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**How Students, Schools and the Community Benefit from Garden-Based Education:  
Frameworks for Developing a Garden-Based Education Center**

By

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## **Abstract**

Gardens can be used as a valuable tool in schools to teach curriculum, improve student behavior and self-confidence, instill a sense of responsibility in participants, and strengthen connections between schools and the community. The benefits of school gardens are well documented, but several challenges impede the effective use of gardens in many youth programs due to the time and knowledge required in maintaining garden-based education programs. In response to this need, a business plan was developed for a garden-based education center that will provide schools and communities with educational resources and support for maintaining gardening programs.

The business plan is supported by in-depth research on garden-based education (GBE), beginning with a literature review that explores the successes and shortcomings of garden-based education programs. This research is additionally informed by educator surveys and interviews with existing GBE non-profit organizations. The information gathered and analyzed from these sources form the foundation of the business plan for Growing Real Opportunities for Wyoming (GROWyoming), an organization promoting sustainable living, educational innovation, and community partnerships through garden-based education programs.

*This work is dedicated with love to my grandmother Janet Friend, a gardener and nature lover who inspires me every day.*

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## **Chapter 1: Introduction**

### **Introduction to the Project**

Imagine yourself in a lush, green garden. An herb plot next to you gives off the tangy aroma of oregano and chives, and when you rub the leaves of a lemon balm plant you smell the fresh sweetness of citrus. Sage and mint flowers attract pollinators with their purple petals while the bright yellow heads of marigolds keep unwanted insects at bay. Looking past the row of sunflowers that grow higher than your head, you find a sea of green life. The photosynthesizing leaves of squash, cucumber, and melons capture sunlight to provide energy for the developing fruit below. Chickens ruffle their feathers as they waddle past your legs and a smiling scarecrow stuffed with straw discourages sparrows from pecking at the growing crops.

You are not only standing in the middle of a garden; you are also in a classroom. An edible, living classroom where students have studied science, created art projects, and were inspired to write poetry. A classroom where students utilized math and engineering skills to construct hoop houses and chicken coops. Students observed firsthand how water, air, and sunlight came together as the perfect ingredients for plant growth, watched how insects, animals, and plants intermingled in a balanced ecosystem of symbiosis, and learned responsibility and teamwork as they worked together to care for this growing environment. They found friendship in each other when they harvested and tasted the fresh food that they grew themselves, sharing a meal of dedication and pride.

The garden began indoors when snow was still on the ground. Students learned the anatomy of a seed by dissecting lima beans and had their first lesson in engineering by building an indoor grow light structure. They were involved in each step of the

garden's creation, each class working together to design their plot and choose what plants they wanted to grow. They learned about their local climate, geography, water sources, and elevation and took this knowledge into consideration when carefully planning their garden. The students thought about their community's needs and decided to donate a portion of their harvest to local food drives, becoming more connected to their home town and fellow citizens.

After the snow melted and the frozen ground thawed outside, the students carefully transplanted their seedlings into the schoolyard garden. They integrated art into the garden space by painting colorful signs marking the different plants and built hoop houses to protect the more vulnerable plant species from harsh weather. They tested the soil and added compost and amendments where needed, and encouraged the important role of worms and ladybugs. Without even knowing it, the students fell in love with science and learning as they nurtured their garden.

Now think back to when you were a student in school. Where were you when you learned botany? How did you learn about ecology and biology? Was art ever incorporated into science and math? Aldo Leopold once wrote, "All the sciences and arts are taught as if they were separate. They are separate only in the classroom" (Callicott, 1999, p. 178). He argues that as soon as you leave the constructed confines of traditional schools, these subjects are immediately connected to one another. School gardens provide a unique way to break out of the classroom and integrate everything that students are learning, offering an engaging, exciting, and rewarding learning experience.

### **Importance and Definition of Garden-Based Education**

Gardens have been utilized in schools around the world for decades, to not only provide healthy food and nutritional value for students but also to supplement and enhance content learned in a variety of school subjects (Sottile, Fiorito, Teccho, Girgenti, & Peano, 2016). Garden-based education (GBE) is a teaching strategy that uses gardens and plants as a platform for learning. It is a hands-on, engaging way for students to learn science, technology, engineering, and math (STEM) concepts and can be a unique way to integrate multiple subjects together, including social studies, history, and art (Waters, 2008). Beyond academics, GBE has the potential to increase intrinsic motivation and self-confidence in students, strengthen student-teacher relationships, and improve student behavior in the classroom (Ruiz-Gallardo, Verde, & Valdez, 2013).

The presence of school gardens also has the potential to create more environmental equity for students in urban areas. Compositions of racial and class boundaries among neighborhoods tend to exclude populations from green spaces that can be beneficial for mental and physical health. The experiences that students have outside of the classroom and in their environment matter for learning, and school gardens can be a way to provide experiences that promote cognitive, physical, and social learning for students who may not have these opportunities at home (Ray, Fisher, & Fisher-Maltese, 2016).

### **Project Inspiration**

My personal relationship with gardening began as a child. I remember eating carrots right out the ground in my father's garden and grapes off of the fence in my grandmother's backyard. Fruits and vegetables had never tasted so good! I joined an organic gardening club in college where we maintained the University's gardens,

organized a campus farmer's market, and taught outreach education programs to elementary schools. This was my first experience teaching, and it inspired me to get an internship my senior year as an education staff for a wetland preserve, officially setting me on a career path in education.

My passion for gardening and my interest in informal education led me to complete an AmeriCorps internship at a botanical center after graduating college. I saw firsthand how engaging learning can become when students get their hands in the dirt, taste herbs fresh out of the earth, and ignite their senses in a flower patch. After my time at the botanical garden I continued to develop my interest in informal education by working with at-risk youth in an afterschool program, where we gave teens academic support and social activities, including a garden program. I watched the students flourish as they learned how to construct garden beds, developed responsibility in taking care of their plants, and took food home to their families. This was a powerful experience for me. It pushed me to return to school to get my Master's degree in education, with the goal of one day creating my own garden-based education center where I can continue working in informal education.

### **Statement of the Problem**

While the benefits of GBE are well documented, there remain many challenges to effectively implementing school gardens. Successful school gardens not only involve the work of students but also require the assistance of directors, teachers, and parents (Sottile et al., 2016). The time and content knowledge needed to build the infrastructure of a garden, maintain it to fruition, and teach GBE curriculum requires resources and support that many schools may not have. Teachers are under a lot of pressure to have their

students perform well on high stakes standardized tests. This accountability often takes teacher focus away from experiential learning and forces them to use more direct instruction in their pedagogy, a sort of “teach to the test” methodology, which can limit the promotion of critical thinking and creativity in students (Jennings, Swidler, & Koliba, 2005). A garden-based education center can provide the support schools and communities need to implement effective and meaningful garden pedagogy.

### **Overview of Research Project**

The following chapters detail a quantitative and qualitative assessment of the effects that garden-based education programs have on schools and communities. This is followed by a business plan for a garden-based education center based on this assessment. Chapter two provides a literature review examining GBE from multiple angles, including how it can contribute to academic success, how it can change students’ attitudes, behavior, and health, and the benefits GBE has on the community as a whole. While the main focus of the literature review in chapter two is on garden-based education, the concept of place-based education (PBE) is also explored, as GBE can be considered a form of place-based pedagogy. Gardens can be used to connect students to place and community, and the collaborative work between students and teachers that extend beyond the classroom and into the garden and nature is a common component of PBE (Tsevreni & Panayotatos, 2011). Chapter three outlines the methodology for data collection, including interviews with existing garden education businesses and online teacher surveys. Chapter four analyzes the data, and chapter five concludes the study with a discussion about the creation of the GBE business plan. The GBE center is intended to be located in Laramie, Wyoming, and will serve as a resource for local schools and the

community for garden development, GBE curriculum, and outreach support so that GBE programs are more accessible to teachers and students. The business plan is informed by the GBE literature review and by the expressed needs of schools, as well as by frameworks of existing garden education businesses and elements of social entrepreneurship.

### **Research Questions**

My research is driven by this question: how can students, schools and the community benefit from garden-based education programs? It is important to examine how GBE programs affect each stakeholder because they depend upon each other and reinforce one another. The answers to this question would not provide the full picture without asking the opposing question, what challenges do teachers, schools, and communities face when attempting to implement GBE programs?

Another important question guiding my research: what are the best practices and frameworks for developing impactful garden-based programs? I developed my survey and interview questions with these questions as their foundation and with the intention of creating a garden-based education center that meets the needs of the students, schools, and community that it will serve. These research questions also formed the foundation of the extensive GBE literature review in the following chapter.

## Chapter 2: Literature Review

### Introduction

Gardens have long been important resources, not only for food production but also as tools for confronting social conflicts in times of financial crisis, urban decline, famine, war, and environmental injustice. Community gardens sprang up all around the United States in the late 1800s in response to an economic recession that left many citizens unemployed. Municipal leaders spanning from Detroit to San Francisco provided the materials and instructions to transform vacant lots into cultivated gardens in order to provide work and alleviate hunger for the impoverished and unemployed. (Smithsonian Gardens, 2017).

These vacant lot gardens diminished in the early 1900s as the economy improved, but saw resurgence during World War I and II (Jagger, Sperling, & Inwood, 2016). The need for food in Europe spurred a patriotic duty to grow “liberty gardens” in the United States to increase exports and also to meet domestic food needs. After the Second World War, the transition to large-scale agriculture expanded the nation’s food distribution system, no longer making community gardens as vital as they once were (Saldivar-Tanaka & Krasny, 2004).

Focus shifted from community gardens to educational gardens during times of peace and economic stability. School gardens gained popularity in the beginning of the 20<sup>th</sup> century with the intention of connecting urban youth with nature and to teach them responsibility (Dirks & Orvis, 2005). Fannie Griscom Parsons, a major advocate of school gardens in the early 1900s, wrote about her intent when starting a children’s school farm in Dewitt Clinton Park, New York:

I did not start a garden simply to grow a few vegetables and flowers. The garden was used as a means to show how willing and anxious children are to work, and to teach them in their work some necessary civic virtues; private care of public property, economy, honesty, application, concentration, self government, civic pride, justice, the dignity of labor, and the love of nature by opening to their minds the little we know of her mysteries, more wonderful than any fairy tale.

(Greene, 1910, p. 4)

In the 1950s school gardens became the focus of nutrition education and student health when the Food and Agriculture Organization (FAO) and the United Nations Children’s Fund (UNICEF) began implementing “Applied Nutrition Projects” at schools and community gardens. Non-government organizations followed suit, encouraging the expansion of a “garden culture” and the development of garden-based education (Sottile et al., 2016). The use and intention behind gardens has evolved over time, but the potential for using them as an experiential tool for learning, personal growth, civic engagement, environmental stewardship, and health is as great now as it has ever been.

This literature review examines the theoretical approach behind place-based elements of garden-based education and documents the outcomes of several school garden programs. The review begins by exploring the academic benefits students can gain from GBE, then delves into the many ways gardening can improve attitudes and behaviors of students. Next, the review explores how GBE can strengthen communities and address social and environmental justice issues across neighborhoods. The literature review concludes with the extension of these benefits to national and global levels. The

challenges and limitations regarding GBE will be addressed in chapter 3 as a basis for the research methodology and analysis.

### **Academic Achievement**

From a pedagogical perspective, garden-based education can be viewed as a subset of place-based education. Place-based education (PBE) uses the local community and environment as a learning platform in order to make more meaningful and concrete connections to students' daily lives (Sobel, 2004). It can be used to teach a variety of curriculum and as a way to tie multiple subjects together. PBE attempts to break down the four walls of a traditional classroom by allowing students to spend time outside on a regular basis and to build relationships with the people and places in their community (Gruenewald, 2008).

The fundamental elements of PBE can be traced back to over a century ago when the educator and philosopher John Dewey expressed concern over the growing disconnect between students' school experiences and their everyday lives outside of the classroom and the subsequent alienation this brought to their learning experiences. Dewey sought to create a new educational approach that could contextualize learning for students to the real world (Smith & Sobel, 2010). This work has been expanded upon by many people across many cultures and is gaining popularity as teachers seek out more hands-on and experiential education (Dirks & Orvis, 2005).

Educational writers David Sobel and David Gruenewald are known for their work in defining and expanding the concept of place-based education. Sobel built upon Dewey's assertion that educational settings no longer draw upon the personal lives of

students and highlighted the problems that accompany standardized “one-size-fits-all” curriculum that is devoid of connections to place. Sobel claims,

The landscape of schooling looks like sprawl America. State-mandated curriculum and high-stakes tests put everyone on the same page on the same day. Educational biodiversity falls prey to the bulldozers of standardization. Schools hover like alien spacecraft, luring children away from their home communities. More and more, we drive a wedge between our children and the tangible beauty of the real world. (Sobel, 2004, p. 4)

Sobel argues that PBE is the antidote to this standardized approach that is prevalent in so many schools. David Gruenewald takes this perspective even farther by elaborating on the importance of not only using place as a vehicle for teaching, but to also encourage students to “inhabit” or re-inhabit their places. This means that as students learn through PBE, they should be encouraged to critically examine the social, political, and economic elements of oppression and to engage in social action that can improve life for both the social and environmental elements of that place. Gruenewald contends, “Acknowledging that experience has a geographical context opens the way to admitting critical social and ecological concerns into one’s understanding of place, and the role of places in education” (Gruenewald, 2008, p. 317).

Gruenewald believes that place-based pedagogy can and should be merged with critical pedagogy, essentially offering the perspective of a “critical pedagogy of place” that promotes critical thinking and reflection on the part of the student. This approach recognizes “place” as the context in which oppressive elements of society and

environmental exploitation may take place and encourages students to take action to induce positive change (Gruenewald, 2008).

Garden-based education draws on the basic principles of place-based education, attempting to connect students to place and make curriculum relevant to life outside of the classroom. It is considered a form of experiential learning, meaning students construct knowledge and skills from direct experiences in local places, and often has components of environmental education with attention to ecology and stewardship (Desmond, Grieshop, & Subramaniam, 2002). The experiential and contextualized aspects of GBE exemplify Dewey and Sobel's assertion of the importance of connecting curriculum with student's everyday lives.

Garden-based education offers a way for students to make the connection between curriculum and real-world applications, thereby strengthening their knowledge and improving academic achievement. A study in Washington D.C. compared standardized test scores of 5<sup>th</sup> graders in public schools with gardens to those without gardens and found that students in schools with gardens scored higher in math, science, and reading (Ray et al., 2016). Students tend to see greater purpose in what they learn in school when they perceive it to be relevant and more worthwhile than simply reading from a textbook (McInerney, Smyth, & Down, 2011).

The Washington D.C. study not only examined how gardens improve test scores but also how they can be used as a tool to close the achievement gap between majority minority and low-income schools compared to predominantly white middle class schools. The researchers mapped all of the public elementary schools in the metropolitan area in relation to neighborhood demographics, noting which schools had active

gardens. They found that the presence of school gardens correlated with higher academic achievement and postulated that if schools with fewer resources gain a garden it may help to decrease the racial and social class achievement gap. The study is based off of W.E.B. Dubois' observation that the social and physical environments outside of school influence learning, noting that minority and low-income students have less access to safe green spaces and out-of-school activities that promote healthy cognitive, social, and physical capabilities. School gardens may be a way to provide these students with those spaces and can be used as an avenue for creating more environmental equity in urban areas (Ray et al., 2016).

In relation to academic achievement, student engagement has also been documented to improve with the utilization of school gardens as hands-on lessons can inspire students to be interested in learning (Dirks & Orvis, 2005). A study exploring how GBE influences academic achievement revealed that student engagement was positively correlated with students' grades in core subjects in school. The report stated,

One reason principals and teachers are so enthusiastic about garden-based education is that such programs seem to capture students' interest and energize their learning...If garden-based education can promote student engagement in the gardens, such programs may become a gateway to increased engagement in science class and in school more generally, contributing to students' academic success. (Skinner, Chi, & The Learning-Gardens Educational Assessment, 2012, p. 19)

GBE not only captures student interest and engagement, but it has also been shown to inspire and rejuvenate teachers as well. A school-farm program in Norway

utilized school gardens as an extension of the classroom for each grade level starting in kindergarten to teach a variety of subjects including science, traditional economics, and entrepreneurship. One teacher noted, “I became more alive (through the outdoor activities) and became a better communicator for the children.” (Krogh & Jolly, 2011, p. 318)

Another study evaluating a third grade junior master gardener program documented the success of teachers integrating the program into other subject areas such as math and language arts. For example, one teacher had students read the gardening chapters out loud, and then incorporated words from the chapters into the weekly spelling lists (Dirks & Orvis, 2005). GBE is a unique way for teachers to enliven and diversify the type of learning that goes on in a classroom.

### **Changes and Improvements in Attitudes and Behaviors**

The benefits that accompany place-based education in general, and garden-based education in particular, extend beyond academic achievement. David Gruenewald, along with the prominent child and adolescent psychologist Gail Furman, contend that, “The less direct contact we have with our local environments, the less able we are to see, appreciate, and conserve the biotic and cultural diversity of our own space” (Furman & Gruenewald, 2004, p. 59).

Place-based pedagogy connects students to their cultural and environmental surroundings to give them a better appreciation and connection to place. Learning outside in the garden can encourage a student’s sense of environmental responsibility, and the practical and experiential learning allows students with opportunities to act on their learning, such as being involved with planning, growing, and learning in school gardens

(Barratt & Barratt Hacking, 2011). The ability to turn knowledge into action can foster feelings of self-efficacy, competency, and reverence for nature that enrich students' lives beyond academics.

A six-year study with at-risk high school youth (Ruiz-Gallardo et al., 2013) demonstrated the positive influences GBE programs have on the behavior of disruptive students. The programs incorporated GBE into a range of subjects, including music, science, and history, all with an environmental focus. Dropout rates and disruptive behavior episodes were measured along with qualitative observations of student behaviors throughout the duration of the study. These observations indicated that the GBE programs fostered more positive interactions between teachers and the students, strengthening their relationships and increasing the level of respect students felt towards teachers as they worked alongside each other in the garden. There was an increase in student motivation, curiosity, engagement, and an enhanced sense of self-confidence and responsibility. One teacher observed, "An example of this sense of responsibility is that some students jumped the school gates during holidays to water their plants in the greenhouse or in the vegetable garden" (Ruiz-Gallardo, et al., 2013, p. 262).

GBL provided students with opportunities to actively display their knowledge and a way to overcome a sense of failure that their school experiences had previously given them. They felt capable, needed, and more connected to each other: feelings that can counteract adolescent depression. The graduation rate increased, and the students left school with a wider range of skills for future job opportunities. (Ruiz-Gallardo, et al., 2013, p. 262).

The findings from the Ruiz-Gallardo et al. study echo conclusions from another research study that explored how GBE promotes intrinsic motivation and an enhanced sense of autonomy in middle school students (Skinner, Chi, & The Learning Gardens Educational Assessment, 2012). This study, conducted by the Learning Gardens Educational Assessment Group, used a modified model of Self-Determination Theory to assess how GBE influences academic achievement and student engagement. Surveys were conducted over the course of one academic year, measuring learning outcomes, quarterly grades, academic self-perceptions, intrinsic motivation, and engagement levels. Results from the study indicated that perceived engagement by both teachers and students was positively correlated with the students' perceptions about how much they learned as well as their actual grades in core subjects. The researchers postulate that:

Perhaps in the garden, students do not require a high sense of their own capability in order to enthusiastically engage in learning activities; instead their participation is fostered by a sense of the personal importance and inherent enjoyment of the activities themselves. (Skinner et al., 2012, p. 32)

### **Benefits to the Community**

One aim of place-based education is to strengthen connections between students and their community. Traditional education is often viewed as a way to produce skilled workers for the competitive market, with the end goal for students being to obtain jobs. Gruenewald uses place-based teaching strategies to challenge this notion, "By promoting a pedagogy for student engagement in community life, place-based educators embrace aims beyond preparing students for market competition" (Gruenewald, 2008, p. 315).

Of course, it is important for students to be prepared with skills that will make them good candidates to be hired after school. School gardens have the potential to blend economic skills with community engagement. Many garden programs incorporate financial literacy and community activities by having students sell their produce at local farmer's markets. For example, the Norwegian school-farm cooperation utilizes their garden in every grade beginning in kindergarten, and by the time the students are in 5<sup>th</sup> grade they are selling their harvest to the community. The students develop an understanding of the traditional economic foundation while also establishing relationships with people in their community through their work. The students feel a sense of pride in the place they live and also gain practical skills that can contribute to the local economy, further benefiting the community by the continued development of local resources (Krogh & Jolly, 2011).

A GBE program at the University of Toronto demonstrated the benefits gardens bring to communities. Graduate students, guided by Gruenewald's critical pedagogy of place (2003), traced the effects of a new campus educational garden over the course of two years and found that the mere presence of the garden rejuvenated the aesthetic, affective, and collaborative scope of the college community. The researchers noticed, "In the creation of our learning garden, the community was an integral element of the active decolonization and reinhabitation that was part of our vision of environmental education" (Jagger et al., 2016, p. 283).

Community development was not the original intention of the University of Toronto garden program, but it ended up being the most long-lasting and significant outcome. University students and faculty nurtured the plants and shared produce with one

another. The garden was located in an urban area, and passing pedestrians would stop and chat with the gardeners, drawn in by the inviting aesthetics of the garden as compared to the stark concrete city surroundings (Jagger et al., 2016).

The aesthetic beauty of a garden provides an incredible value to those working in and around it, and can enhance the perceived significance of a neighborhood. It is alluring and therapeutic. Turning abandoned lots into gardens, as educator and chef Alice Waters did for a junior high school in California, can enhance the attractiveness of the community and open up opportunities for positive development (Waters, 2008). This type of community-oriented learning can play a critical role in keeping students connected to school while also promoting active forms of citizenship, such as cleaning up neighborhoods and finding innovative ways of reducing crime, thus creating opportunities to recognize and address social and environmental justice issues (McInerney et al., 2011).

### **National and Global Benefits of Gardening**

The benefits of GBE extend beyond the local communities surrounding schools and students. In the United States, there is a positive correlation between food insecurity and childhood obesity. Families under the poverty line have less access to expensive produce and resort to buying cheap, energy-dense food such as fast food that is often fried and high in sugar and saturated fats (Kaur, Lamb, & Ogden, 2015). If schools offer garden programs and subsequently provide free fruits and vegetables to their students and families, students are not only given access to healthy food but can also develop healthy eating habits that will benefit them for the rest of their lives and thereby assist in decreasing childhood obesity. *Early Sprouts*, a program for preschoolers, found that

healthy food preferences could be established before students reach grade school by giving them opportunities for sensory exploration in the garden which can help them overcome their fear of new foods (Kalich, Bauer, & McPartlin, 2009).

In addition to national benefits, GBE can help reduce food waste in the international food supply chain. A study in 2010 attempted to quantify global food waste and found that perishable food, particularly produce, is the most wasted food item. 50% of lettuce and leafy greens are wasted annually. In the U.S., 25% of all food wasted happens at the household level. This is likely due to the increasing disconnect between consumers and where their food comes from. This disconnect is expected to expand as urbanization increases in countries around the world, generating even more food waste (Parfitt, Barthel, & Macnaughton, 2010). Gardening is one solution to this problem. GBE gives students a direct connection to their food and a sense of personal and communal responsibility. The more we embrace and learn from the natural resources that sustain us, the more we can avoid wasting them for ourselves and future generations.

### **Summary of the Literature Review**

The literature review was guided by the research question: how can students, schools and the community benefit from garden-based education programs? I reviewed garden-based and place-based education literature, beginning with a brief history of community and educational uses of gardens in the United States dating back to the late 1800s. Next, various benefits were explored, including how GBE, and PBE in general, have been documented to improve academic achievement, positively influence student attitudes and behaviors, and the many ways GBE builds stronger communities. The literature review concluded with a discussion about the national and global benefits GBE

can have, including decreasing childhood obesity and reducing food waste in the food supply chain.

Chapter three builds off of the conclusions from the literature review about the benefits of garden-based education, but also addresses the challenges and limitations of GBE when discussing the research methodology of this study. The methods used to collect data included an online survey sent out to schools in the local school district in order to assess the wants and needs of schools and youth programs regarding garden programs, and interviews with existing GBE organizations in order to gain insights into effective frameworks for building a useful garden-based education center.

## Chapter 3: Research Methodology

### Introduction

This research project seeks to explore and document the many ways garden-based education influences learning experiences: how it affects student academic achievement, ways it can induce positive behavior and strengthen students' self confidence, the ways teachers can enliven their classrooms by incorporating GBE, and how communities are developed and strengthened from opportunities that arise from school garden projects. The goal of this research is to inform a business plan for a garden-based education center that will serve as a community resource for schools and afterschool programs in the local school district and their surrounding neighborhoods so they can develop effective youth garden programs.

The research is driven by the following question:

How can students, schools, and the community benefit from garden-based education programs?

To further specify the research question, the following guiding questions inform the methodology:

- What challenges do teachers, schools, and communities face when attempting to implement GBE programs?
- What are the wants and needs of teachers who currently have or want to start youth garden programs?
- What are effective frameworks for developing impactful garden-based education programs?

According to the findings of the literature review, students can benefit from the incorporation of GBE programs in their classes, and these benefits extend to the communities in which the students live. The next steps in the research process is to explore challenges local schools face in implementing garden programs, to determine how these schools are currently implementing GBE programs, and to assess the support they need to develop additional and more successful garden programs. For this, I developed an online survey and distributed it to schools in a school district in Wyoming. In addition to understanding the wants and needs of teachers regarding GBE, I analyzed the frameworks of existing garden-based education organizations that assist schools with implementing and teaching youth garden projects. To accomplish this, I interviewed non-profit garden education organizations located in Wyoming, Utah, and Colorado, as these locations have similar environments and growing climates to the local region.

### **Challenges Implementing Garden-Based Education**

What challenges do teachers, schools, and communities face when attempting to implement GBE programs? It is imperative to understand the challenges and limitations teachers face when implementing GBE into their curriculum in a meaningful way. More gardens are springing up at schools around the country every year with growing interest in experiential learning and more funding opportunities from local and national sources, such as the National Gardening Association, Learning Gardens Laboratory, Colorado Garden Foundation, and Whole Foods Market (Eichorn, 2014; Life Lab, 2014; Waters, 2008). Many gardens are started with a small start-up grant with the intent of using them for health programs, vocational training, or to incorporate STEM lessons into the garden.

Despite the growing popularity of school gardens and the good intentions behind starting them, lasting and effective gardens remain scarce (Eichorn, 2014).

Many gardens are only funded for a short amount of time, and the funding often does not support extra staff (Eichorn, 2014). Gardens are made successful by teamwork and the collaborative work of the students, teachers, school directors, and parents (Sottile et al., 2016), but without proper funding for extra hands the burden gets placed on already over-worked teachers. Lack of garden and content knowledge is another challenge. The agricultural tradition of the United States has been in decline for the past 60 to 70 years (Eichorn, 2014) and as such many teachers do not have the experience of growing food to really feel comfortable teaching their students proficiently. The lack of content knowledge often goes hand-in-hand with lack of interest in even attempting to incorporate GBE in schools. Research shows that humans are increasingly unaware of plants and their value in the environment, resulting in “plant blindness” in our students (Balding & Williams, 2016). Additionally, while garden curriculum can be utilized effectively to meet national and state science standards, the pressure teachers are under to ensure that their students perform well in high stakes standardized tests takes their attention away from local and community-driven projects such as gardening, as illustrated by educator Mark Graham, “When standards are set far from schools, the curriculum becomes decontextualized by design. Connections to local communities and a sense of caring for place are lost, and alternative cultural attitudes toward nature that are more ecologically responsive are marginalized” (Graham, 2007, p. 377).

Teachers often resort to direct instruction and may forgo more time-intensive project-based and experiential learning in order to meet the demands of strict

standardized requirements (Jennings et al., 2005). The combined effect of limited funding, little to no extra staffing, lack of knowledge and interest, and the pressures accompanying high-stakes standardized testing all contribute to challenges that impede teachers from implementing GBE programs. Often, school gardens that are started with good intentions become abandoned projects, or “ghost gardens” that are more akin to patches of weeds in the schoolyard than a flourishing vegetable or flower plot (Eichorn, 2014).

### **Educator Surveys**

I developed a survey for educators and schools (See Appendix A for survey) based on these challenges and to address the research question: what are the wants and needs of teachers who currently have or want to start youth garden programs? Surveys are useful tools for gathering information from a sample of people from a pre-determined population (Kelley, Clark, Brown & Sitzia, 2003). In this case, the pre-determined population is schools and after-school programs in a Wyoming school district, and the research participants are employees of these establishments. Online surveys are advantageous because they have the potential to gather a large amount of information in a short amount of time. They are relatively inexpensive and can be very user-friendly. I chose to administer an online survey to schools in my target population because they don't require a lot of time to fill out and I wanted to be conscientious of the busy schedule teachers have during the school year. They were sent out during late-winter/early spring when schools and teachers are often at their busiest and I wanted to make this process as easy and quick for them as possible (See Appendix B for survey consent letter).

The surveys consisted of 17 questions for participants who had an existing garden or GBE program at their school, and 8 questions for those who did not. The first question identified the role of the participant; whether they were a teacher, administrator, paid garden educator, afterschool staff member, or other. The second question determined whether or not the participant was already involved with GBE programs. If the participant indicated that their school or program already had a garden, they were then asked a series of questions intended to assess how they used the garden and what, if any, impacts their garden activities had on students' academic achievement, behavior, and connections to community, and what support they needed to improve their garden program. If the participant indicated that they did not currently have a garden program, they were asked a series of questions to determine if they had any interest in starting GBE programs and what support they needed to get started. The survey questions also addressed what challenges the participants faced in starting or continuing GBE programs.

The survey questions were sent to the University of Wyoming Institutional Review Board for review (See Appendix C for IRB approval letter). After approval was attained, a pilot survey was sent out to ten graduate students in the University of Wyoming's Science and Mathematics Teaching Center in order to gain feedback regarding question clarity and how long the survey took to complete. Seven of the graduate students responded with suggested modifications and it was determined that the survey took an average of 8 minutes to complete. After the revisions were complete, the surveys were made available on a web-based platform and the link was sent to participants.

### **Survey Analysis**

The information gathered from the educator surveys provided quantitative as well as qualitative data. The quantitative data includes the percentage of survey responses that already have gardens and those who do not, as well as the numbers of respondents who indicate the same challenges facing their garden programs. For example, 100% of the respondents indicated that “time constraints” were the biggest challenge they face when starting or expanding a school garden program. I compiled these responses into bar graphs for a visual representation of the apparent patterns and trends in various categories.

The qualitative data collected from the surveys includes descriptions of lessons or activities educators conduct in their gardens, anecdotes about student behavior during GBE programs, and comments regarding the size of the gardens, who manages the GBE programs, what is done with the produce, and obstacles facing schools and teachers implementing garden programs. I coded the responses for certain words or phrases that were repeated across respondents (Ryan & Bernard, 2003) using a word and phrase frequency counter (WriteWords, 2017) and used this to identify patterns. The patterns that emerged from the qualitative responses mirror the quantitative data, indicating that while most educators in the district have access to gardens at their facility, they are utilized infrequently due to time constraints, lack of staffing, uncertainty of how to use them, and environmental limitations. The main areas where these patterns occur are: garden use, student behaviors, challenges, and resources for support. These areas will be discussed and analyzed in chapter four.

### **Garden Non-Profit Interviews**

What are effective frameworks for developing impactful garden-based education programs? While it is essential to build a business plan based off of the wants and needs of the local schools and afterschool programs, I also looked into how seven existing GBE organizations have met the needs of their own communities and schools. I looked to non-profit businesses engaging in GBE as fertile ground for exploring sources of knowledge and methods of successfully implementing youth garden programs. I was interested in their stories: what events led up to the creation of their organization, how they developed their original vision into successful garden programs, and how their work influences the students and communities with whom they partner.

Interviews provide an informative vehicle of inquiry when trying to understand the stories and experiences people have (Seidman, 2006). In this case, the experiences are the various ways in which people and organizations provide youth garden programs. Interviewing as a method of qualitative data collection is a reliable way for people to convey meaning through language, and my intent with the interviews was to analyze the language of the research participants' experiences for themes (Strauss & Corbin, 1998).

The garden-based organizations were selected for interviews based on their geographical locations and duration of operation. I required them to be from a similar climate and growing environment as southeastern Wyoming, so organizations were chosen from regions in the rocky mountain west including northern Colorado, Utah, and Wyoming. All organizations interviewed had been in operation for a minimum of 9 years and were well established in their communities. The interviews consisted of 13 questions and were conducted over the phone, taking an average of 40 minutes to complete (See Appendix D for interview questions).

## Interview Analysis

The interviews were transcribed and analyzed using a combination of grounded theory techniques in a sequential order so as to deduct themes from the text (Ryan & Bernard, 2003). First, I ran a quick analysis of repeated words in each interview using an online word and phrase frequency counter (WriteWords, 2017) in order to initially identify themes. The most commonly used words and phrases across the interviews included:

<i>With community</i>	<i>Community garden</i>
<i>School</i>	<i>Students</i>
<i>Funding</i>	<i>Budget</i>
<i>Need for</i>	<i>Able to</i>
<i>Land for</i>	<i>The city</i>

I continued by analyzing each interview to see what kind of themes stuck out. During this phase I applied a constant comparison method between answers as well as across different respondents (Strauss & Corbin, 1998). Using what Bernard termed as an “ocular scan method” (Ryan & Bernard, 2003), I was looking for responses in the rhetoric that conveyed similar underlying principals. The combination of the phrase frequency counter and the constant comparison method yielded five major themes from the interviews:

1. Community partnerships and collaboration
2. Responding to a social need
3. School support and student achievement
4. Funding sources and challenges

## 5. Land use

All five of these themes were repeated and expanded upon throughout the seven interviews. They all contribute to effective frameworks for developing impactful garden-based education programs in varying degrees depending on each organizational mission statement and objectives. Each theme will be explored and discussed in chapter four.

### **Summary of the Methodology**

The research methodology for this project contains two parts. First, I distributed online surveys to educators in a Southeastern Wyoming school district in order to conduct a needs-assessment for implementing school and afterschool GBE programs. Next, I interviewed seven GBE organizations located in Wyoming, Colorado, and Utah in order to assess frameworks for developing impactful GBE programs. The patterns and themes derived from both the surveys and the interviews are analyzed in chapter four, and the conclusions from these analyses, along with information gathered from the literature review, will inform the business plan.

## Chapter Four: Data Analysis and Conclusions

### Educator Surveys

The online educator surveys were sent to eight elementary schools, one junior high school, two high schools, and one afterschool program in a local school district. Eleven responses contributed to both quantitative and qualitative data regarding the current use of youth gardens and the expressed wants and needs of educators for starting or expanding garden-based education programs. The survey responses were analyzed for patterns and trends, which emerged from these main areas: garden use, student behaviors, challenges, and resources for support.

**Online Survey Response Trend: Garden Use.** 50% of respondents indicated that they currently have a garden at their school. However, the majority of those who have gardens noted that they use the garden less than 5 times during the growing season, with 80% of them mentioning they lead activities in the gardens less than three times per year. In regard to who is in charge of managing the school gardens, 80% of respondents indicated that it was a cooperative effort between teachers, parents, students, and the community, echoing the finding in the literature review that it is critical to have the collaboration of teachers and parents when gardening with youth (Sottile et al., 2016).

The activities implemented in the school gardens largely revolved around sensory observations and planting seeds, with some science lessons involving soil quality and inquiry projects. Produce from the gardens is used in a variety of ways, including for academic study, nutritional classes, harvested and eaten during lessons, and sent home with students. One respondent indicated that a lot of waste is left over from the garden, as there is not currently a system for harvesting at their school. This participant commented,

We do not utilize our garden properly. I can see it making a huge difference if it was done properly. Our first year (teacher ran) was our most successful year. The next year it was turned over to special ed students only. The third year a district coordinator took over and the last year a few classes planted, a parent watched it over the summer...not sure what happened to the harvest...I think the parent took it...she did the work...so she took it.

The survey results indicate that there is potential and interest in utilizing school gardens, as 50% of respondents already have a garden at their site and the 50% that do not have a garden indicated that they are interested in starting one. Current programs may benefit from a more methodological approach for implementing lessons, activities, and systems addressing harvests and waste.

**Online Survey Response Trend: Student Behaviors.** Respondents noted mixed behaviors from students from being out in the garden, with most indicating that they saw no difference in student behavior after implementing GBE activities, and one respondent noticing distraction in some students from the change in their normal school day routine. Many also commented on how results could be different if they utilized the gardens more frequently during the school year. 20% of the surveys indicated improvements in students' attention in class, social skills, academic performance, and leadership skills, and 40% of the surveys noted improvement in motivation and self-confidence in their students while learning in the garden. Evidence of positive student behaviors resulting from GBE activities is revealed in the following comments:

- Some challenging students tend to be more attentive and right up front willing to get dirty.

- Students are always excited when they are able to be outside and learning.
- I have noticed that some students are more engaged when we are out in the garden, I think because they like being in an alternative environment.
- One of our youth who I would never have pegged as a gardener decided to try our gardening activities the day they visited the seed library. He was so excited when they returned and proceeded to plant some seeds when he got back to the program. It has been fun to see him watch and care for his plants - the progress they have made has been great.

These responses infer the beneficial impacts hands-on learning can have on student engagement and enjoyment of learning. While there are certainly challenges to changing the daily routine of classroom activities, anecdotal evidence from the survey responses supports the finding from the literature review that getting outside and connecting to place can provide fun and meaningful learning opportunities for students (Dirks & Orvis, 2005; Skinner et al., 2012; Sobel, 2004).

**Online Survey Response Trend: Challenges.** Respondents specified several challenges they face when starting or expanding school garden programs. These challenges include no available funding, lack of staffing, little or no knowledge about gardening, difficulty linking to core academic standards, no interest in having a garden, and time constraints. Many of these challenges mirror Eichorn's assertion that school gardens often fall by the wayside due to inadequate staffing and lack of gardening knowledge (Eichorn, 2014). The top area of concern was not having the time to plan, grow, and teach lessons in a garden, with the second highest challenge being linking GBE activities to academic standards.

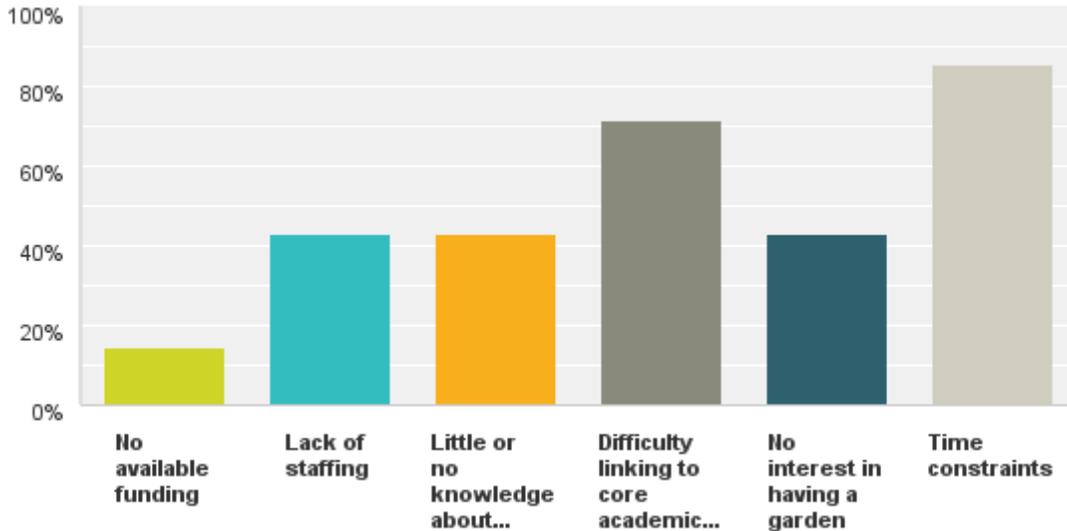


Figure 1: Percentage of respondents who selected challenges facing GBE implementation

In addition to the six challenges listed above, several respondents commented on the difficulties of growing gardens in Wyoming’s climate. The growing season in southeast Wyoming does not align well with the school year, as winter storms can persist through the end of May. Season extension strategies, such as hoop houses or cold frames, are required for an adequate garden in this environment, but if educators are already lacking in funding, staffing, knowledge, and time, they may not have the resources needed to implement effective GBE programs.

**Online Survey Response Trend: Resources for Support.** Respondents provided examples of several resources that would help them do more GBE activities and lessons, including instructive books and online trainings, professional development workshops, GBE curriculum that connects to state and national education standards, outreach programs, and support from administration. While two of the respondents indicated a history of personal gardening experience at home or with their families, none of the survey participants had received formal garden training so professional development

opportunities were highly sought out. The four areas of interest for professional development were GBE curriculum for grades k-12, basic horticulture (e.g. seed propagation, composting, and irrigation), connecting GBE with state or national standards, and building a gardening program (e.g. construction and fundraising). This is very important information, as a GBE center could provide many of these resources and professional development opportunities for schools so that they can utilize their gardens as powerful places for learning.

### **Survey Limitations**

The online educator surveys provided a good first step into a needs-assessment of the schools and afterschool programs in the local school district. They were, however, very limited in their reach due to the time of year that the surveys were distributed. The winter and spring of the school year are undoubtedly the busiest time of year for most teachers, so I only received eleven completed surveys. Due to the small sample size not much can be inferred from the responses.

### **Garden Non-Profit Interviews**

Seven non-profit organizations that have a focus on youth-oriented gardening were interviewed with a focus on the frameworks these organizations use when developing impactful GBE programs. Responses were analyzed using a word and phrase frequency counter along with a constant comparative method, revealing five major themes: community partnerships and collaboration, responding to a social need, school support and student achievement, funding sources and challenges, and land use.

**Non-Profit GBE Interview Theme: Community Partnerships.** The beneficial impacts of community partnerships came up at various points in all seven interviews.

Each representative spoke in length about how community partnerships assisted in the creation of the organization, contributed to hiring employees, and made it possible to establish flourishing community gardens. Four of the seven organizations began their first year with at least one community garden program, establishing relationships with their surrounding neighborhoods. All seven of the organizations expanded with the crucial help of volunteer workers, with one organization relying solely on volunteers' backyard gardens as "host sites" for youth programs for several years. All of the organizations acknowledged and celebrated partnerships with other local non-profit organizations and commercial sponsors, with some boasting federal partners. Benefits from partnerships mentioned by the GBE interviewees included financial support, program expansions, volunteer and internship recruitment, and a general sense of a stronger community. One interviewee noted, "everybody has each other's back," in recognizing partners in the community. Partnerships and support from volunteers is especially critical due to the fact that many organizations have high staff turnover rates that result from minimal pay rates, which will be addressed in the funding section. The seven organizations were able to expand their influence and reach broader populations with the added support of community partnerships, as illustrated by the diagram below.

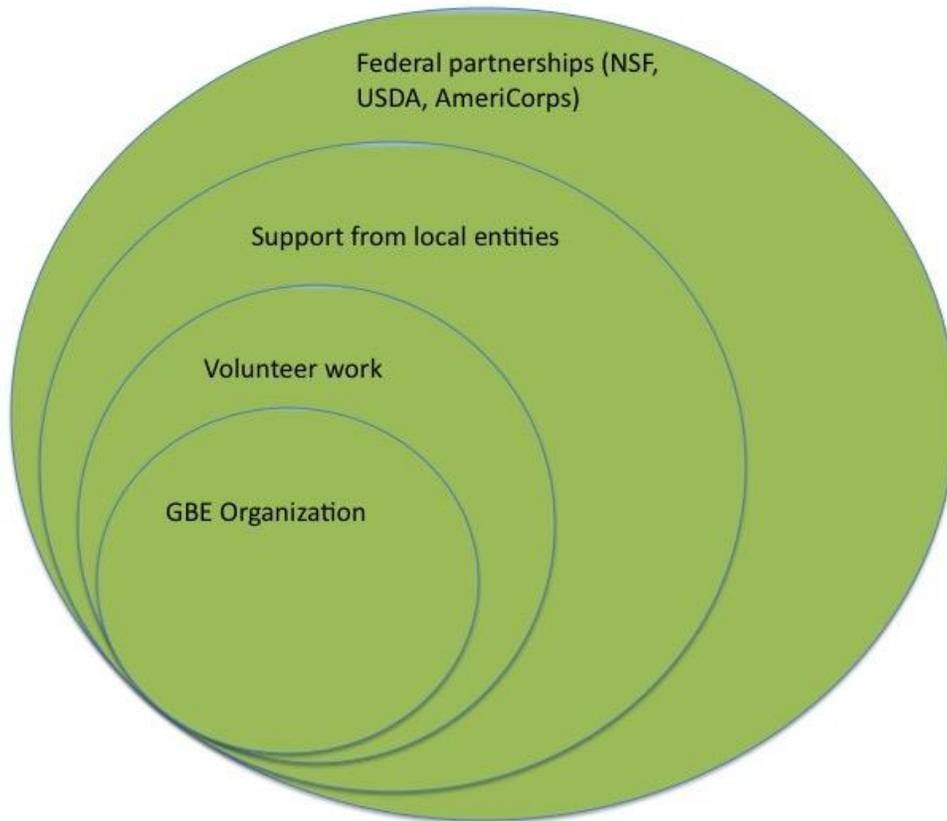


Figure 2: Spheres of influence GBE organizations can have with the support of partnerships

**Non-Profit GBE Interview Theme: Responding to a Social Need.** All seven of the organizations interviewed started their programs as a response to a social need in their community. Three of the organizations originated as a resource for community members living with food insecurity, with one GBE organization also including fishing along with gardening. The other four organizations address the needs of at-risk youth, with one focusing exclusively on refugee youth and another offering gardening services for special needs students. While many of the organizations have expanded or altered their initial missions, they all have continued to develop strategies for responding to needs in their communities. Several of the representatives commented on the importance of empowering their students and communities through their garden programs, and how the social interaction that takes place in a garden can lead to social change. One interviewee

commented, “we can break down social barriers and realize people are just people, working together side-by-side in the garden.”

### **Non-Profit GBE Interview Theme: School Support and Student**

**Achievement.** Only two out of the seven organizations interviewed began their programs with an academic and school-related focus, but all of them have incorporated youth projects since their inceptions and six of them described ways in which these programs have contributed to their students’ academic achievement. One interviewee made the comment that, while their youth programs aren’t specifically geared towards academic learning, 100% of kids that stay with their afterschool and weekend programs for more than six months graduate high school and a large majority of them go on to attend college, supporting the claim that GBE can have positive impacts on student academic achievement (Dirks & Orvis, 2005; McInerney et al., 2011; Ray et al., 2016). These particular students are refugee youth who have very few opportunities in the community, so the GBE organization is a critical resource for providing a social network and mentorship in addition to the healthy produce and gardening opportunities. This highlights the notion that the social and physical environments students live with outside of school can have a major influence on how well students do in their academic careers (Ray et al., 2016).

Five of the organizations work directly with schools by building school gardens, delivering outreach education programs, providing professional development workshops for teachers, and serving as a field trip destination. All five indicated that they communicate with schools mainly through emails, and they advertise their programs through social media and flyers posted at the schools. The main goal for each

organization when working with schools is to empower the teachers and students to take on the gardening programs by themselves; the organizations are simply there to provide support when needed. Two organizations that also have a focus on high schools have the additional goal of providing job training for teens and offer paid internships for juniors and seniors, demonstrating how GBE not only can improve academic achievement but can also provide opportunities for students to gain practical skills that will prepare them for future employment (Krogh & Jolly, 2011).

**Non-Profit GBE Interview Theme: Funding Sources and Challenges.** Funding sources varied in each organization, but all seven interviewees acknowledged receiving money from grants. They all had ongoing grants from city and state agencies, and were continuously searching for additional funding nation-wide. Examples of national grants that helped with the organizational start-up costs include funding from the U.S. Department of Agriculture and AmeriCorps. Other organizations began with money from private funders, and while grants continue to support the ongoing costs of each organization, they also rely heavily on private donations and fundraisers.

All seven respondents addressed the challenges of depending on these types of funding sources, as grants and donations are never a guarantee. One interviewee commented, “It is a constant battle to make sure you have enough money for all of the different gardens and keeping programs consistent based on funding.” Re-budgeting is often necessary at the end of each fiscal year if grants came to an end. There was also the challenge of providing sufficient pay to employees, and many organizations reported high staff turnover rates, which some addressed by hiring unpaid interns or staff who worked for class credit from high schools or colleges rather than for a paycheck. Another

common challenge of relying on funds from grants and private donors are the expectations the outside agencies have for the way the money is spent, which can limit opportunities or stray away from the organization's mission statement. These budget constraints were some of the biggest obstacles facing the seven non-profit organizations, and they are always looking for creative and new ways to secure funding.

**Non-Profit GBE Interview Theme: Land Use.** The final theme that came up in each interview was land use. Garden operations require large amounts of land, especially as the companies expand over time. All of the respondents described an evolution of land attainment for their organizations, beginning with small parcels or backyard gardens and eventually leading to purchasing land or developing long-term lease agreements. Three organizations began in private backyard gardens and have since moved to larger locations, including school grounds, city land, and farmlands. The acquisition of land ties into the importance of community partnerships, as many of the organizations don't actually own the land they garden on but instead lease it from schools or have ongoing contracts with city parks.

In addition to acquiring land, environmental obstacles were mentioned in regard to land use. All seven of the organizations are located in the western United States where harsh climatic conditions exist year-round. The growing season for many of the locations are short due to cold, snowy winters, late springs and early autumns, and even during the growing season the temperature can rise to sweltering heat and water can be scarce. One organization in particular faces extreme desert climates, and compensates for this by digging divots in the soil to retain water, strategically planting trees to provide shade, and using hoop houses, greenhouses, and geometric domes for indoor growing.

## **Data Analysis Summary and Conclusions**

The purpose of this research was to identify challenges teachers and schools face when implementing GBE programs, the wants and needs they have for starting or expanding their garden programs, and frameworks for building impactful GBE programs. Data was collected via online educator surveys distributed to schools and afterschool programs in a local school district and interviews with GBE organizations in Wyoming, Colorado, and Utah. The surveys, though limited in their reach, indicated that there is a desire to expand youth gardens in this school district, as 80% of survey respondents currently have access to gardens and 100% of them would like to expand their programs with outside support. The desired support includes training materials, GBE curriculum that ties to state and national standards, and professional development workshops.

The interviews highlight several ways to best operate a GBE center and methods for supporting school and community gardens. The five themes that emerged were community partnerships and collaboration, responding to a social need, school support and student achievement, funding sources and challenges, and land use. A successful GBE center will have a broader impact with partnerships at the local and national level, and many start up by addressing a need in their community. GBE centers utilize social media to advertise their events and it is critical to be in communication with teachers throughout the year. Funding often comes from grants and private donations, which can cause challenges since these sources are never a guarantee. Annual fundraising events are essential. Land acquisition tends to evolve over time; generally GBE centers start small, even just in backyards, and then expand to school grounds, city land, and private farms.

The local environment can limit the growing seasons, so strategies such as growing in hoop houses are necessary.

The findings from the educator surveys and the GBE center interviews provide valuable information for creating a business plan and for implementing GBE programs. The conclusions from the data analysis, along with the information gathered from the literature review, will form the basis of the business plan. Chapter five discusses how I took what I learned about garden-based education and attached it to the business plan.

## **Chapter 5: Discussion**

### **Overview**

The purpose of this research project was to develop a business plan for a garden-based education center that will serve as a resource for schools and afterschool programs in southeastern Wyoming. The business plan (See Appendix E for business plan) was informed by a literature review of place-based education and garden-based education and by research conducted through educator surveys and interviews with existing garden-based education organizations. This chapter discusses how I used the research to develop the business plan for Growing Real Opportunities for Wyoming (GROWyoming).

### **Research Questions**

This research project endeavored to answer the following overarching research question:

How can students, schools and the community benefit from garden-based education programs?

To further dig into this question, I explored answers to the opposing question:

What challenges do teachers, schools, and communities face when attempting to implement GBE programs?

Finally, in order to develop a business plan for a garden-based education center that will serve the needs of schools and students in the community, I investigated solutions to the following questions:

- What are the wants and needs of teachers who currently have or want to start youth garden programs?
- What are effective frameworks for developing impactful garden-based education programs?

The subsequent sections will discuss how the findings to these research questions informed the business plan for GROWyoming.

### **GROWyoming Business Plan**

There are several overlapping findings from the literature review, surveys, and interviews. For example, student academic achievement and community partnerships were major findings from both the literature review and the interviews, and both the educator surveys and the GBE non-profit interviews illustrated positive changes in student behaviors during GBE activities. I will be going through each section of the business plan and identifying where findings from the research have influenced its development. The following business plan sections include an executive summary, GROWyoming's company overview, services provided, a market summary, strategy and implementation summary, a management summary, and a three-year financial projection.

**Business Plan: Executive Summary and GROWyoming Overview.** The Executive Summary and GROWyoming Overview (U.S. Small Business Association, N.D.) are similar sections that introduce the company and describe the nature of the business. A major finding from the research is how GBE can positively influence academic achievement, so the first idea presented in both sections is GROWyoming's mission to be a resource for k-12 schools and afterschool programs in a southeastern Wyoming school district. Both sections also describe GROWyoming's intentions to build community partnerships, which was another important conclusion from the research, particularly emphasized in the interviews.

**Business Plan: Services.** Services make up the next section of the business plan (U.S. Small Business Plan, N.D.). The services for school programs were developed

directly from the educator survey feedback. The first service mentioned is professional development workshops for teachers, which was the most sought out resource indicated by the surveys. Other school services include outreach programs, assistance with garden construction and maintenance, and lesson plans that are tied to state and national standards. I intentionally left the school services section somewhat open in order to provide room for customizing our support for each individual school, which was feedback I got from interviewing several of the GBE organizations. One interviewee also mentioned their objective to empower schools to take on their own garden projects through trainings and resources, which I included as a goal for GROWyoming as well.

Funding sources (and their accompanying challenges) was one of the themes that emerged from the interviews; therefore I added summer camps as a revenue generator for our organization. More importantly, however, our summer programs will provide an opportunity for teens to do their court-ordered community service hours or to receive job training skills. This will serve as a way to fill a community need, which was another major theme that emerged from the interviews. Workshops are another service that can produce revenue for GROWyoming's operational costs, and I included a list of grants that can serve as funding sources over the next three years.

**Business Plan: Market Summary.** The Market Summary (U.S. Small Business Association, N.D.) expresses the interest Wyoming educators have in pursuing GBE projects and their uncertainty about how to accomplish them successfully, therefore establishing the need for GROWyoming's existence and the niche it will fill in the community. Based on the interest I received from the survey feedback, I developed a three-year plan for the number of programs and clients we will serve. In order for this

plan to come to fruition, however, I also identified several key partnerships GROWyoming will establish over the course of the next three years. As the interviews indicated, community partners are essential for the growth of a GBE company. The goal is to develop partnerships with six local organizations. Other partnerships will undoubtedly be identified over time.

**Business Plan: Strategy and Implementation Summary.** The Strategy and Implementation Summary (U.S. Small Business Association, N.D.) describes the main focuses GROWyoming's development during the first three years. The first is to create a network of contacts with the school district, a process that has already begun through the educator survey research. The second strategy is based off of the research interviews and their assertion that securing funding is a major challenge. The business plan's funding strategy aims to diversify funding sources by including annual fundraisers, donations, workshop and summer camp revenue, and a wide array of grants. Ten grant opportunities are identified that come from local, regional, and national sources over the course of the next three years.

The marketing strategy (U.S. Small Business Association, N.D.) was largely influenced by the interviews. All of the seven interviewees commented on the use of social media as a marketing tool, which inspired GROWyoming's plan to incorporate Instagram, Facebook, and a company website as platforms for advertising their services as well as for recruiting staff and volunteers. Many of the interviewees also described advertising their youth programs by posting flyers at schools, which GROWyoming will embrace in the future.

The educator surveys expressed a need for assistance with their garden programs, as gardening can be a very time-consuming and work-intensive endeavor. All seven of the GBE organizations I interviewed discussed how they relied on volunteers to accomplish the hard work that goes into youth garden programs. Based on these assertions, I included a staff and volunteer strategy that identifies several ways to recruit important people that will make it possible to accomplish the goals of GROWyoming and that of the schools, students, and communities we will be serving. Recruitment techniques include partnerships with AmeriCorps and the University of Wyoming, social media announcements, and postings on various local job boards.

**Business Plan: Management Summary and Financial Projections.** The business plan concludes with a Management Summary and Financial Projections (U.S. Small Business Association, N.D.) that provide the logistical information required in order to accomplish the goals, services, and strategies of the previous sections. The management summary echoes the story that many of the GBE organizations told of their inception: the companies started small with one or two employees who volunteered their time, and eventually expanded with the assistance of outside organizations such as AmeriCorps. GROWyoming's goal is to expand from our two current employees to six staff members by our third year, and will rely on the hard work of volunteers in the meantime.

The financial projections are calculated from my previous experiences working in garden-based education. It begins with the cost of one garden program and then incorporates our program growth projections over the next three years. The surplus and

deficit chart outlines our assumed budget beginning with year one, which currently has 44% of the expected budget secured.

### **Limitations**

The limitations to GROWyoming's business plan include the small sample size from the educator surveys and the fact that many of the financial projections assume that we will receive grant money. I used the information gathered from the surveys to outline the majority of GROWyoming's services and partnerships, but this may need to be updated in the future as we establish stronger relationships with the Wyoming school district and receive more feedback from the teachers and educators we hope to serve. I also did not survey the students, parents, or community members in the area, which would have been useful information regarding interests and needs for youth gardens.

In terms of the financial projections, the budgets are merely goals I hope to attain by receiving donations and grant money, so I tried to stay conservative in my estimates. I also based the revenue from summer camps on an assumption that we will have 45 participants each paying a \$35 admission fee, and revenue from workshops on the assumption that we will have 15 participants per workshop paying a \$25 fee. These goals and assumptions are not set in stone, and the financial projections will likely need to be altered as funding sources become available (or unavailable) in the future.

### **Future Research and Recommendations**

I will continue to adjust the business plan for GROWyoming as more partnerships are formed and more funding becomes available. I would recommend distributing the educator surveys during a time when teachers are not as busy, such as during summer or winter breaks, in order to receive more responses. Setting up in-person meetings with

principals might have also yielded more responses, as the emails I used for communication may have gotten lost in the shuffle.

In regard to the interviews, I recommend visiting the organizations in person to witness how their business functions. I only conducted phone interviews, but have been invited to visit several of the sites and plan to do so in the near future. I believe this will make visible many of the practices I researched and provide inspiration for how to implement strategies such as land use. It may also help with fostering partnerships and professional networking.

The next step in the process of developing and launching GROWyoming is to put together GBE curriculum that is aligned with Wyoming state science standards and to develop professional development workshops. I have started this process by compiling curriculum from several different GBE organizations such as Life Lab, Captain Planet Foundation, and various GBE non-profits in the western United States. I developed a curriculum guide for reviewing existing GBE curriculum to evaluate where it connects to Next Generation Science Standards and Wyoming State Science Standards, or how it could be adapted to do so (see appendix F for curriculum review guide). I also created a school garden planning template in order to customize curriculum for each school (see appendix G for planning template), which will be used in designing future outreach programs.

### **Summary and Implications**

The benefits GBE brings to students, schools, and the community were outlined and reinforced throughout each of the three research techniques: the literature review, educator surveys, and GBE non-profit interviews. While there are many challenges to

implementing GBE programs, such as not having adequate funding, staff, and knowledge to do so, the improvements to students' academic achievements, behaviors, and connections to each other and their communities signifies the powerful impact this pedagogy can bring to our education system.

Garden-based education impacts students by providing context to their learning. It can tie multiple subjects together, reinforce STEM concepts, and instill a sense of autonomy and responsibility in our students. GBE influences our schools by offering an innovative learning platform that can re-engage not only our students, but our teachers as well. GBE strengthens our community by creating environmentally conscious citizens with the skills and passion to improve our neighborhoods, decrease our food waste, and provide local, healthy produce for our society.

While the objective of this research was met, the process of creating a garden-based education business is not over. Right now much of it remains theoretical, but as real community partnerships are formed and GBE curriculum and programs are developed and tested, GROWyoming will expand in size and scope. Currently we are working on two youth garden programs to be carried out over the spring and summer of 2017, which will put into practice many of research findings from this project and illuminate the directions we go in the future. The research backs GROWyoming's mission statement to promote sustainable living, educational innovation, and community partnerships through garden-based education, and we are excited to see where the future takes us.

### **Reflections as an Educator**

This project has given me the opportunity to diligently focus on an idea that has been developing over the course of my career as an educator. Conducting research on the benefits and challenges of garden-based education and attaching that research to a business plan has helped clarify my personal objectives for starting a garden-based education center, and has shed light on the steps I need to take in order to make GROWyoming a reality. What was once merely a vision now has concrete action steps to come to fruition.

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## Appendix A

### Educator Survey

#### How Students, Schools and the Community Benefit from Garden-Based Education: A Framework for Developing a Garden-Based Education Center

1. Which best describes you?
  - Teacher
  - Paid school garden educator, employed by the school
  - School administrator
  - Afterschool program staff member
  - Other \_\_\_\_\_
  
2. Does your school have a garden?
  - Yes, or one is planned/in construction at my school
  - No, and one is not yet planned at my school (Proceed to question 12)
  
3. Who initiated or built your school garden?
  - School Administration
  - A teacher or group of teachers
  
4. Who manages the garden?
  - A paid garden coordinator employed by the school
  - Teachers
  - Students from specific classes/grade levels manage their own plots
  - Other \_\_\_\_\_
  
5. How long has your garden been in operation?
  - Less than one year
  - 1-2 years
  - 3-5 years
  - 5 years or more
  - Not sure
  
6. How large is the garden? (Approximate area or number of beds) \_\_\_\_\_  
\_\_\_\_\_
  
7. How often do you teach lessons or run activities in your garden?
  - Frequently, at least once every week during the growing season
  - Occasionally, 3-5 times during the growing season
  - An outside garden educator does all lessons
  - Other \_\_\_\_\_

8. Please describe the lessons/activities you teach in your garden and if state or national science standards are connected to any lessons

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9. What is done with edible produce from your garden? (Check all that apply)

- Used for academic study
- Used for nutritional/cooking classes
- Donated to school food services
- Sold in markets or to school food services
- Harvested and eaten during lessons
- Sent home with students
- Other \_\_\_\_\_

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10. What behaviors have you observed in your garden participants?

(Check/circle all that apply)

- |   |                  |          |               |           |                   |
|---|------------------|----------|---------------|-----------|-------------------|
| <input type="radio"/> Attention in class    | Greatly improved | Improved | No difference | Decreased | Greatly Decreased |
| <input type="radio"/> Motivation            | Greatly improved | Improved | No difference | Decreased | Greatly Decreased |
| <input type="radio"/> Self-confidence       | Greatly improved | Improved | No difference | Decreased | Greatly Decreased |
| <input type="radio"/> Social skills         | Greatly improved | Improved | No difference | Decreased | Greatly Decreased |
| <input type="radio"/> Community connections | Greatly improved | Improved | No difference | Decreased | Greatly Decreased |
| <input type="radio"/> Academic performance  | Greatly improved | Improved | No difference | Decreased | Greatly Decreased |
| <input type="radio"/> Leadership skills     | Greatly improved | Improved | No difference | Decreased | Greatly Decreased |

11. Please provide an example or anecdote of student behavior (positive or negative) that resulted from your garden-based education program:

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12. Does your school/organization have ambitions to expand any garden programs in the future?
- Yes
  - No
  - Maybe, with outside support
13. What are the biggest challenges you face in starting or expanding a school garden program? (Check all that apply)
- No available funding
  - Lack of staffing
  - Little or no knowledge about gardening
  - Difficulty linking to core academic standards
  - No interest in having a garden
  - Time constraints
14. What resources would help you do more garden-based learning activities? (Check all that apply)
- Instructive books, pamphlets, or online trainings
  - Teacher training workshops for garden-based education activities
  - Garden-based education curriculum
  - Outreach programs
  - Other \_\_\_\_\_
- 
15. What gardening training have you received? (Check all that apply)
- School sponsored training
  - Offsite workshops, conferences, or seminars
  - Online courses
  - No formal training
  - Other \_\_\_\_\_
16. What professional development would you be interested in? (Check all that apply)
- Nutrition and food supply chain education
  - Garden-based learning curriculum for grades k-12
  - Basic horticulture: composting, seed propagation, irrigation, etc
  - Connecting garden-based learning with NGSS
  - Building a gardening program: fundraising, construction, etc
  - Other \_\_\_\_\_
-

17. Any other comments, suggestions, needs, or questions for your school garden program:

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**Thank you**

## Appendix B

Consent letter for online educator survey

Dear [Name of recipient],

My name is Claire Ratcliffe, I am a graduate student in the Science and Mathematics Teaching Center at the University of Wyoming. I would appreciate your assistance with my Master's degree research project on garden-based education programs and frameworks for building a garden-based education center. This research will help me to understand the benefits garden-based education programs bring to schools, students, and the community.

Please complete this short survey, which should take approximately 10 minutes. If you do not wish to participate, simply discard the survey. Responses will be completely anonymous; your name will not appear anywhere on the survey. Completing and returning the survey constitutes your consent to participate.

If you have any questions regarding the research, please contact Claire Ratcliffe at (801)-888-3750 or by email at [cratcli1@uwyo.edu](mailto:cratcli1@uwyo.edu). You may also contact the Secondary Education Chair, Kate Welsh, at (307)-766-2013 or by email at [kmuir@uwyo.edu](mailto:kmuir@uwyo.edu). If you have any questions about your rights as a research participant, please contact the University of Wyoming Institutional Review Board Administrator at (307) 766-5320.

Thank you very much.

Sincerely,

Claire Ratcliffe

## Appendix C

### Institutional Review Board Approval

December 22, 2016

#### ***Protocol #20161222CR01410***

Re: IRB Proposal “*How Students, Schools and the Community Benefit from Garden-Based Education: A Framework for Developing a Garden-Based Education Center*”

Dear Claire and Kate:

The proposal referenced above qualifies for exempt review and is approved as one that would not involve more than minimal risk to participants. Our exempt review and approval will be reported to the IRB at their next convened meeting January 19, 2017.

Any significant change(s) in the research/project protocol(s) from what was approved should be submitted to the IRB (Protocol Update Form) for review and approval prior to initiating any change. Per recent policy and compliance requirements, any investigator with an active research protocol may be contacted by the recently convened Data Safety Monitoring Board (DSMB) for periodic review. The DSMB’s charge (sections 7.3 and 7.4 of the IRB Policy and Procedures Manual) is to review active human subject(s) projects to assure that the procedures, data management, and protection of human participants follow approved protocols. Further information and the forms referenced above may be accessed at the “Human Subjects” link on the Office of Research and Economic Development website: <http://www.uwyo.edu/research/human-subjects/index.html>.

You may proceed with the project/research and we wish you luck in the endeavor. Please feel free to call me if you have any questions.

Sincerely,

Esther Seville  
IRB Office Associate  
On behalf of the Chairman,  
Institutional Review Board

## Appendix D

### GBE Non-Profit Interview Questions

#### Introduction:

I am a graduate student from the University of Wyoming. I am researching garden-based education programs and the benefits these programs can have on schools, students, and the community. I would love to hear the story of [organization name], how the original vision was developed into a successful gardening program, and learn about the frameworks used to operate the organization.

If you have any questions regarding the research, please contact me at (801)-888-3750 or by email at [cratcli1@uwyo.edu](mailto:cratcli1@uwyo.edu). You may also contact the Secondary Education Chair, Kate Welsh, at (307)-766-2013 or by email at [kmuir@uwyo.edu](mailto:kmuir@uwyo.edu). If you have any questions about your rights as a research participant, please contact the University of Wyoming Institutional Review Board Administrator at (307) 766-5320.

1. What events led up to the creation of [organization name]?
2. How has your academic and career path helped you in working for [organization name]?
3. What have been [organization name] greatest successes?
4. What have been the biggest challenges?
5. Is there a business plan to operate [organization name]?
6. Tell me about the process you went through to become incorporated as a non-profit. What are the advantages and challenges of this type of business model?
7. How and where did you acquire land for your gardening operations?
8. How many employees work at [organization name]?
9. How do you recruit/hire employees?
10. Tell me about your marketing strategies. How do people know about events at [organization name]?
11. How do you partner and communicate with schools?
12. Why was [organization name] chosen to be located in [location]?
13. What are some aspirations you have for the future of [organization name]?

**Appendix E**



**Business Plan**

**April 2017**

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- Executive Summary
- GROWyoming Overview
- Services
- Market Summary
- Implementation Summary
- Management Summary
- Financial Projections

## **Executive Summary**

GROWyoming is a developing organization that strives to provide garden-based education resources and support for k-12 schools and afterschool programs in the Albany County School District #1. Our program will develop partnerships with local, regional, and national organizations in order to expand our reach to offer meaningful youth gardening programs that will improve students' academic achievement and strengthen communities.

### *Mission Statement*

To promote sustainable living, educational innovation, and community partnerships across Wyoming through garden-based education.

### *Keys to Success*

- Establish a strong network of support with Albany County school systems, afterschool programs, and the juvenile court system.
- Apply for grants and launch a series of fundraising campaigns that will provide funding for the start-up costs.
- Create a marketing strategy to build a presence in the local community, including a website and social media network.
- Compile a team to carry out the organizational functions in order to achieve the goals of the mission statement.

## **GROWyoming Overview**

Growing Real Opportunities for Wyoming (GROWyoming) is a nonprofit agency providing garden-based education support for schools and youth programs in Albany County, Wyoming. GROWyoming will form partnerships with local school districts and

other local, state, and federal agencies committed to sustainable practices, educational innovation, and youth empowerment.

GROWyoming will provide garden-based education support for k-12 schools throughout the academic school year. During the summer we will run week long gardening camps for youth in grades k-6, and summer services for teens including community service opportunities, credit recovery programs, and internships. In addition to youth programs, we will offer gardening workshops for the community.

## **Services**

### *School Programs*

GROWyoming provides garden-based education support for schools and after-school youth programs in Albany County, Wyoming. The long-term goal of GROWyoming is to empower educators and youth workers to implement meaningful youth garden programs that have lasting beneficial impacts on their students. Each program will be customized for the needs of the individual school or afterschool program. Examples of the support we will provide include professional development workshops for teachers, outreach education programs, assistance with garden construction and maintenance, and lesson plans and activities that are tied to state and national standards.

### *Summer Youth Programs*

Eventually, when GROWyoming has its own location, we will host a series of weeklong summer camps for youth in grades k-6. Camp themes will include Junior Horticulturists, Insect Investigators, Habitats and Homes, Garden Chefs, and Nature Artists. The revenue from summer camps will help support the school programs and operational costs. GROWyoming will also provide opportunities in the summer for teens

to do volunteer work, complete court-ordered community service hours, and work as interns to receive job training and skills.

### *Community Workshops*

Workshops will be offered to the community throughout the year and will include basic horticulture, composting, herbs and health, building hoop houses and cold frames, container gardens, green construction, and indoor gardening. They will generally be half-day or full-day workshops. Revenue from workshops will help support the school programs and operational costs.

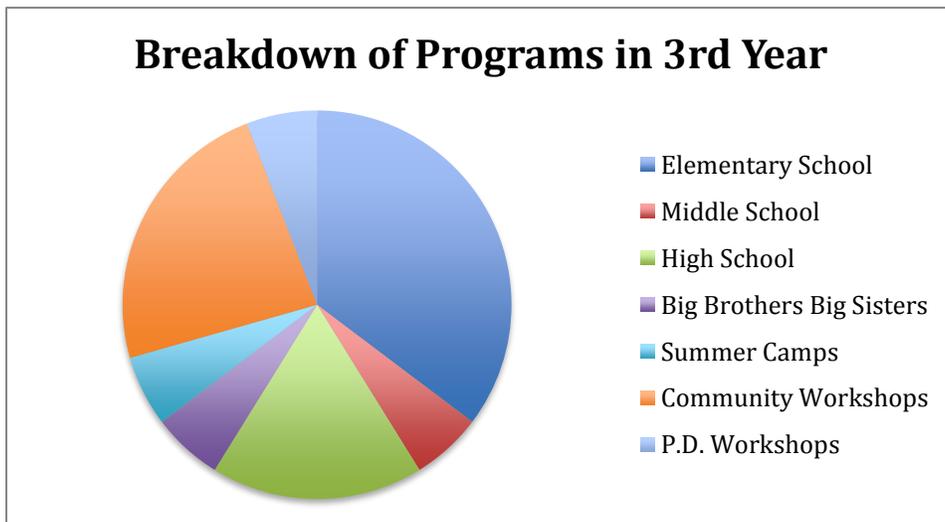
### **Market Summary**

GROWyoming was developed primarily to be a youth garden resource for K-12 schools and afterschool programs in the Albany County School District #1 (ACSD1). This school district serves students in the city of Laramie and neighboring towns including Rock River, Centennial, The Buttes, Woods Landing-Jelm, and communities in Bosler, PhinDeli, Garrett, and Tie Siding. Thanks to the work of the Laramie River Conservation District, raised garden beds can be found at the majority of K-12 schools in ACSD1. Despite access to the garden beds, however, educators have expressed a need for additional support in order to utilize the gardens to their full potential.

In order to provide gardening support for ACSD#1 and afterschool programs in the district, GROWyoming seeks to build community partnerships with the Laramie River Conservation District, Big Brothers Big Sisters of Laramie, and the school district itself. Other local agencies we seek partnership with are the Laramie Gardening Club, ACRES Student Farm, Bright Agrotech, and Feeding Laramie Valley, a non-profit organization committed to providing food security for Laramie. We also plan to introduce

summer camps and garden workshops within three years to provide gardening programs for the city of Laramie and as additional revenue generators. With the support of partner agencies, we project the following growth of programs over the next 3 years:

Potential Client	Year 1 (2017)	Year 2 (2018)	Year 3 (2019)
Elementary School Programs	1 class	3 classes	6 classes
Middle School Programs	0	0	1 class
High School Programs	0	1 class	2 classes
Big Brothers Big Sisters Program	1	1	1
Summer Camp Programs	0	0	1
Community Workshops	0	2	4
Professional Development Workshops	0	0	1
<b>Total Programs</b>	<b>2</b>	<b>7</b>	<b>16</b>



## **Strategy and Implementation Summary**

There are four focuses to GROWyoming's implementation:

1. First is to create a network of contacts in Albany County School District #1, both in the schools and afterschool programs such as Big Brothers Big Sisters of Laramie.
2. The second is to secure funding through grants, fundraisers, donations, and revenue-driven services.
3. Third, we will develop our social media presence through Facebook and Instagram and build a company website.
4. The fourth is the recruitment and training of volunteers and, when funding is secured, paid staff.

### *Networking Strategy*

Initial contacts with ACSC1 were made through University of Wyoming Plan B research conducted by the founder of GROWyoming in 2017. Relationships with teachers, schools, and community partnerships will develop over the course of the next three years through email communication, personal meetings, and marketing strategies.

### *Funding Strategy*

Fundraising will include a Kickstarter campaign in the summer of 2017 and an annual plant sale starting in the spring of 2018. Private donations will be accepted after receiving 501(c)(3) status in 2018, including cash donations, legacy gifts, and corporate sponsorship. Revenue from workshops will start accruing in the spring of 2018, and summer camps in the summer of 2019. Grant applications have already been or will be submitted to the following local and national agencies:

- Laramie Audubon Society, spring 2017
- University of Wyoming's Haub School Creative Activities Grant, spring 2017
- Project Learning Tree, fall 2017
- University of Wyoming's Elbogen 30k Competition, fall 2017
- AmeriCorps, winter 2018
- National Gardening Association, spring 2018
- Wyoming Community Foundation, summer 2018
- Scott's MiracleGro, spring 2019
- WholeFoods, spring 2019
- National Science Foundation, TBD

### *Marketing Strategy*

GROWyoming's marketing goal is to raise visibility of the organization to assure that schools, afterschool programs, and the community are aware of our services, to promote current and future community partnerships, and to recruit volunteer and staff members. Passive marketing will take place through social media and a seasonal newsletter published on our website four times a year. Active marketing will include flyers promoting summer camps which will be posted at all ACSD1 schools in the spring and sent home with students in our school programs. Visibility will also be increased through the distribution and sale of company stickers and other merchandise during our third year.

### *Staff and Volunteer Recruitment*

GROWyoming will rely on the hard work of volunteers for the first year. They will be recruited from the Laramie Gardening Club and the University of Wyoming's

Botany Club, and students in the Education and Plant Sciences Departments. Community partnerships will be instrumental in recruiting volunteers during the second year as well. AmeriCorps volunteers will be recruited in the spring of 2018 to create and implement summer camps. Recruitment techniques will include job postings on GROWyoming’s website, the AmeriCorps website, various University of Wyoming department job boards, and local online job boards such as Wyoming at Work and Craigslist.

**Management Summary**

Currently, GROWyoming’s team consists of two employees: the Founder and the Director of Garden Operations, both working on a part-time, volunteer-basis. Within three years, GROWyoming will consist of a Board of Directors, an Executive Director, and a team of seasonal professional program and fundraising staff to manage and expand our services.

*Personnel Plan*

<b>Title</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Executive Director	0	2,500	2,575
Director of Garden Operations	0	2,000	2,060
Education Specialist	NA	NA	AmeriCorps
Education Specialist	NA	NA	AmeriCorps
Garden Specialist	NA	NA	AmeriCorps
Fundraising/Grant Coordinator	NA	NA	1,000
<b>Total People</b>	2	2	6
<b>Total Payroll</b>	0	4,500	5,635

## Financial Projections

GROWyoming will build funding from grants, fundraisers, private donations, and corporate sponsors. However, it will take three years before funding from these sources becomes strong enough to expand the programs. The primary expenditures for the organization during the first three years are for garden supplies and payroll. It is important to note that the social mission of GROWyoming is to promote sustainable living, educational innovation, and community partnerships through our services, and the social value we will provide to this community is our central criterion as opposed to wealth creation. The social value will be measured by assessing students' academic achievements as a result of participating in GROWyoming's programs by conducting pre and post content tests, teacher evaluation forms at the end of each school program, and anecdotal testimonies given by workshop participants and community partners.

*Itemized cost of one youth garden program (school and afterschool):*

<b>Item</b>	<b>Price</b>	<b>Quantity</b>	<b>Total</b>
pH tester	\$20	2	\$40
Soil	\$20	3 bags	\$60
Soil amendments	\$20	2 bags	\$40
Seeds	4 for \$1	50	\$12.50
Seed containers (72 cell packs)	\$2	2	\$4
Plant containers (set of 100)	\$12	1	\$12
Hoop house materials (PVC pipe, metal stakes, plastic covering)	\$50	2	\$100
Art supplies	\$40		\$40
Student journals	\$1.50	20	\$30
Misc. teaching supplies	\$20		\$20
Scale to weigh food	\$15	1	\$15
Student incentives	\$15		\$15
Transportation costs	\$12.50	1 field trip	\$12.50

<b>Total Cost</b>			<b>\$400</b>
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*Surplus and Deficit*

	Year 1	Year 2	Year 3
<b>Funding (grants, donations, net surplus)</b>	\$900	\$7,070	\$13,970
Expenses			
Youth Programs (school and afterschool)	2 programs	5 programs	10 programs
	\$800	\$2,000	\$4,000
Summer Camps	\$0	\$0	\$800
Community Workshops	\$0	\$200	\$400
Professional Development Workshops	\$0	\$0	\$500
Payroll	\$0	\$4,500	\$5,635
Marketing and Other Expenses	\$30	\$100	\$1,000
Training	\$0	\$50	\$200
Liability Insurance	\$0	\$1,000	\$1,000
<b>Total Operating Expenses</b>	<b>\$830</b>	<b>\$7,850</b>	<b>13,535</b>
Operating Profit (EBIT)			
Youth Programs	\$0	\$0	\$0
Summer Camps	\$0	\$0	\$1,575
Community Workshops	\$0	\$750	\$1,500
Professional Development Workshops	\$0	\$0	\$750
Fundraising and Sales	\$2,000	\$3,000	\$4,000
Grants	\$5,000	\$10,000	\$15,000
<b>Total Operating Profit (EBIT)</b>	<b>\$7,000</b>	<b>\$13,750</b>	<b>\$22,825</b>
<b>Net Surplus</b>	<b>\$7,070</b>	<b>\$12,970</b>	<b>\$23,260</b>

## Appendix F

### GBE Curriculum Review Guide

<b>Title</b>	
<b>Source</b>	
<b>Grade Level(s)</b>	
<b>Topic/Subject</b>	
<b>Science Discipline</b>	
<b>Summary</b>	
<b>NGSS Disciplinary Core Ideas</b>	
<b>NGSS Science and Engineering Practices</b>	
<b>NGSS Cross Cutting Concepts</b>	
<b>Wyoming Content and Performance Standards</b>	
<b>Classroom Uses</b>	

## Appendix F

### School Garden Planning Template Introduction to Gardening: Lesson One

*\*Please fill out the red sections*

<b>Essential Question or Theme for the Garden Program:</b> <ul style="list-style-type: none"> <li>● <i>In what ways are plants important to us and to the environment?</i></li> <li>● <i>How do we use science to explain our observations (what we see, feel, smell, taste)?</i></li> <li>● <i>How can gardens be used as a way to strengthen the community?</i></li> </ul>	
<b>Student Information (# of students, grade level, etc):</b> <ul style="list-style-type: none"> <li>●</li> </ul>	
<u><b>Science Curriculum</b></u>	
<b>Percentage of program:</b>	
<b>Teacher's Goals:</b> <ol style="list-style-type: none"> <li>1.</li> </ol>	
<b>Program Objectives (can be modified according to teacher's goals):</b> Students will... <ol style="list-style-type: none"> <li>1. Identify the different parts of a seed, including the seed coat, food storage (cotyledon), and embryo</li> <li>2. Articulate the growing conditions seeds need to germinate</li> <li>3. Explore different methods of seed dispersal</li> </ol>	<b>Program Assessment Evidence:</b> <ol style="list-style-type: none"> <li>1. Successful dissection of a lima bean seed</li> <li>2. Active engagement with journals and naturalist tools</li> <li>3. Appropriate use of vocabulary</li> </ol>
<u><b>Gardening Field Practices</b></u>	
<b>Percentage of program:</b>	
<b>Teacher's Goals:</b> <ol style="list-style-type: none"> <li>1.</li> </ol>	
<b>Program Objectives (can be modified according to teacher's goals):</b> Students will... <ol style="list-style-type: none"> <li>1. Design a vegetable and flower plot for their school garden beds</li> <li>2. Plant, label, and water seeds</li> <li>3. Discuss the importance of different gardening practices, such as weeding, watering, transplanting, and harvesting</li> </ol>	<b>Program Assessment Evidence:</b> <ol style="list-style-type: none"> <li>1. Completion of a garden poster representing their garden design</li> <li>2. Plant seeds in containers that will germinate indoors, to be transplanted outside in May</li> <li>3. Active engagement with journals and gardening tools (containers, seed packets, trowels, garden gloves)</li> </ol>

<u>Leadership in Community</u>	
<b>Percentage of program:</b>	
<b>Teacher's Goals:</b> 1.	
<b>Program Objectives (can be modified according to teacher's goals):</b> Students will... <ol style="list-style-type: none"> <li>1. Be active participants and respectful classmates</li> <li>2. Build and sustain a positive learning environment</li> <li>3. Reflect on their experiences and knowledge from the activities</li> </ol>	<b>Program Assessment Evidence:</b> <ol style="list-style-type: none"> <li>1. Successful execution of team building initiatives</li> <li>2. Work in teams to plan garden plots</li> <li>3. Final closing discussion on community</li> </ol>
<b>Any additional comments, questions, or concerns:</b>	

\*Modified from Teton Science Schools Planning Document