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GROWING GREEN MINDS: IMPLEMENTATION OF A SCHOOL GARDEN & NUTRITION PROGRAM FOR THE FREEDOM AREA SCHOOL DISTRICT IN RURAL WISCONSIN

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CAPSTONE PROJECT PAPER

A paper submitted in partial fulfillment of the
requirements for the degree of
Master of Public Health in the
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Department of Health, Behavior & Society
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ABSTRACT

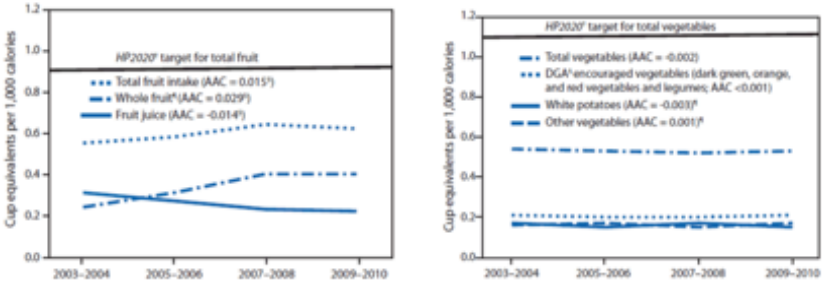
Most children in the U.S. consume too few fruits and vegetables which is putting them at risk to develop obesity and other lifestyle diseases. The 2015-2020 *Dietary Guidelines for Americans* recommends that individuals should increase the amount and variety of fruits and vegetables consumed in order to prevent weight gain and other chronic diseases[1]. Research shows that garden-based educational programs can increase children's fruit and vegetable intake as well as change their preferences and attitudes towards eating and trying new fruits and vegetables. Incorporating a garden and nutrition curriculum into a school setting is an ideal opportunity to improve children's diets as most children regularly attend school where they consume at least one meal each day. Therefore, we propose a program utilizing a district-wide school-based garden and educational program to increase fruit and vegetable consumption in children. We will work with local and regional experts on developing and maintaining the school gardens year-round. By leveraging existing educational curriculum, we will work with teachers to incorporate nutrition and garden-based activities into their lesson plans throughout the school year and develop summer school classes focused on gardening. To facilitate increased fruit and vegetable consumption, produce from the gardens will be used in the school cafeteria for lunches. We will collaborate with the district, area farmers, and other community partners to start a farmers' market on the school grounds to increase access to local fruits and vegetables. We will evaluate the effects of the program using pretest/posttest design to evaluate the change students' attitudes, preferences and behaviors towards eating fruits and vegetables. We will also conduct formative research to assess the feasibility, acceptability and sustainability of the school-based garden program and local farmers' market amongst the school and community stakeholders.

TARGET POPULATION & NEED

Problem: Low Rates of Fruit & Vegetable Consumption

In the United States, children consume insufficient quantities of fruits and vegetables[2]. In fact, Healthy People 2020 established multiple objectives to increase fruit and vegetable consumption in order to address the obesity crisis in the United States[3]. In 2011, 34.1% of Wisconsin adolescents reported eating fruit less than once daily and 35.7% reported eating vegetables less than once daily[2]. These numbers fall below the U.S. Department of Agriculture's recommendation of consuming 2.5 cups of vegetables and 2 cups of fruit everyday[1]. Between 2007 and 2010, 60% of children did not meet fruit intake recommendations from the U.S. Department of Agriculture and 93% did not meet the vegetable recommendations (see Figure 1)[4]. Additionally, the 2005-2006 National Health and Nutrition Examination Survey found that fruits and vegetables were not included in the top 25 sources of calories amongst individuals two years old and older[5]. According to the 2018 Outagamie County Community Health Report, the percentage of adults consuming the recommended number of servings of fruits and vegetables decreased from 2015 to 2018. Research suggests that these low levels of fruit and vegetable consumption are linked to dietary practices established in childhood (see Table 1)[6]. Research also demonstrates that less than 25% of rural adults consume five or more servings of daily fruits and vegetables[7].

Figure 1



Mean daily intake of fruit and vegetables in cup-equivalents per 1,000 calories among children aged 2–18 years — National Health and Nutrition Examination Survey, United States, 2003 to 2010*

Table 1. Results from the 2018 Outagamie County Health Report

	Outagamie County			WI	US
Nutrition	2011	2015	2018	2016	2016
Fruit Intake (2+ Servings/Day)	59%	62%	50%	N/A	N/A
Vegetable Intake (3+ Servings/Day)	24%	34%	26%	N/A	N/A
At Least 5 Fruit/Vegetable/Day	30%	42%	28%	23%	23%

Consuming fewer fruits and vegetables increases a child's likelihood of becoming overweight or obese which in turn can result in other lifestyle diseases, such as heart disease, cancer, hypertension, stroke, diabetes, and psychological problems[2,8,12]. The rapid increase in childhood obesity is a significant public health challenge facing the United States, the state of Wisconsin, and the community of Freedom, Wisconsin, where this project will be implemented. Pediatric obesity has increased from 5% to 20% in the United States over the last 30 years[8]. Currently, Wisconsin ranks as the 18th highest state for childhood obesity[9,10]. According to the 2016 Wisconsin Health Atlas, about 13% of children who reside in Freedom are obese[11]. This represents a significant health risk both during childhood and adulthood as obesity can lead to chronic lifestyle diseases such as heart disease, cancer, hypertension, stroke, diabetes, and psychological problems[2,8,12]. Rural populations experience an even greater risk for developing these conditions compared to their urban counterparts[7]. Fortunately, with proper nutrition and physical activity, obesity can be reversed and prevented both amongst children and adults[8]. One lifestyle modification to decrease obesity risk is to consume more fruits and vegetables. Therefore, this data demonstrates a need for intervention to engage both the children and the community in healthier eating habits to lower their risk for obesity and other chronic diseases into adulthood.

Target Population: Freedom, Wisconsin

Freedom, Wisconsin is a small, rural agriculture town (population 5,842; U.S. Census Bureau, 2011) located in Outagamie County in northwest Wisconsin. Like much of rural Wisconsin, the community is predominantly white (98.6%), however; there are a few American Indians (0.4%), African Americans (0.4%) and Hispanics (0.6%) who reside in the town (U.S. Census Bureau, 2011). Similar to many other rural communities in the U.S., access to healthy foods, such as fresh fruits and vegetables, is a significant challenge[13]. Prior research demonstrates that distance to grocery stores and transportation play a role in access to fruits and vegetables[14]. Additionally, based on our community assessment we found that the town of Freedom only has one grocery store and two apple orchards where community members can purchase fresh produce. The 2018 Outagamie County Community Health Report stated that the top two community health issues were overweight or obesity and chronic diseases[6]. Access to affordable healthy food was specifically identified as a key health concern for the county[6].

The Freedom Area School District is an ideal partner for this project as all of the students use the same campus, which allows for uniform access to the school gardens. The district contains a single elementary, middle, and high school. The middle and high schools are located in the same building and share the same cafeteria and some classroom space. The district serves approximately 1,600 students (700 elementary students, 400 middle school students, and 500 high school students), 89% of whom are white, 4% Hispanic, 3% American Indian/Native American and the remaining categorized as other[15].

Figure 2. Map of the Freedom Area School District

For the purposes of this project, we will only obtain measurements and provide nutritional curriculum for students in grades 3 through 12. However, the younger grades (preschool through second grade) will also utilize the gardens throughout the school year. Therefore, the project will both directly or indirectly serve all 1,600 students in the district.

In Wisconsin, there are 390 Farm to School programs throughout the state, serving over 500,000 children each year[16]. However, the Freedom Area School District does not participate in any Farm to School programming. Currently, the district does not have a school garden and according to the 2015 *Farm to School Census*, the only produce that the district purchases locally are apples[17]. According to that report, one of the key barriers to purchasing more locally grown produce was difficulty in finding suppliers or growers[17].

Additionally, our community assessment discovered local resources and organizations that we could partner with to help maintain the school garden and farmers market. One of those organizations is the Master Gardener Program in Outagamie County. This program trains volunteers on research-based gardening practices which they use throughout the county There are over 100 Master Gardeners in the Outagamie County area that we can utilize throughout our project. A second organization that we found during our community assessment is the Wisconsin

School Garden Network (WSGN). WSGN provides educational and informational tools, resources, and workshops surrounding implementation of school gardens.

PROGRAM APPROACH

As previously stated, the school system provides an ideal environment to increase a child's fruit and vegetable consumption. Schools can create policies and practices that support healthy behaviors, such as including fruits and vegetables in the school lunches[12]. Additionally, schools provide the ideal environment for children to learn and practice healthy eating habits[12]. Schools throughout the U.S. have implemented farm-to-school programs in which the produce served at school cafeterias comes straight from a local source such as a farm or school garden. Research shows that school gardens can not only increase consumption of fruits and vegetables but also increase knowledge and preference for fruits and vegetables among children[12,18]. School gardens add a sensory element to learning as well as providing context to children about where food comes from in the real world[19]. Furthermore, school gardens promote life skills such as gardening, harvesting and cooking[19].

Growing Green Minds will provide increased access to fresh, local fruits and vegetables by developing a school garden program within the Freedom Area School District. *Growing Green Minds* is developed following the evidence-based program *The GREEN Tool* to implement a school garden and integrate the gardening activities into the school's curriculum. *The GREEN* (Garden, Resources, Education, and Environment Nexus) *Tool* was developed based on a study in New York City to determine which components are key in developing a well-integrated school garden program[20]. Both qualitative and quantitative data from 21 elementary and middle schools throughout New York City were used to develop *The GREEN Tool*, which identifies four domains and 19 components needed to establish, integrate and sustain a school

garden (see Table 2). Additionally, the study team developed an evaluation tool with questions on a 3-point scale to measure the progress on the various components of *The GREEN Tool*. We will take the components of this urban-based program and adapt them to fit a rural district-wide setting[20].

The goals of *Growing Green Minds* are to 1) improve students' attitudes about fruit and vegetable and increase knowledge and skills related to preparing and consuming fruits and vegetables, 2) increase students' consumption of fruits and vegetables and 3) establish sustainable relationships and programming related to healthy eating and access to fresh produce. The long-term goals of this project are to reduce the rates of obesity and obesity-related diseases in our population; however, those outcomes are likely longer-term than this project. We will use a pre/post survey to measure the students' knowledge and attitudes about fruit and vegetable consumption. In-school fruit and vegetable consumption will be measured using visual estimation of photos taken of school lunch trays. We will also engage the community throughout the entire program by allowing members to participate in either the planning, developing, or evaluating of the program.

Table 2

The GREEN Tool Component Definitions

Stages of School Garden Integration	The GREEN Tool Domains: Resources and Support	Physical Garden	Student Experience	School Community
Minimally-ingegrated	**Budget and Funding:** The monetary requirement and financial estimate necessary to support a gardening program **Networks & Partner Organizations:** The interconnectedness of a school with other supporting organizations or individuals in the field of school gardens	**Planning & establishing the space:** The deliberate action(s) taken to develop and implement a strategy to maximize the garden's potential to meet the school's goals and needs for the space	**Connection with curriculum:** The relationship, relevance, and fit of the garden with state mandated learning objectives, aims, and goals for students in a particular grade or class	**Volunteer & parent involvement:** Non-staff members of the school, neighborhood, or community become involved with the school's gardening program
Moderately-ingegrated	**Administrative Support:** Mental, practical, or other encouragement and help needed from key leaders within a school required for teachers, parents, or others to implement an ongoing gardening program **Professional Development:** Guided learning and training provided to educators in order to improve their knowledge, skills, and comfort using school gardens as an educational tool	**Garden care & upkeep:** The physical support provided to the garden to ensure that plants, animals, or habitats in the garden have the adequate care and resources necessary for growth **Characteristics:** The attributes of a particular garden that facilitate or promote its use space	**Time spent in the garden:** The duration and frequency of structured educational time that students spend in the garden **Activities:** Action taken by students in the garden	**Social events:** Time allotted for recreational activities in or related to the garden
Well-ingegrated	**Organizational Structure:** The decision making person(s) that determines how a school's gardening program is implemented	**Crop vitality & diversity:** The robustness and variance of plant species in a particular garden **Evaluation and feedback:** The acquisition of information relating to the effectiveness and/or efficacy of one or more aspects of a garden or gardening program	**Engagement:** The cognitive, emotional, and behavioral involvement of students in the learning process and participation in tasks related to the garden **Tasting:** The specific activity of trying edible plants **Learning opportunities:** Learning facilitated by the garden that is unrelated to mandated curriculum or learning standards	**Food environment:** The school's culture and standards for foods allowed within the school, offered to and/or consumed by students

***Formative Research*:**

The Garden Resources, Education, and Environment Nexus (GREEN) Tool was developed by Columbia University in order to determine the components of successful school gardens and how they can help keep the program sustainable[20]. The researchers who developed this tool sampled 21 elementary and middle schools throughout New York City who had a school garden[20]. Researchers collected both quantitative and qualitative data surrounding their school garden programs through surveys, interviews, imaging, and observations. Based on the data collected, the researchers developed 4 domains of well-established school gardens as well as an order in which school can navigate the 19 components of the domains (see Table 2). This toolkit can help school systems operationalize all 19 components needed to implement and sustain a school garden program.

Before implementing the school-based gardening program, we will meet with stakeholders via focus groups and key informant interviews to understand their interests and perspectives on the program as well as gain resources, such as the following:

School District Staff: Our Program Coordinator will host a focus group with the teachers at each grade level to obtain their feedback on educational components of the program. We will ask them questions about feasibility and compatibility of the education materials being integrated into their curriculum. By meeting with the teachers, we will identify a teacher from each school who will be our point person in order to maintain buy-in and support from the teachers. These selected teachers will represent their fellow teachers on the advisory board and voice any questions or concerns that they may have regarding the program. While meeting with the food service director, we will discuss the integration of the garden produce into the school lunches. Using the questions from the Garden-to-Cafeteria Program questionnaire, we hope to determine

how our program can fit the need of serving local and fresh fruits and vegetables in school lunches[21]. We will conduct a key informant interview with the director of Future Farmers of America, which is an organization that prepares students to work in the agricultural field, to determine how to develop and maintain a volunteer program with the high school FFA students. This program would include year-round garden maintenance as well as assistance with the summer school curriculum associated with gardening and nutrition for elementary students.

Parent & Community Involvement: The Program Coordinator will conduct a focus group with the school district's Parent Activity Committees (PAC) and Middle School Association for Parents, Students, and Staff (MAPSS) to obtain feedback on the school garden and farmers' market proposal and recruit volunteers for data collection. Alongside the PAC and MAPSS, the Program Director will also present our proposal to the school board to gain their approval of the program. She will also present at the Freedom Town Board meeting to invite community members to participate in the development of the project by offering their services (i.e. building, plowing, etc.) as part of the Community Garden Day (see the Community Engagement section). The Program Director will also reach out to local businesses to volunteer their services or time to help build the gardens and gain interest in the community farmers' market.

Garden Design, Construction & Maintenance: The UW Extension agriculture agent for Outagamie County agreed to assist us with soil testing, crop selecting, scheduling, and other issues involved with gardening in the area. Through the UW extension office, we will connect with the local master gardener program to onboard volunteers to acquire knowledge on best gardening practices as well as create a volunteer program so local master gardeners could help maintain the gardens throughout the year. Lastly, we will meet with the regional coordinator

from the Wisconsin School Garden Network (WSGN) to help with the planning and implementation of the school gardens.

After conducting our formative research, we will identify stakeholders to comprise our community advisory board (CAB). Members of the CAB will be recruited to provide regular feedback and oversight of the program. While the day-to-day activities will be the responsibility of the program coordinator, the CAB will serve as a critical information resource to the director and coordinator. The CAB will include district personnel, including a school board member, a teacher from each school, the food service director and school principals to help ensure that the program is effectively coordinating with ongoing school activities. The larger Harmony community will be represented on the CAB by agricultural professionals (FFA Director, a Master Gardener volunteer, the WSGN regional coordinator and the UW Extension agriculture agent) and a representative from the Wisconsin Academy of Nutrition and Dietetics Northeastern Region. These CAB meetings will occur monthly in Year 1 to help facilitate implementation and then quarterly in Year 2 & Year 3. The meetings will be held in-person but will include a teleconference option for the members who cannot meet at the school district office.

Physical Garden:

Two school gardens will be established as part of this project, one near the elementary school and one near the combined middle and high school building. We will utilize the USDA Farm to School Planning Toolkit and the Wisconsin Department of Health Services Got Dirt? Toolkit to help determine how the gardens will be designed; when, how much, and what types of produce will be planted, and what tools and material and personnel resources we will need to implement and sustain the garden[22,23]. Special attention will be made to ensure that the garden is accessible for all students, including those with physical disabilities. Exact placement of the

gardens will be determined in consultation with school personnel and agricultural experts, such as the FFA Director and UW Extension Agent.

To increase interest in the program while helping reduce startup costs, we will engage local businesses, organizations and community members to help develop the garden. Given the close-knit and agricultural characteristics of the community, the Program Director will reach out to local businesses and farmers to find volunteers who will donate their time and equipment to help develop the infrastructure of the garden. The local lumber store has agreed to donate two storage sheds for garden tools and supplies. Garden soil will be tested annually to determine the appropriate fertilization schedule[24]. In addition, CAB members will help us solicit material support from local businesses for materials, such as fencing, storage sheds, garden tools, and watering infrastructure.

***Garden Design**:*

The *Got Dirt? Garden Toolkit* will be used as the basis for garden design and maintenance plans, in conjunction with advice from key stakeholders. We will utilize the *Got Dirt? Garden Toolkit*, the knowledge of the master gardener and regional WSGN coordinator, and the query the opinion of the students to determine the layout of the gardens (i.e. straight rows, wide rows, square-foot method, etc.). The program coordinator will also work with these experts and the food service director to decide which crops to plant in the gardens using the Vegetable Cultivars and Planting Guide for Wisconsin Gardens[24]. After creating the inventory of needed seeds and supplies, the program coordinator will work with the master gardener to develop a timeline based on the *Got Dirt? Garden Toolkit* and advice from the UW Extension agents and the FFA Director. The timeline will include a seed starting schedule for both indoor and outdoor planting, and transplanting schedules for moving plants to the outdoor gardens.

Once the timeline is developed, the master gardener will recruit other local master gardeners to volunteer their time and expertise.

Garden Maintenance & Seasonality Challenges:

The Program Coordinator will meet with the master gardener, teachers and FFA director to develop a maintenance schedule year-round. We will utilize the expertise of two master gardeners, one for each school garden, to be "garden directors" to work with other stakeholders to ensure that the garden needs are met. During the school year, we will assign each class to maintain specific rows or parts of the garden during the school year. We will have the students plant the garden either outside in the gardens or start the plants in the greenhouse before the school year ends. Given that the main gardening season occurs during the summer, the program coordinator will work with the master gardeners and the educational stakeholders to develop a summer maintenance schedule. We will work with the school districts to set up summer enrichment classes for elementary and middle school students that focus on gardening. As part of those classes, the students will help water, weed, and harvest the garden over the summer.

However, we anticipate that the maintenance needs of the garden will exceed the time and responsibilities of the children attending the summer school classes. Therefore, we will work with the master gardener and the high school teachers, including the FFA director, to recruit volunteers to help maintain the garden throughout the year. We will recruit 10 master gardeners who will devote 10 hours per month as part of their master gardening volunteer commitment to do the following 1) summer garden maintenance, 2) work with students to implement the fertilizer schedule, and 3) work with the UW Extension agent and FFA Director to address pest and weed problems. Additionally, we will want to pair up the master gardeners with the high school students looking to earn their volunteer hours for graduation to teach them the proper

techniques for maintaining the garden. We also will create opportunities for the master gardeners and high school students to volunteer during the summer school classes to help teach the elementary students about gardening.

In regard to fertilizing and mulching for the garden, the program coordinator will work with the master gardener to set up a schedule with the master gardener volunteers to take on this responsibility given their expertise. We will also set up a composting site to use all of the leftover organic lunch waste to act as fertilizer for the garden during the school year. We will use the master gardener's skillset to set up this system and work with the food service director on implementation. The Program Coordinator will also meet with the master gardener, teachers, and food service director to create a schedule for harvesting the crops.

***Student Experience*:**

Hands-on Gardening*:*

Students will engage with the school gardens in a variety of ways, following the strategies outlined in the Green Tool program on which this project is based. Table 3 describes the ways in which the students will experience the garden:

Table 3: Student Garden Experience	
Garden bed preparation	Students will help prepare the garden beds by plowing, raking, fertilizing under the supervision of teachers and master gardeners.
Planting	Students will participate in seeding the garden as well as transplanting some of the crops from the greenhouse to the school gardens.
Weeding	Each classroom will be responsible for weeding their section of the garden throughout the school year. During the summer programming, students will also participate in weeding the garden.
Harvesting	Each classroom will harvest the crops that they have grown following the methods described in the Garden-to-Cafeteria toolkit[16].
Cooking & Tasting	Students will partake in cooking lessons where they will learn how to prepare and cook fruits & vegetables. They will then get to taste the dishes that they prepared. Students will also get to taste the produce from the gardens in their school lunches.
Composting	Students will learn the biological and environmental concepts through experiments and lessons on composting.

Integration with Class Curriculum*:*

Alongside the hands-on experience, we will collaborate with the teachers to incorporate gardening and nutrition education into their curriculum throughout the year. In order to gain and maintain teacher participation, we will give each teacher $300 per year for three years to purchase classroom supplies related to the gardening curriculum. We will use one of the teacher in-service days to host workshops for the teachers to learn how to integrate the school garden into their curriculum. We will also provide elementary teachers with the free Got Veggies? curriculum developed by the Wisconsin Department of Health Services and Community Groundworks to combine the gardening activities with nutritional education[25]. The current activities in the curriculum are for students in second and third grade, so we will work with the fourth and fifth grade teachers to adapt the activities to meet their students' academic needs. One example activity from the curriculum entitled "Deconstructing a Cheeseburger" teaches the connection between soil and food by challenging the students to trace each ingredient of a cheeseburger back to the soil. Another example includes a garden journal in which the students can reflect on their garden experiences.

The middle school teachers will receive the Exercise Your Options curriculum developed by the Dairy Council of California. Exercise Your Options uses various behavior-change models to encourage the students to utilize problem solving, reasoning, and critical thinking strategies that can influence their health[26]. The theoretical models used in this curriculum are the Social Cognitive Theory, Theory of Planned Behavior, and the Transtheoretical Model. The Social Cognitive Theory describes the regulation of behavior through control and reinforcement of goal-directed behaviors[27]. The Theory of Planned Behavior indicates that an individual's attitudes, beliefs and perceived self-control play a role in one's behaviors[27]. Lastly, the Trans-

theoretical Model states that individuals utilize a range of various change processes as they pass through the stages of change regarding a specific behavior[27]. One example activity from this is "Food Records", which tasks the students to record their diet and then analyze their diets based on food choices, serving size and areas for modifications. The activity also teaches students how to read a food label. Of note, this program aligns with the education standards for the state of California so we may have to adapt the program to fit the education standards for Wisconsin[26].

For the high school students, we will provide the district with a curriculum entitled FoodSpan developed by the Johns Hopkins Center for a Livable Future. FoodSpan is a free resource that provides high school students with the opportunity to understand food systems, promote healthy food choices, and advocate for food policy change[28]. The lessons from FoodSpan align with the national education standards for social studies, science, health and family and consumer sciences[28]. This curriculum will also facilitate the connection between gardening/farming and food systems. Additionally, the high school requires the students to complete volunteer hours for graduation, so the program coordinator will set up a volunteer system for high school students to work in the gardens and at the farmers' market. Overall, we will work with the director of curriculum and teachers to ensure that the lessons also meet the state requirements for education. These educational activities will allow the students to be engaged in the gardening process from planting the seeds to composting the leftover produce as well as develop an understanding for food system issues.

We will also work with the school district and teachers to develop summer school programs for elementary and middle school students focused on gardening and nutrition education. We will ask the master gardener and FFA director for input on the summer school courses to determine how we could involve the master gardener volunteers. Once the summer

school classes are created, we will ask the FFA director to see how we could best incorporate some of his high school students into the course so that the younger children can learn about gardening and nutrition through role modeling.

Integration with School Cafeteria:

The produce from the school gardens will be incorporated into the school lunches. Therefore, we will work with the food service director and the cafeteria staff to get their feedback on strategies on how to best prepare and store the produce. Additionally, the program coordinator will meet with the food service director and the county health department to ensure that all of the rules and regulations are followed. We will use the USDA protocols entitled Good Agricultural Practices and Good Handling Practices to make sure that we are growing and handling the produce in a safe manner for consumption[22]. We will also collaborate with the kitchen staff to generate a list of recipes that will utilize the crops grown in the garden. In order to reduce food waste, we will collaborate with the kitchen staff to generate feasible recipes for integrating the garden produce in the school lunches as well as provide materials for canning excess produce. The recipes will also be shared with the classroom teachers as part of the cooking or preparing aspect of the nutrition curriculum.

Community Engagement:

To extend the impact of the gardens beyond the school itself, several activities will seek to engage community participation and support. First, we will collaborate with the school district to host a Community Garden Day in which we will invite the students, parents, and community members to help develop and build the school gardens on a Saturday in the fall months so that the gardens are ready for planting in the spring months. Secondly, a weekly farmers' market will be held on school grounds, with area farmers and local FFA alumni invited to sell produce. The

FFA students and/or the school classrooms will also set up a booth to sell any leftover produce from the school gardens. This will allow parents and others in the community to both visit the gardens and to purchase produce to prepare and eat at home. Any remaining produce from the school gardens will be given to students to take home to their families or donated to the local food pantry to eliminate food waste and increase the community reach of this project.

Lastly, the schools will host an annual Harvest Day each fall, inviting parents and other stakeholders (school board members, master gardeners, school administrators, advisory board members) to tour the gardens, see examples of classroom activities linked to the gardens, and to eat a school meal prepared with garden produce. Harvest Day will showcase to the community how the children are gaining nutritional and educational benefits from our program in order to maintain their support. Additionally, we will invite the Wisconsin Academy of Nutrition and Dietetics to set up a booth to disseminate additional information on resources and programs regarding nutrition for children and families. Results of the project will be widely disseminated via the Outagamie County Public Health Department and our community partners.

PERFORMANCE MEASURES AND EVALUATION:

Process Evaluation:

As part of the evaluation process, we will be conducting a process evaluation which will determine if the program followed the intended design as well as the intervention's quality[27]. Members of the community advisory board will use the 19 components of *The GREEN Tool* Scorecard to determine if the school garden program met the tool's criteria. We will have each member of the advisory board fill out the assessment and use the results of the assessment to consider future directions and improvements of our program.

The Program Coordinator will also conduct focus groups and key informant interviews with the same school and community stakeholders as part of the process evaluation. The program coordinator will interview one teacher from each grade level to get their feedback on the school garden program and education using the Teacher Focus Group Questions and Guide from the National Farm to School Network[29]. The program coordinator will also hold a focus group with PAC and MAPSS and the school board to gather feedback and suggestions from the parents and community members about our program. Similarly, we will conduct a key informant interview with the food service director to get his feedback on the program delivery and the integration of the garden produce into the school meals.

At the end of the growing season, the Program Director or Program Coordinator will also conduct interviews with key stakeholders to determine the program implementation's strengths, weaknesses, and potential modifications to the program for the next season. All in-person interviews and focus groups will be recorded and coded by the graduate assistant to look for recurring themes of positives and negatives of the program. Once the data is coded, the advisory board will meet to review the process evaluation, determine if the program was implemented as intended, and discuss strategies for improvement of the program.

Outcome Evaluation:

Outcome evaluation focuses on the program's success in producing the intended behavior change[27]. The major outcome goal for this program is to increase the students' attitudes and knowledge of fruit and vegetables through the use of school gardens, which will be measured using a pre/post design, utilizing both a student survey and direct observation of produce consumption in the cafeteria. Prior to data collection, we will obtain IRB approval as well as

parental consent for the data collected on the students. We will collect baseline data prior to program initiation in Year 1 and follow up data during the fall of Year 2 and Year 3.

We will collect data on the students' knowledge and attitudes surrounding fruits and vegetables using a modified version of the Wisconsin Farm to School survey measuring students' knowledge, attitudes, and behavior about fruit and vegetables will be administered to a sample of students at each school[30]. Students from one English class per grade (grades 3-12) will take the survey because English is required each year; this will ensure equal likelihood of every student being surveyed.

To measure dietary behavior, we will use digital photographic observations of school lunches. In both the pre-test and posttest assessments, evaluators and volunteers will attend 3 lunch periods to take "before" and "after" photos of the lunch trays of students from grades 3 through 12[31,32]. The pictures will then be compared by the graduate student and program coordinator to estimate the amount of each fruit and vegetable consumed by each student, following the procedure outlined by Swanson et al[31,32].

Following the same procedures as used in collecting baseline data, follow up surveys and cafeteria photos will be collected during the fall of Year 2 and Year 3 to measure changes in attitudes, knowledge, and behavior as the students will have had the opportunity to participate in garden activities as well as consumption of the school produce. We will work with a biostatistician to conduct statistical analysis to compare the preliminary data with the follow-up data from the Year 2 and Year 3 marks to see if the students' knowledge, attitudes, and behaviors changed in regard to fruit and vegetable consumption.

We will conduct these process and outcome evaluations in Years 2 and 3 of the grant. The first year of the grant will be spent conducting formative research and planning of the

program. We will review the results of the process evaluation in Year 2 to identify and adjust the program going into Year 3. Then, we will repeat both process and outcome evaluations during Year 3.

Limitations & Sustainability

A key limitation facing all school gardening programs is weather and seasonality. If planting is severely delayed, we will purchase transplants to enable us to keep to the project timeline as much as possible. Another challenge includes the reliance on volunteers to develop and maintain the garden. Our use of master gardeners, who are required to volunteer as part of the master gardener program, will minimize this problem. This organization has a membership committee that ensures a strong body of volunteers. Lastly, the success of the farmers' market relies on active participation of both local farmers and customers, without which the market cannot be successful. However, this is not a central element of the program, so this limitation will not affect our primary aims and goals.

Additionally, while student absences may reduce our sample size in pre and posttests, the proposed sample is large enough to produce statistically meaningful results even with some missing data.

Despite the limitations, the sustainability of *Growing Green Minds* will be enhanced due to the substantial community engagement aspect of the program. We believe that involving the community throughout the entire program process will increase support to maintain this garden, both via volunteer support and financial and material support from local businesses.

CAPACITY OF APPLICATION ORGANIZATION

The Outagamie County Public Health Department's mission is to prevent disease and injury, promote wellness, and protect the health of the communities who reside within the

county. Our core values help us deliver high quality services as well as develop and implement evidence-based strategies to address the priority health issues in our community. Our department has 4 units: Community Health, Environmental Health, Public Health Nursing, and Women, Infants and Children (WIC). Our Community Health Unit works with community partners to design, implement, and evaluate various public health interventions or programs. This unit also has experience with developing policies to address reduction in morbidity and mortality as well as support healthy environments, such as schools and workplaces. Furthermore, we conduct a Community Health Assessment every 5 years in order to determine the impact of our current programs as well as develop new programming in order to better meet the needs of the communities. In addition to the Community Health Assessment, we produce an annual report specifying the cost of all of our services during the fiscal year. In 2019, our department properly spent the approved budget of $20,000,000. Additionally, we collaborate with over 20 community partners and organizations to generate an additional $15 million in grant funding for programming.

In 2014, we teamed up with over 50 key stakeholders, leaders, and community members to review our annual Community Health Assessment to identify health priorities for our Community Health Improvement Plan (CHIP). The CHIP is a 5-year plan that integrates the community into its efforts in order to achieve the greatest impact on health. One of the priority areas identified was to improve nutrition and food culture among all people living in Outagamie County. To achieve this goal, we created programs to increase skills and knowledge regarding food systems. One way we achieved this objective was through community and school gardens in which we collaborated with the local Goodwill Community Center to develop 8 gardens

throughout the county, including school gardens. As part of this program, we also provided nutrition education, in-class demonstrations, and food-related events for various school districts.

Lastly, in accordance with our policy, the Outagamie County Public Health Department prohibits discrimination in the provision of services on the basis of age, disability, sex, race, color, national origin, religion, sexual orientation, or gender identity. This policy is strictly enforced amongst our employees as well as with our collaborating community partners. Overall, our vision is to be a leader for change in policies, systems, and environments to support a healthy community where all individuals have an opportunity to reach their highest level of wellness.

PARTNERSHIPS AND COLLABORATIONS

This project heavily involves collaboration with various community organizations. The Outagamie County Health Department will work the community partnerships listed in Table 4 to implement and sustain the proposed project. The main organization that we will partner with is the Freedom Area School District given that it is the setting for this project. The district will be involved in most of the decision making for the project and will connect us with school staff and resources. Some of our community partnerships will provide expertise and resources related to agriculture and gardening practices, such as the UW Extension Office, the Outagamie County Master Gardener Association, and the local FFA chapter. Other partnerships, including the Wisconsin School Garden Network and the Wisconsin Academy of Nutrition and Dietetics will provide nutrition related expertise and resources for this project. Additionally, each of our partnerships will have a representative serving on our CAB, who will report back to their respective organizations about the progress of the project.

Table 4: Community Partnerships		
Organization	**Expertise**	**Roles**
Freedom Area School District	Leadership over the school system and knowledge about the Wisconsin curriculum standards.	FASD will help with integration of the school garden program into the classrooms and cafeterias. They also will help with designing and disseminating the nutrition and garden-related curriculum. School leaders, teachers and staff will serve on the CAB.
UW Extension Office	Expertise in evidence-based agriculture methods.	The local agricultural agent will serve on the CAB. The UW Extension office will help with soil testing, pest management, and garden design.
Wisconsin School Garden Network	Experience with school garden implementation and integration into curriculum	The regional coordinator will serve on our CAB. This organization will provide support and resources for implementation of the school gardens.
Outagamie County Master Gardener Association	Expertise in gardening, specifically growing produce in the State of Wisconsin	One Master Gardener will serve on the CAB to provide guidance for designing and maintaining the school gardens. This organization will also provide volunteers who will help maintain the school gardens along with the students.
Wisconsin Academy of Nutrition & Dietetics Northeastern Region	Expertise in food and nutrition services in Wisconsin	A representative from this organization will serve on our CAB to provide nutrition expertise. They will also partake in our community events by setting up informational booths.
Freedom FFA Chapter	Provides agricultural education to students and alumni	The FFA director will serve on our CAB. The chapter will maintain the student volunteer program as well as the local farmers' market through their connections with alumni.

In addition to providing expertise and resources, our community partnerships will also help us better connect with the community as a whole to help gain buy-in for the project. Some of these organizations will participate in our community outreach events, such as the Community Garden Day, the farmers' market, and the Harvest Day, to demonstrate support and provide additional resources to community members about gardening and nutrition. We will also work

with these partnerships to disseminate the results of this project to further broaden the reach of this project to other groups and schools in the region.

PROJECT MANAGEMENT

The Outagamie County Public Health Department will oversee this school garden program as it employs both the Program Director and Coordinator for this project. The connection with the health department will help us leverage community resources and support needed for this project. Given their expertise, we will work with the Wisconsin School Garden Network, the local UW Extension Office as well as the county's master gardener organization to help establish the school gardens. Each of these community organizations will provide ongoing advice to the Program Director, Coordinator and teachers on proper gardening methods, composting, and maintenance. They will help us address any seasonality issues that may arise during our implementation process.

Project management will be enhanced by regular communication between the Program Director, Program Coordinator, and the graduate assistant via weekly meetings upon project initiation and then biweekly as the project progresses. Additionally, we will meet monthly (Year 1) and quarterly (Year 2 and 3) with our community advisory board to address any concerns that may arise during implementation or adaptations that need to be made. The CAB meetings will also serve as a management strategy to monitor those individuals or groups involved with the implementation of the project. Please Appendix B for the Program Organizational Chart.

Meredith Grey, MPH, will serve as the Program Director for *Growing Green Minds*. She obtained her MPH from the University of Wisconsin-Madison School of Medicine and Public Health in 2007. Prior to becoming the Director of the Outagamie County Public Health Department, Mrs. Grey previously worked at the Wisconsin Department of Health Services

where she started out working as a Tobacco Control Specialist and then transitioned into a leadership role to help develop the state health plan back in 2010. She will oversee the implementation of this project and some of her responsibilities will include supervision, financial management, and community engagement, including overseeing the community advisory board.

Marissa Schuh, MPH, will serve as the Program Coordinator for *Growing Green Minds*. She received her MPH from the University of Kentucky College of Public Health in 2020 and began working for the Outagamie County Public Health Department. Ms. Schuh will serve as the main point of contact and manage daily operations for this project. Her responsibilities will include data collection and analysis, some community engagement, GRA supervision, farmers' market oversight, volunteer recruitment, and educational training/curriculum dissemination. She will work with the various volunteer groups and the school district to develop a year-round garden maintenance plan prior to implementation. Ms. Schuh will work with the GRA and parent volunteers to collect data and then analyze the results with the help of the biostatistician. She will attend the National Farm to Cafeteria Conference with the graduate student to present the results of the project in Year 2.

One Master of Public Health student from the University of Wisconsin-Green Bay will act as a Graduate Research Assistant (GRA) for *Growing Green Minds*. The GRA's primary responsibility will be collection and some analysis of the baseline and post-intervention data (i.e. surveys, photographs, coding). The GRA will support the Program Coordinator with oversight of the farmers' market and participate in CAB meetings and focus groups. The GRA will also attend the National Farm to Cafeteria Conference with the Program Coordinator to present results. One GRA will be hired each year of the project for 10 hours per week.to this project. We

will also hire a biostatistician from the University of Wisconsin-Green Bay to oversee analysis of the pre-post survey and photography data.

We will also utilize some key players from community organizations for this project. **Christina Yang** is the regional coordinator from the Wisconsin School Garden Network (WSGN). She will provide guidance in regards to planning and implementation of the school garden. WSGN has a surplus of resources related to Farm-to-School programs including planting guides, garden maintenance, and classroom activities. Christina will also serve on our CAB. **Derek Shepherd** is the Crops, Soils and Horticulture Agent for the UW Extension in Outagamie County. He will provide insight and resources for soil testing for our gardens. Additionally, he oversees the Master Gardener program in Outagamie County, so he will connect us with master gardeners in the area. The UW Extension Master Gardener program recruits volunteers to educate them with research-based gardening information to then provide them as free resources back to the community. We will recruit one master gardener to act as an expert for garden development and trainings as well as recruit other master gardeners in the area to help with maintenance. The master gardener will serve on the CAB.

Given the environment of our project, we will involve staff from the school district as key players of our project. One of those key players will be the FFA director, **Alex Karev, MA**. His agricultural expertise will be exploited for garden development and maintenance as well as curriculum generation for high school students. Mr. Karev will also serve as the primary contact for recruiting high school students to volunteer at the school gardens and farmers' market. He will also act as a liaison for teachers and serve on the CAB. Another key player will be **George O'Malley** who serves as the district's food service director. His responsibilities include management of kitchen staff, food ordering, and meal planning for the entire school district. Mr.

O’Malley will work with the Program Coordinator to implement a workflow of harvesting the produce from the gardens and incorporating it into the schools’ lunches. He will also serve on our CAB. Lastly, we will work with **Izzie Stevens, MEd**, the district’s director of curriculum to ensure that the education materials and training that we provide teachers meet the state’s educational standards.

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APPENDICES

APPENDIX A: Budget Justification

A. Personnel Salaries & Wages*

Title	Annual Salary	% FTE	Salary	Fringe Requested	Total Requested
Program Director	**$100,000**	**10%**	**$10,000**	**$2,743**	**$12,743**
	$103,000	**5%**	**$5,150**	**$1,413**	**$6,563**
	$106,090	**5%**	**$5,305**	**$1,455**	**$6,760**
Program Coordinator	**$50,000**	**100%**	**$50,000**	**$16,805**	**$66,805**
	$51,500	**100%**	**$51,500**	**$17,309**	**$68,809**
	$53,045	**100%**	**$53,045**	**$17,828**	**$70,873**
MPH Graduate Student	**$32,000**	**30%**	**$9,600**	**$3,894**	**$13,494**
	$32,960	**30%**	**$9,888**	**$4,011**	**$13,899**
	$33,949	**30%**	**$10,185**	**$4,131**	**$14,316**
Biostatistician	**$100,000**	**0%**	**$0**	**$0**	**$0**
	$103,000	**3%**	**$3,090**	**$848**	**$3,938**
	$106,090	**3%**	**$3,183**	**$873**	**$4,056**
FASD FFA Director	**$60,000**	**10%**	**$6,000**	**$1,893**	**$7,893**
	$61,800	**10%**	**$6,180**	**$1,950**	**$8,130**
	$63,654	**10%**	**$6,365**	**$2,008**	**$8,374**

*Salaries increase at a rate of 3% per project year.

Meredith Grey, MS, MPH, Program Director (10%/5%/5%). Mrs. Grey is the Director of the Outagamie County Health Department. She will dedicate 10% of her time during Y1 during the start-up phase of the project and then 5% FTE for years 2 and 3. Her role as director of a county public health department will allow her to effectively oversee the implementation of the school garden program. She will be primarily responsible for implementation and recruiting local resources such as the master gardeners. The program director will supervise the program coordinator to make certain that timelines and deadlines are met as well as provide financial management of the project.

Marissa Schuh, MPH, Program Coordinator, (100%). Ms. Schuh will contribute 100% FTE for all three years of the program. She will be responsible for overseeing the daily operations of the project. The coordinator will be responsible for the collection and analysis of the pre/post data. The program coordinator will also act as liaison between the various key personnel,

stakeholders, and community members. Additionally, the program coordinator will help manage the CAB and farmers' market operations. Ms. Schuh will supervise the GRA for the project.

Graduate Assistant, University of Wisconsin-Green Bay (30%). One student from the MPH program at the University of Wisconsin-Green Bay will serve as a graduate assistant for the project. The student will spend about 12 hours per week on the project by assisting with data collection and analysis. We will have one graduate student for each of the three years.

Biostatistician, University of Wisconsin-Green Bay (3%). The biostatistician from the University of Wisconsin-Green Bay will assist with data analysis for both the surveys and digital photography in Years 2 and 3.

Alex Karev, MA, FHS FFA Director (10%). Mr. Larson will contribute 10% FTE for all 3 years of the project. He will assist the Program Coordinator with developing a volunteer program for high school students as well as serve on the community advisory board.

Kitchen Staff. We will provide Freedom Area School District with $15,000 per year to food service to cover additional labor costs incurred by the program.

Fringe Benefits. Fringe benefits were calculated using a predetermined rate and include health insurance. The components of fringe benefits are explained in the table below.

Fringe Benefits Calculations		
Benefit	**Staff**	**GRA**
Retirement	10%	N/A
Social Security	7.65%	7.65%
Other Fringe	3.6%	1.2%
Total Percent	**21.25%**	**8.85%**
Health/Life Insurance		
Employee	$5,688/year	$2,166/year

B. Equipment

We will designate $460 of the funding to install watering systems for each garden in order to make the watering process easier. This equipment includes hoses ($240), sprinklers ($80), and

drip tape ($140). Additionally, we will use $200 to build a composting site at both the elementary school and middle/high school. The compost will act as an organic and sustainable fertilizer for the garden thereby reducing the cost of having to purchase fertilizer.

C. Supplies

We will purchase paper ($180) in order to collect the pre/post surveys. Three digital cameras will also be purchased for data collection ($390). We will take some of year 1 funding to purchase soil for the gardens ($15/per cubic yard x 8 for $120 total). We will allocate funds for gardening tools ($1,000 for Year 1 and $300 for year 2 and year 3) and seeds or plants for the garden ($500/year). We anticipate spending about $100 per year on fertilizer as we will use the organic material from composting to help fertilize the gardens. We also will spend $500 on pots and grow lights for the greenhouse.

D. Travel

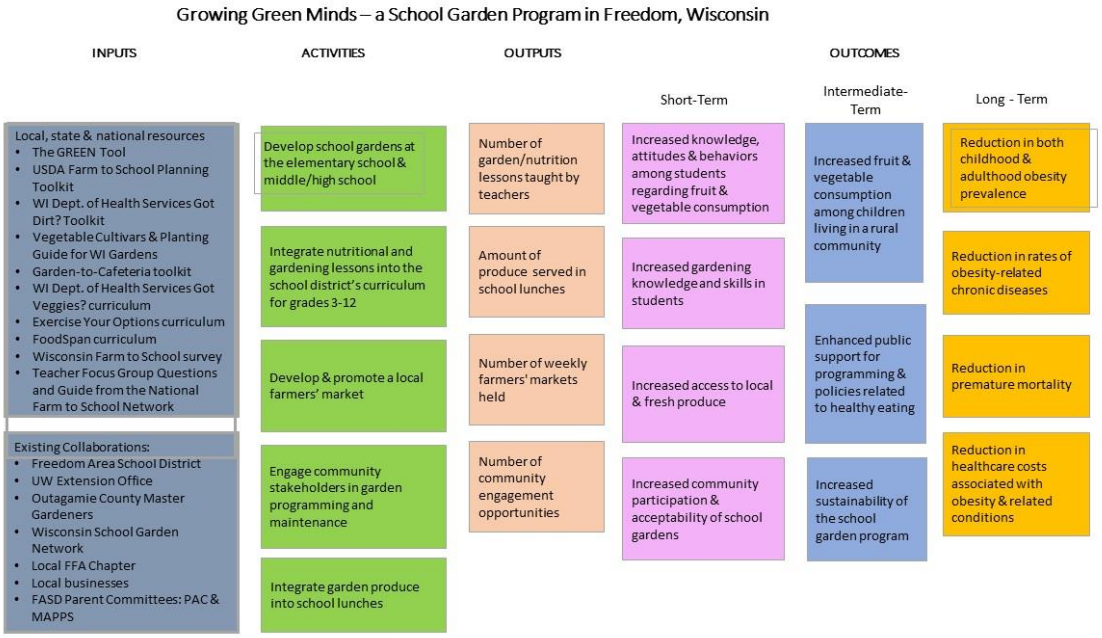
Some funding will be used for the Program Director to attend the annual Project Directors' Meeting in Washington, DC all three years of the program. The cost to attend this meeting will be $1,100 per year ($500 for airfare, $400 for hotel for 3 days, $200 for per diem. We will also use some of the funding in years 2 and 3 for our staff to travel to trainings and conferences. In Year 2 & 3, the Program Coordinator and the GRA will attend the National Farm to Cafeteria Conference in New Mexico. Travel expenses for each year will be $4,100 which includes mileage from Freedom to Albuquerque, New Mexico ($500 per person), lodging ($400 for 3-day hotel stay), conference registration ($400 per person) and per diem ($200).

E. Other

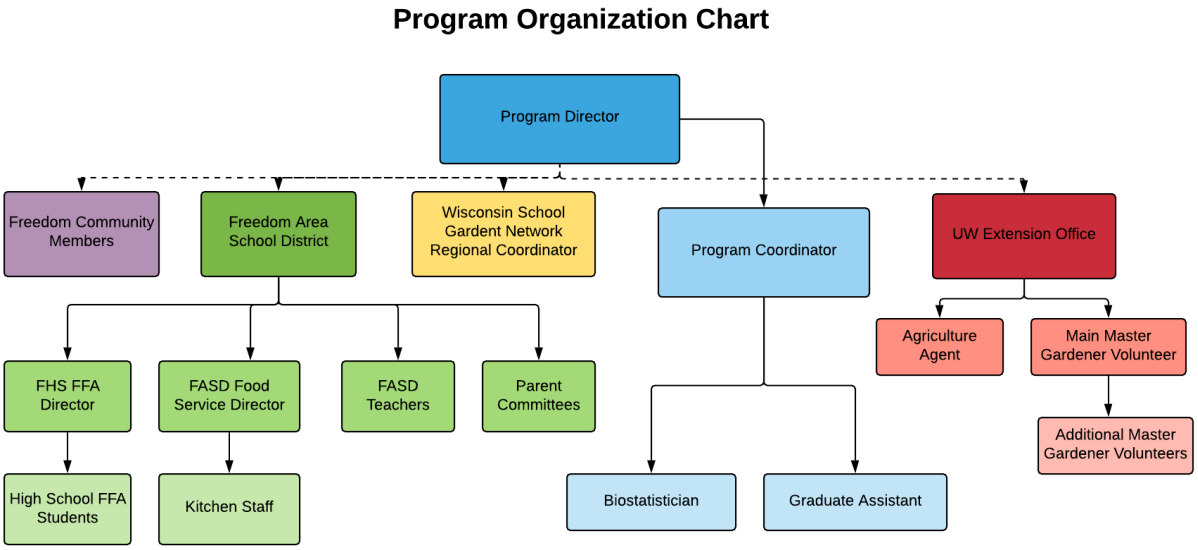
We will be funding tuition for the graduate assistant for all 3 years using the rates of graduate tuition at the University of Wisconsin-Green Bay ($10,000 for Year 1, $10,300 for Year 2, and $10,600 for Year 3). We will also give 110 teachers in the school district $300/year for all three years to be used for classroom supplies to teach the lessons on gardening and nutrition. Some

examples include journals, worm bins, books, mason jars, grow lights, plates, etc. Additionally, we will provide them with the free gardening and nutritional activities listed in the *Integration with Class Curriculum* section. We will also allocate funds for food for our focus groups ($500) and teacher in-service day ($1,000) that will occur during our project.

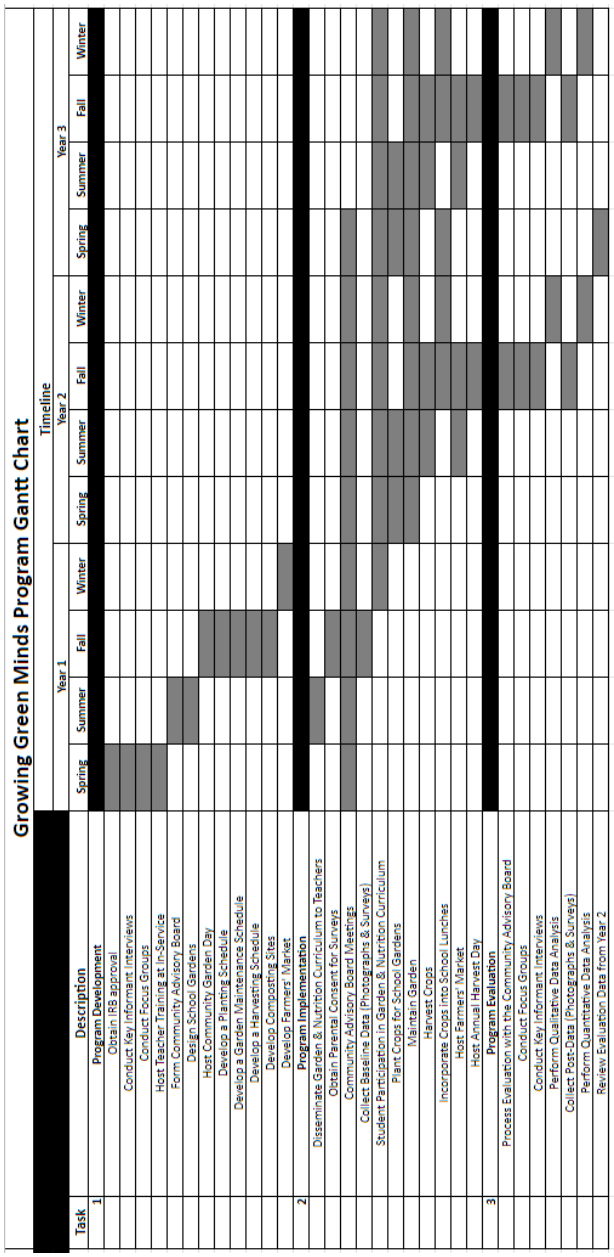
APPENDIX B: Logic Model



APPENDIX C:



APPENDIX D:


Growing Green Minds Program Gantt Chart
Timeline
Year 1
Year 2
Year 3
Spring
Summer
Fall
Winter
Spring
Summer
Fall
Winter
Spring
Summer
Fall
Winter
Task
Description
1
Program Development
Obtain IRB approval
Conduct Key Informant Interviews
Conduct Focus Groups
Host Teacher Training at In-Service
Form Community Advisory Board
Design School Gardens
Host Community Garden Day
Develop a Planting Schedule
Develop a Garden Maintenance Schedule
Develop a Harvesting Schedule
Develop Composting Sites
Develop Farmers' Market
2
Program Implementation
Disseminate Garden & Nutrition Curriculum to Teachers
Obtain Parental Consent for Surveys
Community Advisory Board Meetings
Collect Baseline Data (Photographs & Surveys)
Student Participation in Garden & Nutrition Curriculum
Plant Crops for School Gardens
Maintain Garden
Harvest Crops
Incorporate Crops into School Lunches
Host Farmers' Market
Host Annual Harvest Day
3
Program Evaluation
Process Evaluation with the Community Advisory Board
Conduct Focus Groups
Conduct Key Informant Interviews
Perform Qualitative Data Analysis
Collect Post-Data (Photographs & Surveys)
Perform Quantitative Data Analysis
Review Evaluation Data from Year 2