sign being analyzed is *A House in a Town*, Figure 1. While the picture provided by the case study is grayscale, the actual sign is in color. At first glance, the sign is much like an illustration with several captions. This differs from traditional interpretive signage, which contains informational text with supplemental images. On this sign, the image is the main content while the small clips of information are supplemental to the image. The scene being visually represented in the image is the homes of different wildlife. It includes a view of the ground level and underground tunnels. At first glance, I thought the image depicted a prairie dog home comprised of tunnels. After further inspection, I discovered that there are other animals represented as well, including a snake residing in one of the tunnels as well as an
owl family huddled around a mound on the ground. What I believe to be deer and a hawk are represented on the ground level. Having a clearer image of the sign would clarify exactly what is present and would make it possible to read the text. Even though it is unreadable, I note that the text appears rather small compared to the overall size of the sign. The title appears to be small, which contradicts the recommendations in the case study. Because of the small text size, there is not a very clear visual hierarchy: even though the title is larger than the other text, the viewer begins by looking at the middle of the underground section of the image. There is plenty of movement in the image due to the organic form of the tunnels, which guide the viewer’s eye around the image, allowing them to read the captions along the way. The viewer’s gaze would then be brought back to where they began. While *A House in*...
Sign 2

The second sign to be analyzed is *Prairie Survival – Go Underground!*, which is represented in Figure 2. This sign is comprised of illustrations, photographs, and a balanced amount of text. There is an interesting variety of elements to view, each supporting the others in various ways. A visual hierarchy is much more established in this sign than in the previous sign. The title is large with enough negative space around it to guide the viewer’s eye to start there. From there, the eye goes to the short paragraph just below, then to the photograph of the turtle below that. Next, the eye goes to the photographs, illustration, and captions in the top left corner of the sign. The caption in the bottom left corner then guides the eye to the organic movement of the illustration from the bottom middle to the top right corner of the sign, reading captions along the way, which returns the focus to the title. A three-dimensional rattlesnake sculpture is not
shown in the image provided. The interesting sign along with the sculpture would almost certainly draw the attention of visitors walking by the sign. The colors of the sign are natural and calming in appearance, which supports the content of the sign. Overall, the visuals of this sign make it successful. It follows most, if not all, of the elements found by the study to be most effective in educating visitors. I believe *Prairie Survival Go Underground!* to be a successful sign in educating visitors on wildlife that lives in the ground.
Case Study 2

The Study

A case study that informs the solution to the research problem is “Learning on the Trail: A Content Analysis of a University Arboretum’s Exemplary Interpretive Science Signage System” by James H. Wandersee and Renee M. Clary. The purpose of the study is to find the most effective educational signage to teach children about science in an immersive environment (Wandersee and Clary 2). The benefits that come from an immersive learning experience make it valuable and worthwhile to optimize. The types of locations that provide this immersive learning experience are arboretums, botanical gardens, fossil parks, zoos, and similar places. The interpretive signage systems found in these types of locations provide an optional learning experience that is each person consumes to the depth of their interest level. In other words, some visitors choose to read every sign completely while other visitors only stop and partially read the signs that grab their attention. It is also noted by the study that this type of signage system provides a more targeted and engaging learning experience than a brochure for the same area (Wandersee and Clary).

Wandersee and Clary’s study is conducted on the signs in the Crosby Arboretum on the Mississippi State University campus in Picayune, Mississippi (Wandersee and Clary 2). This arboretum has 158 signs in total. Wandersee and Clary compare the signs at the Crosby Arboretum to the 46 signs in the Watchable Wildlife exhibit in Alberta, Canada. The characteristics of the signs at these locations are compared to find out which elements are favorable. The results from this comparison theoretically
present guidelines for what qualifies as an excellent interpretive signage system. The study is conducted by taking photographs of each sign at both locations and analyzing the text with appropriate software. The software analyzes several aspects of the text, such as “average word count per sign, percentage of passive sentences, Flesch Reading Ease score, and Flesch-Kincaid Grade Level score, among others” (Wandersee and Clary 2). The results for the two locations are compared to each other. The results found that the signs at the Crosby Arboretum have almost half the average number of words per sign, slightly shorter sentences on average, and slightly more passive sentences on average than the signs at the Watchable Wildlife exhibit. Contrary to expectations, the signs at the Watchable Wildlife exhibit are found to be easier to read by more of the public (Wandersee and Clary 5).

Results

After taking this information into account and viewing some relevant literature on the topic, Wandersee and Clary then drew conclusions about the contents of an ideal sign (7). Teachers looking for future field trip locations or designers working on an educational signage project could review these conclusions and make better, more informed decisions. The authors state that a sign should have around 70 words per sign and that the sentences should be about eight words in length (Wandersee and Clary 7). The active voice should be used a minimum of 80% of the time and there should be a maximum of 15% of new, unfamiliar words. Additionally, an eighth-grade reading level should be maintained, and each sign should have one main topic and be conversational, interesting, coherent, and logical. Each sign in an interpretive
signage system should contain the common and scientific names of the subject, complementary graphics, and something for the viewer to visually compare and contrast. The authors also conclude that signs should be placed frequently along a trail to give the feeling of a well-informed tour. Lastly, there are some ambiguous conclusions that support the basic idea of increasing the viewer’s involvement in the tour and interest in the content of the signs (Wandersee and Clary 7). The conclusions drawn by Wandersee and Clary provide a starting point for selecting a good interpretive signage system. They also provide specific characteristics to help develop the solution to the research problem.
Visual Analysis 2

Background

The visual analysis associated with this case study is on one sign from each location. The first sign to be analyzed is from the Crosby Arboretum, while the second is from the Watchable Wildlife exhibit. Unfortunately, the artists, illustrators, or designers of both signage systems are unknown, but the article states that Bob Brzuszek wrote the content for the signs in the Crosby Arboretum, while the government of Alberta is responsible for the signage system at the Watchable Wildlife exhibit. It is also worth noting that the sizes of the signs are not discussed for either location. However, as all the signs are similar to their counterparts within the same location, the dimensions of the signs will not be a factor in the visual analysis.
Sign 1

The first sign to be examined is titled *Toothbrush Tree*, and it can be found in the Crosby Arboretum. It is represented in Figure 3. The photograph of the sign is grayscale, which makes the sign appear black and white. While it is unclear if the lack of color is due to the sign itself or to a photograph filter, this design would not include much colorful content.

There is a title in a large, bold, and all-caps font across the top of the sign. There are two short paragraphs under the title in a standard sans-serif font. Lastly, there is a line-style illustration of a leaf to the right of the second paragraph and a double-line border around the edges of the content. As stated before, each of these elements leaves little room for creativity with the use of color. The
limited content of the sign leaves little room for creativity in any form, and the visual analysis reveals the simplicity of the sign. This simplicity helps to establish the visual hierarchy. The viewer’s eye goes straight from the title to the first paragraph spanning the length of the sign, down to the second paragraph, and then to the leaf illustration to the right. The viewer might then notice the border if they take additional time and effort to view the sign. The only element of content besides the blocks of text is the leaf illustration, which provides some organic shape and movement. The sign achieves its purpose of being educational. Although it might benefit from more interesting design choices, overall, the *Toothbrush Tree* sign at the Crosby Arboretum can be classified as a success.
Sign 2

The second sign to be visually analyzed is titled *Tamarack*, and it can be found in the *Watchable Wildlife* signage system. It is represented in Figure 4. It appears that this sign is also black and white. However, like with the last sign, this information is not explicitly provided and the lack of color could be a filter on the photograph. A first glance reveals several things to view on this sign. Firstly, the eye goes to the large, bolded, and all-caps title. However, it is unclear where the viewer’s eye is meant to travel after that, as there is not a clearly established visual hierarchy. Logically, a viewer might continue reading the sections to the right of the title, which contain some very small text in the middle section and two illustrations or graphics in
the right section. These illustrations are an inconsistently small tree and a representation of Alberta. After viewing the top sections, the viewer’s eye would move to the bolded sentences at the beginning of the first paragraph, leading them to read the rest of the two short paragraphs. Then, they would most likely view the illustration to the left of the paragraphs. This illustration is a branch of the tamarack tree, which is the subject of the sign. Last, the viewer might look at the nametag or logo block at the bottom right of the sign. It could be argued that this identifier would catch the attention of the viewer after reading the text and before viewing the illustration of the tamarack branch. This is another example of an unclear visual hierarchy. Although both signs have a similar amount of text, this sign seems to have more movement than the previous one. The illustrations are a large part of the overall movement present on the sign, but the text justification and rounded corners of the borders add to the movement as well. Overall, this is a successful sign, even with its strange aspects and possible design flaws, because it accomplishes the goals of being educational and contains most, if not all, of the elements recommended by the study.
Case Study 3

The Study

Another case study that provides useful information in advising the solution to the research problem is “Using Visitor Observations to Predict Proper Waste Disposal: A Case Study from Three US National Parks” by Timothy J. Mateer, B. Derrick Taff, Zachary D. Miller, and Ben Lawhon. The study’s purpose is to find out if the Zero Landfill Initiative (ZLI) campaign is effective in reducing the amount of landfill waste from national parks (Mateer et al. 1). The article begins by explaining the need for a study like this one. The problem being addressed by the study arises because national parks are receiving many more visitors than previous years. While this is a positive sign for the exposure of the national parks, more visitors means more waste. To combat the new influx of waste, the National Park Service partnered with some similar nonprofit organizations to create the ZLI, which attempts to send more waste to recycling plants and less waste to landfills. While there have been previous studies on visitors’ intentions after encountering campaigns like the ZLI, the authors claim there are not any studies measuring actual behavior in park settings with such campaigns. A study to measure the behavior of park visitors after experiencing a campaign to promote better environmental action would provide proof of whether or not such programs work (Mateer et al. 2). This information is applicable to the development of the solution because it provides insight into the effectiveness of signage prompting pro-environmental behaviors.

The study is conducted at Grand Teton, Yosemite, and Denali National Parks because the ZLI was already
implemented at these parks (Mateer et al. 2). The program consists of placing more frequent recycling bins and appropriate signage in important areas around the parks. The study is conducted by observing visitors in an unobtrusive way from a designated spot. These observations are conducted over a twenty-five-day period during high-traffic days and times in peak season, aiming to gather the most amount of information in the shortest amount of time. The study notes that high-traffic times prevented the skewing of results due to the observers’ presence because there were almost always other people present as well. This is important because people are inclined to make more ethical choices when someone is watching. Therefore, the high-traffic setting prevented the observers’ presence from influencing the visitors’ choices. The observers wore regular, inconspicuous clothing to blend in with other park visitors. Characteristics the observers were looking for included group size, gender, the presence of children, interactions with the signs, confusion, and proper disposal of different kinds of waste (Mateer et al. 3-4).

**Results**

The study found that group size and gender do not have a significant role in predicting whether or not visitors properly dispose of waste (Mateer et al. 5). However, the results found that the presence of children, interactions with the signs, and confusion do have a significant role in predicting visitors’ waste disposal behavior. In fact, the study found that groups with children are 1.51 times more likely, visitors who were observed interacting with the signage system are 1.25 times more likely, and visitors who did not appear to be confused about the waste system are 2.68 times more likely to
participate in proper waste disposal. Overall, 83% of park visitors properly disposed of their waste, which is encouraging. However, only around 31% of visitors were observed interacting with the new signage. The article discusses how this could be improved through changes to the signage system. In order to have more visitors interact with the signage, the authors recommend designing similarly intended signs to be eye-catching, prominent, possibly emotional, and in a place that disrupts normal behavior (Mateer et al. 5). Each of these findings has a significant impact on the creation of the solution to the research problem. Firstly, the tendency of groups with children to be more likely to properly dispose of waste is interesting. There could be several reasons for this tendency, including a concern about the future of natural areas like national parks. This means it might be beneficial to design park signs in a way that supports the same ideas in visitors who do not have children. Secondly, making the signs simple, concise, and consistent with waste disposal industry standards would cut down on any confusion visitors might experience. Thirdly, the efficiency of a signage system that encourages pro-environmental behaviors is high. These specific characteristics help inform the solution to the research problem in content and format.
Visual Analysis 3

Background

The visual analysis accompanying this case study is the image from the ZLI set-up, not the signs themselves. Unfortunately, I could not find any clear photographs of the signage on the recycling bins and trash bins associated with the ZLI. Additionally, I could not find any more information on who designed the signs for the program. The National Park Service is responsible for this program, which means that they are also responsible for the creation of the signs. The size of the signage is not mentioned in the article, but the photograph provided does allow for a size comparison with surrounding objects, which can be used to analyze prominence in the area. The campaign is restricted to an increased number of recycling bins and trash bins along with the signage system; therefore, there are no other factors of the campaign to be considered in the visual analysis. Additionally, the signage seems to be limited, with just one or two signs per bin.
Image 1

The photograph to be visually analyzed, Figure 5, is an image of the ZLI set-up that shows three recycling bins and one trash can. Each recycling bin and trash can is a neutral color that could be found in nature, and they each have two signs on the front. Additionally, the recycling bins have a large, bright yellow recycling symbol painted on the front. The signs are difficult to analyze because the photograph is blurry, but the general features can still be seen. The signs are simple in design and cohesive with one another. Each sign contains the name of the type of recyclable material that goes into that bin, an image of the recyclable material, a recycling symbol,
and a short description that cannot be read in the photograph provided. The signs seem to have nice color, movement, and visual hierarchy, largely due to the round, brightly colored shape behind the text. The signs on the front of the trash can are impossible to analyze due to the poor quality of the photograph provided. However, it is obvious that visitors to the national park could easily view and understand the waste station and its function just by walking past them. I believe that the signs and the campaign overall are successful because they achieve their intended purpose and are aesthetically pleasing.
Research Conclusion

Now that an in-depth investigation on the research problem has been completed, the problem and solution are clearer and more defined. The literature review provided a thorough analysis of the research problem, and the case studies and visual analyses gave specific details on how the solution should be created in reference to content, layout, and interactivity.
Chapter 3

Visual Solution

As established, current environmental education fails to effectively influence people to make better decisions regarding the environment. Therefore, the solution is the creation of a more effective method of environmental education. To achieve this, I created a visual application in the form of a practical project that educates the public on environmental issues. In this chapter, I discuss the process of creating this visual solution.

Based on the research, I chose to create a scavenger hunt for green spaces. The scavenger hunt is comprised of five signs and a supplemental informational website. Since the focus is placed on more effective communication, the solution serves as a model that could be adopted by different green spaces and parks rather than as a comprehensive interpretive learning system. The informational sections are customizable to each area the scavenger hunt is placed in. For the purposes of this project, five signs were created—one welcome sign and four “found objects” signs—and the information on the website is customized to Alabama. There was one unexpected obstacle during the process of creating this project: it was more difficult than anticipated to establish the style and visual design of the project. First, the unprecedented nature of the project meant that research was lacking on how a scavenger hunt can be most educational. Second, it is difficult to find the right balance when creating something both fun
and educational. The tone, interactivity, and the form of gamification all needed to be intentionally thought out.

**Visual Research**

Research and brainstorming are necessary steps in the creative process before any designs can be made. For this project, I created mood boards and sketched potential icons and layouts. Mood boards can be vital in making intangible ideas more understandable and workable. I curated images that represented my ideas or inspiration into three sections: Signs, Website, and Icons. Once I started selecting images for the mood board, I realized that finding previous examples of scavenger hunt signs would be much more complex than finding images for the website layout and icon ideas. After completing the relatively simple website and icon sections, I started collecting more abstract and inspirational ideas for the scavenger hunt signs. Interpretative signage is not exactly appropriate to my project, since my signs are intended to be more interactive and challenging to find, while traditional interpretive signage is designed to be noticed easily. Still, I gathered information about the different stands, forms, and tone of interpretative signs to inspire the physical form of the signs for the project. I searched for signs with three-dimensional and interactive elements to inspire the interactive qualities of the project, but while I found some interesting images, they were not congruent with my project. Lastly, I tried to find inspiration for the design of the sign content. I looked for sign designs with QR codes for examples of how to manage such a structured, busy element in an aesthetically pleasing way. Lastly, I looked for signs with simple designs including illustrations as examples to reference. However,
due to the originality of my project, I did not find images that matched my intentions exactly. The curated collection of images below, Figures 6-9, makes up the final mood board.
Sketches

The completed mood board established some of the ideas for the project and led to the next step in the creative process, sketches. Sketching the icons that would be used on the signs and website was straightforward, as I already had a size and style in mind that would be perfect for the scavenger hunt. These sketches can be seen in Figures 10 and 11. For the website layout sketches, the sketching process was more thoughtful and exploratory because I did not know exactly what I wanted the layout of the website to be. At this point in the process, the contents of the website—what elements should be in the prototype versus what could be eliminated—were still unclear. I was still finalizing the research, so I sketched different general layout possibilities that would serve the purposes needed for the scavenger hunt. Because of this initial lack of direction, I later revisited them to make them clearer and more understandable. These sketches can be seen in Figures 12-18.
Figures 12-18. Website Layout Sketches
Icons

After the preliminary work of a mood board and sketches was complete, I began work on creating the project. Before designing the signs or the website, I needed to create the foundational branding elements that would be found on both the signs and website. I started with digitally illustrating the icons, which was a simple process. After some trial efforts in Illustrator, I recognized that this program was preferable to Photoshop for this task. I also knew that the icons should be vectors so they would resize well for the sign designs. To create the icons, I first placed the images of my sketches in a layer and then created a second layer above it to draw on. I used the brush tool and a Wacom drawing tablet to trace my sketches. I made corrections to any strange or sharp anchor points with the Direct Selection tool, and I made the strokes into objects using the Shape Builder tool. Lastly, I colored the vectors. The first drafts of the icons can be seen in Figures 19-23. After some feedback, I made some changes to the recycling symbol icon, rounding the sharp corners to match the more whimsical feel of the other icons. While revising all five icons, I rounded any sharp corners, thickened some lines, and adjusted the positioning of some elements to strengthen the whimsical, organic feel of the icons. The final icons are shown in Figures 24-28.
Figures 19-23. Icon Drafts

Figures 24-28. Final Icons
Logo

Another foundational element that is present in both the signs and website is the logo. Since this project would be implemented by different city governments or sponsoring companies, the scavenger hunt needed its own cohesive, recognizable branding to represent it. I started by giving the project a title. I wanted the title to reflect the purpose of the scavenger hunt, so I eventually decided on Eco-Adventure. The “eco” is short for ecology representing the subject of the scavenger hunt, and “adventure” illuminates the fun gamification aspect of the scavenger hunt. Once I had a title, I looked for a font that fit the tone of the logo, which was fun, playful, organic, and natural. After finding several fonts that fit the fun and natural tone, I settled on Carrotflower. While the font is a little rougher in texture than I originally wanted, I think it gives the logo character and lends to its organic quality. However, setting the title in the Carrotflower font was not enough: the logo needed more illustrative characteristics to bring visual interest to the signs and to be cohesive with the hand-drawn icons. After considering the different options, I decided to try adding leaves I had already drawn for the pattern of my thesis cover. I experimented with having many leaves surrounding the title, but found that the result was too busy. See Figure 29 for a similar draft. I next selected my favorite leaf motifs and centered them under the title. I chose to use a curved, pointy leaf because of the movement it provided. As the logo looked off-balance with just the leaf and title, I used a process of trial and error to add hand-drawn, imperfect lines to the sides of the leaf, working as an underline for the title. Figure 30 represents this types of draft.
Lastly, I changed the color of the leaf to match the green in the icons. I believe that my completed logo achieves the fun, playful, and natural tone I was intending. It is pictured in Figure 31.
Sign Iterations

Once the necessary branding elements were created, I could begin work on the sign designs. I decided to make the signs for the scavenger hunt 9 by 12 inches, so that they would be big enough to be seen but small enough to hidden. I chose a complimentary gray for the background color because it is neutral without being earthy, with the goal of making the signs stand out from their surroundings without being too obvious. Similarly, I also updated the colors of the icons slightly, making the green more blue and the blue less purple in hue. Since the signs are for a scavenger hunt, the contents on them should be limited, unlike in interpretive signage systems. In my first draft, the only contents on the signs were a number, an icon, and a QR code. The first sign to be found introduced the scavenger hunt and was distinguished as the “Welcome” sign by the title and the lack of a number. I experimented with the layout quite a bit. I wanted the signs to be vertical rather than horizontal, which narrowed down the layout options. I did not like options where the contents were simply stacked vertically. I tried positioning the number and QR code on the same row with the icon centered either above or below them. Lastly, I tried an off-centered approach with more movement. The number was placed in the top right, the icon in the middle right, and the QR code on the bottom slightly to the left. I finally decided on the second option: the number and QR code are aligned and the icon is centered above or below it. For the first draft, I decided to alternate every other sign whether the icon was placed above or below for variation. This is pictured in Figures 32-36.
Figures 32-36. Sign Drafts
Final Signs

After receiving some feedback, I made some changes to the signs. To keep the signs cohesive, I added the logo and instructional text to each one. If someone misses the first sign, they will still be able to join the scavenger hunt. I also added an audio icon to indicate that the information on the website can be consumed in an auditory way as well. This additional function serves a couple of purposes. First, it makes the scavenger hunt more accessible to people with auditory learning styles. Second, it allows visitors to participate in the scavenger hunt in a less technology-intrusive way. Some people may find it more pleasant to experience their nature walk without having to read the information from their phone. Due to the new content on each sign, I had to revisit the layout. With the new header, placing the icon on the bottom no longer worked well. It looked top-heavy and crowded. I experimented with different sizes and thicknesses of all the fonts on the signs. I also tried resizing the numbers or removing them altogether. Resizing the icons and QR codes was the key to making the design more balanced. The finalized layout has the logo centered at the top, the icon in the center, and the number and QR code horizontally distributed across the bottom. This design is shown in Figures 37-41. The mockups for this design are shown in Figures 42-46.
Figures 37-41. Final Signs
Figures 42-46. Final Sign Mockups
Website Iteration

Creating the informational website to accompany the scavenger hunt signs was the next major part of the project. I started by creating the content for the website, which includes informational sections and photographs. I wanted to keep the tone of the website casual and fun, even if it is informational and text heavy. I wrote the informational sections with my own knowledge to keep it conversational and not bogged down with facts. The text is a combination of fun facts and interesting anecdotes about Alabama. For the images, I went to a local park and took some photographs of the green space. I did basic edits to make sure the images were aligned and cropped in an aesthetically pleasing way. Once I had all the content for the website, I did a very basic layout in Adobe XD that I intended to change later. It is pictured in Figure 47.

Figure 47. Website Prototype Draft
Final Website

The edits I made to the second draft of the website were extensive. First, I added the logo. Second, I created some riddles and hints as well as ways to get involved to immerse the visitors further and, hopefully, to make them feel ownership or responsibility for the space. Third, I resized and respaced the text and experimented with the font styles to create a better hierarchy. Fourth, I added texture to the background. Fifth, I edited an organic edge onto the photographs to give them a more natural feel and placed them in the website. Sixth, I added an abstract walking trail to the background behind the text to add some visual interest. Seventh, I enclosed the hints and ways to get involved in rectangles to set them apart and draw attention to them. Lastly, I changed the format of the navigation. Instead of a list of items to find, there are hints and a low-profile navigation bar at the bottom of each page. The navigation bar is for the purposes of the project only. If this project were to be realized and carried out, any navigation would give away the searchable items in the scavenger hunt. After some feedback, I adjusted the leading in the “Hint” and “Get Involved” sections. The final website is represented in Figures 48-52.
Click here to view the Final Website Prototype

Figures 48-52. Final Website Prototype Webpages
Public Relations

The plan for the public relations aspect of the project is very simple. The onboarding process of getting people to the scavenger hunt is organic. The basis of this project is to help green space visitors appreciate and participate in their surroundings more, so there is no need for advertising or a marketing plan. People who are visiting the green space will simply discover the scavenger hunt on their own and choose whether or not to participate. Since the scavenger hunt is branded with a cohesive title and logo, participants could easily share their discovery on social media. This leads to the reward for completing the scavenger hunt which is a hashtag to share the triumph on social media. The hashtag would be shown at the end of the last webpage, and it would be customized to the location of the green space. An easy hashtag search would lead people to find the general identifying hashtag as well as hashtags for the different locations in which the scavenger hunts can be found. Another potential engagement opportunity is to include local companies in the reward portion. For example, a coffee shop could provide used coffee grounds to use for composting, or they could provide a coupon to people who present a social media post showing that they participated in the scavenger hunt. Another example would be advertising a recycling drop-off location nearby. These decisions would be based on the various stakeholders of the given area and their level of willingness to participate. The individual-level stakeholders could participate by posting on social media or sharing by word-of-mouth. City organizations like Parks and Recreation Departments
could sponsor the scavenger hunt by paying for its installation and upkeep. Lastly, the institutional-level stakeholders, such as businesses or green space and sports teams’ sponsors, could participate to the level they choose, as previously stated.
Challenges

As stated, several obstacles arose during the creation process that needed to be overcome for the completion of the project. The primary issue was the unprecedented nature of the project. It is difficult to get examples and inspiration for a nontraditional method. This caused difficulty in finalizing a design style and selecting a mockup. I had to make decisions, mostly in reference to tone, interactivity, and type of gamification, that were not necessarily drawn from research. Once these decisions were made, it was easy to finalize a design style and select a mockup. In these scenarios, I revisited the objectives of the solution and the ideal experience to have when encountering the scavenger hunt. All my decisions were made, at least partly, in reference to information found in the research. To overcome the obstacles that occurred during the creation of the project, I simply revisited the objectives of the solution and any related information from the research that could be translated or applied to the scenario.
The final solution was based on information from several different sources, and, as touched on in the last chapter, not every decision was straightforward or explicitly based on academic studies. However, the decisions were always guided by the research. This chapter discusses the specific pieces of research that informed the decisions made in the creation of the visual solution. The final solution is pictured again below in Figures 37-41 and Figures 48-52.
Figures 37-41. Final Signs
Click here to view the Final Website Prototype

Figures 48-52. Final Website Prototype Webpages
Defining the Problem

The development of the final solution became possible when I changed the problem statement after further researching the issue. The original problem statement was “Established methods of educating the public on global environmental issues fail to communicate the personal benefits of caring for green spaces, which are better mental and physical health, stronger and safer communities, and sustainable ecosystems for wildlife.” In other words, if people knew how great the environment could be, they would act more environmentally consciously. However, researching the issues in current education led me to rethink the original problem statement. The problem was not that environmental communication needed to be more positive, as positive communication existed and proved to still be inefficient in making a lasting difference in people’s actions. This was proven through the studies I examined on emotional tactics in environmental education. The studies by Chapman et al., Ettinger et al., and Schneider et al. all found that the use of emotional tactics was not effective in changing people’s behaviors long-term (Schneider et al. 4; Chapman et al. 1-2; Ettinger 15-16). The problem was also not that people did not know that green spaces are beneficial. That was proven through the various studies I examined that validated the benefits of green spaces. I concluded that my problem was not as clear as I had originally thought, and that the real issue in environmental education is that it is ineffective in influencing people to make more environmentally friendly decisions. This point was made most clear to me after analyzing the study by Velez and Moros on behavioral science. The study investigated factors in decision-making
which made me realize the research problem went deeper than a need for a change in tone or aesthetics. The problem needed a solution that would change people’s behaviors. Without this shift in defining the problem, the final solution would have been significantly different. It would have been simply another piece of positive environmental education that was no more effective than anything that came before it. Once the problem statement was better defined, I started the process of developing a solution that would attempt to influence individuals’ behaviors.

**Gamification**

To develop the project, I searched for ways to achieve an effective method of environmental education. One of the sources I analyzed pertaining to vandalism, a study by Mohammed and Hirai, discussed the idea of reducing crime through gamification (7). The idea relied on the broken window theory and utilized gamification to involve citizens in the community and to reduce the amount of crime, specifically vandalism (7). The article discusses the concept of gamification: “One definition of gamification is to bring game elements to non-game contexts in order to motivate users into certain behaviours. Another definition is that gamification is design that places the most emphasis on human motivation in the process” (Mohammed 3). These definitions align with the objectives of the project. Since influencing people’s motivations and behaviors in green spaces would lend to more effective education, I considered how the experience of walking through a green space could be gamified. After some brainstorming, I selected the idea of a scavenger hunt as an effective way to turn an informational learning session in a green space into a gaming experience. I believe
a scavenger hunt is the best format for the visual solution because it involves both solving a riddle or hint, which is a learning experience, and seeking something, which keeps visitors interested in the green space surroundings.

**Format**

As there are many types of scavenger hunts (paper, digital, video, etc.), the next decision needed to be the format of the solution. There were several sources that touched on this topic amongst my research on current environmental education. Wandersee and Clary found that signage systems provide a more targeted and engaging learning experience than a brochure for the same area (1). This led me to eliminate the option of a pamphlet scavenger hunt with a list of objects to find. Wolf et al. found that signs are the best option for a traditional media approach and that multimedia education is more easily customizable, widely accepted, and better at holding attention (12). While their study was focused on the most effective methods of interpretive tours, I believe their information is still relevant to my project. The findings of the study by Wolf et al. made me consider how to work with signage and multimedia approaches to make the most effective scavenger hunt. I first considered including video lessons, as informational communication with long blocks of text is unappealing, harder to comprehend, and will most likely not be read (Wolf et al. 11 and Davis and Thompson 2). Additionally, more effective learning takes place when multiple senses are engaged, which, again, would lead me to incorporate videos (Wolf et al. 2). However, in my research for this thesis, I found that every source that conducted a study on video education concluded that it is ineffective in making a change in behavior
long-term. Ettinger et al. examined the emotional tactics of video education. While the participants experienced the intended emotions, it did not lead them to change their actions (Ettinger et al. 15-16). The study conducted by Pearson et al. compared the effectiveness of a video and a slideshow in educating on orangutan conservation. Like the other study, it found that emotions were changed in the short term, but that actions in the long term were largely unaffected (Pearson et al. 11). This is problematic since the solution needs to impact long-term behaviors to be effective. In the case of environmental issues, video education seems not to be the best format. With this information in mind, I thought about how I could still incorporate a multimedia approach. I decided that the most effective approach would be to include signs and a website, which would give the benefits of both the traditional and digital methods of education.

**Tone**

The next step was deciding the tone of the solution, which would also help determine the design style of the project. As I have touched on before, while researching the use of emotional tactics in environmental education, I found that emotions are not levers and that there is no single emotional appeal that equates to more environmental action (Schneider et al. 4; Chapman et al. 1-2; Ettinger 15-16). Because of this, I determined that the final solution would not be emotionally persuasive in any way. Chapman et al. state that communication should be honest and authentic and should meet people where they are (1). Similarly, Wandersee and Clary state that interpretive communication should be conversational, interesting, coherent, and logical. It should maintain an eighth-grade reading level and use a maximum of 15%
of new, unfamiliar words (7). The sentiment from the two articles was foundational in my decision that the project should feel conversational, authentic, entertaining, and inclusive for children and adults. Finalizing the tone also determined the style of the project, which is fun, playful, organic, and natural.

**Content and Layout**

Next, I needed to make decisions about the content and layout of the project deliverables to develop the solution. For this, I looked to research on content, title size, amount of text, and number of photographs and illustrations. Davis and Thompson state that interpretive signage should include a large title, images of local wildlife, and a depiction of something that can not normally be seen by visitors, such as prairie dog tunnels (10). Wandersee and Clary observe that the best signs have one main topic and contain complementary graphics (7). Lastly, Wolf et al. state that signs should have an appropriate number of images and amount of text, be suitable for all learning styles and ages, and provide entertainment value (12). From this information, I developed the characteristics of each of my signs. They should have a large title, one main topic, a balance of text and imagery, and relevant photographs and graphics. While this research was aimed at signs and signage systems, I decided to apply the same concepts to the individual webpages on the website as well. The research discussed lent insight to both the content and the layout of the project.

**Interactivity**

The last thing I considered when developing my solution was how I could provide more interactivity using the content and layout discussed in the last paragraph. Davis and
Thompson claim that the use of interactive elements in exhibits and signs causes individuals to give more attention to the interpretive experience, which leads to higher levels of learning (2). Wolf et al. discuss this same phenomenon through the lens of having control over the learning experience, which leads to higher levels of mindfulness and attentiveness (11). The concept of having control over a learning experience is touched on by several articles, which attribute the unique and effective nature of interpretive signage systems to this characteristic of control over the learning experience (Davis and Thompson 2 and Wandersee and Clary 1-2). Based on this research, I prioritized finding multiple ways to incorporate interactive elements into the solution. However, the research is not the only reason I prioritized interactivity. Getting green space visitors to interact with their surroundings would, hopefully, make them feel more connected to and responsible for the green space. Higher levels of attention, learning retention, connectedness, and responsibility all influence the decision-making process for visitors. Therefore, I incorporated multiple elements of interactivity. The first interactive element is the gamification of the solution: rather than a signage system to be viewed, the solution is a game to participate in. The second incorporation of interactivity is the use of QR codes. Not only is there a physical action for the visitor to take, but there is also a second type of educational media to experience. The third form of interactivity is the hints provided for the searchable objects. The hints present an extra opportunity for an active role from the visitors when a simple list of searchable objects could have been provided instead. The fourth intentional addition of interactivity is the “Get Involved” sections. These sections are meant to provide...
a practical application of the knowledge gained through the interpretive learning experience, allowing visitors to take an active role in their surroundings instead of passively engaging in the interpretive learning experience. I believe each of these interactive elements adds value to the final solution, and, according to the research, it also increases its effectiveness.

**Artistic Decisions**

Unfortunately, not every decision was so straightforward. I had to make artistic decisions during the creation process. For example, when deciding the background color for the signs and choosing the font for the logo, I had to make my own conclusions about what would help further the project, rather than hinder it. In cases like these I simply revisited the objectives, tone, and research for the project to determine my course of action. I relied on sound academic principles of design which I have learned and seen demonstrated throughout my education and within the professional sphere.
Chapter 5

Conclusion

The current methods of environmental education and communication have not been successful in influencing individuals to make more environmentally friendly decisions, and therefore they need to be revisited. This failure can be significant in relation to green spaces because of how they can affect quality of life. When people do not act environmentally consciously, green spaces experience degradation. People in communities without access to maintained green spaces lose the opportunity to experience improved mental and physical health, stronger and safer communities, and sustainable ecosystems for wildlife. The causes and significance of the issue were examined through a literature review, and case study reviews and visual analyses were conducted to establish a starting point for a possible solution. The process of creating a visual solution was described in depth. Lastly, it was explained how the final solution is thoroughly backed by research. All of the previous chapters have compiled information to lead to the conclusion that the final solution works to solve the original research problem.

The final solution of an informational scavenger hunt works as a more effective method of environmental education because causes for continued degradation and inefficiency in education were considered and avoided in the project. First, the fun, interactive experience works to prevent the negative effects of the broken window theory. The mix of
traditional and digital methods of education maximizes the benefits of holding attention, learning retention, and entertainment. Making the communication authentic and accessible avoids the inefficiency of emotional tactics, while designing the content and layout to be easily consumable and accessible helps to maximize the learning experience. The addition of interactive elements contributes to higher levels of learning and more involvement in the green space. The final scavenger hunt solution thus achieves higher efficiency in impacting pro-environmental behaviors than previous methods of environmental education.

Through the process of creating this project, I acquired some new perspectives. I gained a new appreciation for green spaces, and all public spaces, and the community organizations that are responsible for them. I also learned the high level of complexities of environmental issues. There are many aspects that contribute to the issues, and any lasting solution needs to be multifaceted. While I did not learn any new skills creating this project, it was a new experience to create a project with specific design decisions that are informed by research. I believe I have taken the significance of green spaces, the complexities of environmental issues, and important research into consideration during the creation of the project. I am proud of how it turned out, and I believe it would be successful if implemented. Consequently, I would like to see the scavenger hunt realized in a green space. After implementation, it would be nice to have its effectiveness studied to find its success. The results of any studies would determine how the project would evolve.
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