

Abstract

THIS REPORT CONTAINS PLANNING METHODS AND INSTALLATION PROCEDURE FOR A RAISED VEGETABLE GARDEN FOR WILSONVILLE HIGH SCHOOL, IN WILSONVILLE, OREGON. THE PRIMARY PURPOSE OF THE GARDEN WAS TO USE IT AS A LEARNING TOOL FOR THE SPECIAL EDUCATION DEPARTMENT AT WILSONVILLE HIGH SCHOOL. UPON DOING MORE RESEARCH IT BECAME EVIDENT THAT THE GARDEN CAN ALSO BE USED AS A HEALING TOOL FOR STUDENTS WHO SUFFER FROM ATTENTION DISORDERS AND WHO HAVE EMOTIONAL AND LEARNING DISABILITIES. THE STUDENTS HAVE BECOME INVESTED IN THE GARDEN PROJECT AND LOOK FORWARD TO DOING MORE PROJECTS WITH THEIR CLASS.

Introduction

Horticulture as a Learning Tool

When gardens were first planted in schools a hundred years ago, many of those schools were using them as hands on learning for their agriculture curriculum. Though agriculture curriculum in schools is not as prevalent as it once was, schools are still using gardens to get students out of the classroom. A high school in Idaho, Meridian Academy, is using a garden at their school as a learning tool with students who weren't passing their classes at the traditional high school. Students in a Kentucky elementary school even reported higher scores on standardized tests taken by student who were involved in their garden program (Pranis, 2010).

A school garden is the perfect learning community for students in a class that has students with a wide variety of learning, mental, and emotional needs. By creating a list of tasks and job duties, students at different developmental levels can find their own niche in the garden. By creating timelines of planting and garden activities, the students learn planning skills. More advanced students can lead groups of students while learning leadership skills and all students can have a hand in producing a physical product that they can show their friends and family at the end of the day.

Horticulture as a Therapy

Horticulture therapy is the use of plants and gardens to promote health and wellness in individuals or groups (Larson, Hanchek, and Vollmar, 1996). This form of therapy encompasses many garden activities where the "patient" is cultivating, thinning, weeding, watering, sowing and harvesting plants, to nature activities such as clearing land, putting up nesting boxes, and tending animals that graze, as well as activities using products from the garden to make crafts and cook, and even just creating spaces for patients to sit alone and have time to think. It is also important that the patients have many different kinds of sensory inputs, be they tasting fruits, smelling flowers, touching different vegetation, stones, and water, as well as have sounds from nature or water features.

The use of gardens as places of healing and wellness can be dated back to the ancient Egyptians. Poets have written about gardens, artists have recreated the splendor of landscapes on canvass, and authors have conveyed the beauty of their natural environment in words. Scientifically, stress levels were measured in people and shown to be significantly reduced after seeing plants (Ulrich, 1981). Patients in hospitals showed a significant increase in their recovery rates if they had views of trees from their recovery room (Ulrich, 1984).

Anyone can reap some sort of benefit from horticulture activities; however there are some gardens that are built with a specific "patient" in mind. The Swedish University of Agricultural Sciences' Alnarp campus has built a garden for the use of patients who are sad, depressed, fatigued, distressed, or upset. These patients suffer from what the Swedish call burnout diseases. The garden acts as a safe place where patients won't be judged or discriminated against, which is going to be a key to setting up our garden.

Included in this report, is a table of known health benefits (see Table 1) of natural and garden settings. This list was compiled from a list of literature submitted to the Healthy Parks, Healthy People Congress. In their report, the authors believe that the "prevailing attitude in society" is that nature is separate from human society and that humans are independent of nature (Maller, Townsend, St. Leger, Henderson-Wilson, Pryor, Prosser, and Moore; 2009). The authors report that the shift of populations away from rural, natural areas into urban cities has promoted this idea that we are independent from nature. Further, the authors report that while there are numerous studies being done in several scientific fields that prove nature has benefits to human physiological, emotional, and spiritual needs, the specific medical reasons for these health benefits are still unknown.

Interaction	Known Health Benefit
Viewing Nature	Improves concentration, remedies mental fatigue, improves psychological health (particularly emotional and cognitive aspects)
	Reduces stress and tension and improves self-reports of wellbeing (positively influencing the immune system by reducing stress hormones such as cortisol and corticosterone)
	When exposed to scenes of natural environments subjects recover faster and are more resistant to subsequent stress, which also is likely to boost immunity
	Recovery from a stressful event is faster and more complete when subjects are exposed to natural rather than urban scenes, and heart rate and muscle tension decreases (yet it increases when viewing urban scenes)
	Viewing nature improves performance in attention demanding tasks
	Viewing nature aids recovery from mental fatigue (attention restoration) and encourages reflections by requiring involuntary attention
	Views of flowers and trees in the workplace reduce perceived of job stress, improve job satisfaction, and reduce the incidence of reported illness and headaches of office workers
	Trees nearby: decrease levels of fear, incivilities, and violence amongst residence; decrease crime rates in public housing; and improve life satisfaction of residence
Being in Nature	Natural play settings reduce the severity of symptoms of children diagnosed with Attention Deficit Disorder (ADD) and improve concentration
	Viewing nature enhances residents' satisfaction and makes higher density living more acceptable
	Natural surroundings assist cognitive functions in children
	Wilderness areas provide spiritual inspiration, enable people to gain a fresh perspective on life, and provide an opportunity to 'get away'
	Therapy in a wilderness setting heals emotional and psychological conditions and can aid those recovering from substance abuse and violence
	Outward Bound and similar programs use wilderness challenges to boost self-confidence and self-esteem
Observing Plants and Gardens, or Gardening	Community gardens increase community cohesion, reduce graffiti and violence and enhance self-image of residence
	Gardening and gardens help people feel tranquil and at peace
	In habitat restoration people see a metaphor for their own personal transformation and growth, enhancing psychological wellbeing
	Gardens improve psychological wellbeing, provide environmental stimulation, a means of self-expression, physical exercise, and social interaction for residents of retirement communities
	Residents who have nature nearby or regularly pursue nature-related activities (e.g. gardening, bird watching) have greater neighborhood satisfaction, overall health and life satisfaction than residence who do not
Observing/Encountering Animals (Pets and Wildlife)	Pets provide companionship, and an opportunity to nurture and express intimacy, as well as facilitating social networks
	The site of, or touching a pet can reduce stress, decrease blood pressure and heart rate
	Pet owners report fewer minor health problems and have better mental health than non-owners (regardless of overall health, socio-economic status and physical exercise)
	Owning a pet can reduce the risk factors for cardiovascular disease (systolic blood pressure, plasma cholesterol, plasma triglycerides) independent of lifestyle and other health factors
	Observing native animals, having them nearby, or interacting with them improves quality of life

Table 1 – A list of know health benefits by having contact with nature and natural settings (Maller, Townsend, St. Leger, Henderson-Wilson, Pryor, Prosser, and Moore; 2009)

Planning a School Garden

Determine the Purpose

There are several reasons why a school would want to install a school garden. It is important to first determine the reasons for the garden in order to determine what will be planted in the garden, which will then determine what space and construction will be needed for the installation. Currently, there are two main reasons school's have for installing school gardens- sustainability and creating a new learning environment.

With the "going green" trends taking the nation, some schools are striving to become sustainable, growing the produce they use rather than buying it. Many schools are growing fruits and vegetables to supplement the school's lunch program. In turn, the cafeteria sends its compostable food waste back to the garden to be turned into composted fertilizer and limiting the waste sent to the landfill. Also, many teachers use produce that can be grown in a garden in their classes. Biology teachers use onions to teach students about cell division. Nutrition teachers use salad greens to teach students about healthy food choices. Though sustainability in schools is a recent trend, teachers have been using gardens to create a new learning environment much longer.

The purpose of the garden project at Wilsonville High School is as a learning tool for the Special Education department. Students in the Life Skills classes will be able to grow fresh fruits, vegetables, and herbs for their cooking lessons. Additionally, the Life Science class for students with learning and behavior disabilities will have a hands-on learning environment where a broad range of abilities can work together and learn not just science, but also math, art, and literature while also learning important skills such as working in a group and project planning.

Because we are using this garden as a space for students with a wide range of disabilities, it is important for us to plan for those disabilities as much as possible. We have many students who are wheelchair bound, so we needed to have a space that would allow them to participate as much as the next students. This meant that we needed to build raised beds between two and three feet tall and with pathways that were at least three feet wide between the beds. With this idea in mind, I created a scaled drawing of a raised vegetable garden with three raised beds (see Figures 1 and 2).

With the idea in mind that we would be asking for materials to be donated, and that the lumber being donated would be primarily eight-foot lengths, I designed the beds to be eight feet wide and four feet long. I guessed that the lumber would be primarily two by fours. To prevent the sides from sagging out, I designed two braces made from four foot lengths of the two by fours.

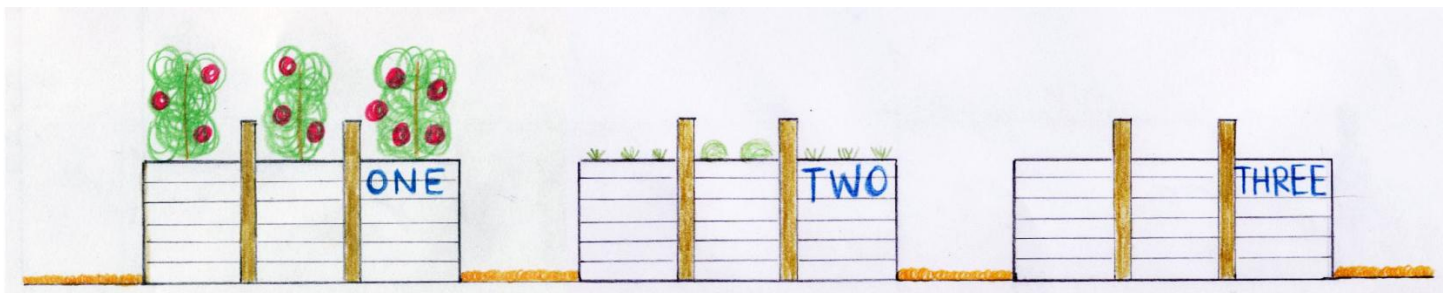


Figure 1 - Side view of WHS Vegetable Garden Plan.

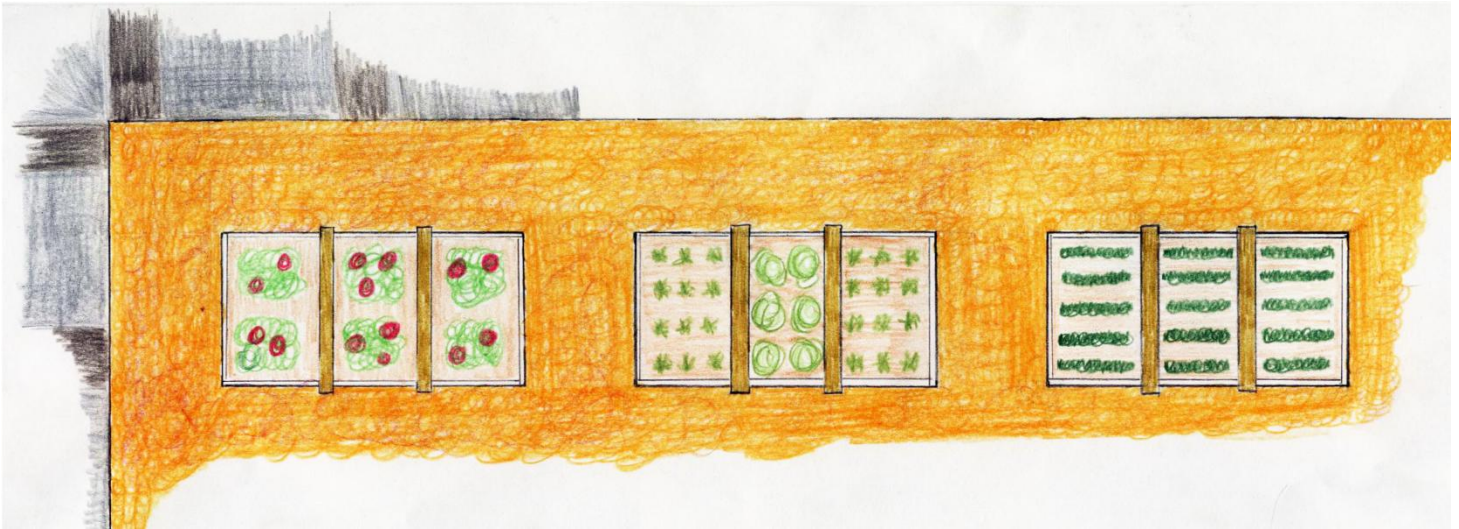


Figure 2 - Plan view of WHS Vegetable Garden Plan. Three beds running lengthwise with three foot pathways around each of them. This view also shows the braces running across the top of the beds.

Determine the Site

In order to determine a site for a school garden, there are many considerations to make. You should have already determined what kind of produce you will start growing. Now, you need to determine the location and size of your site.

The location of your school garden is very important. You should work with school administrators to know where other new projects are being planned. At my location, a student installed a garden as part of her senior project two years ago. Now that site is being prepped, and her garden plowed under, for two new tennis courts. You will also want to make sure you have the appropriate amount of sun light during the day (at least six hours) and that you have access to water.

Though you may have the funding and man power available to install and maintain a two acre garden, start small. As funding and support increase and your program grows in size, you can always increase the size of your garden later. Also, installing new beds and plantings to the garden will make it special for the students. Because classes and students will be moving through your program, having different classes installing new additions to the garden will make the students feel more invested in the program.

At Wilsonville High School, we decided to start our garden in the front of the school. The grassy area in front of the school was the perfect place to start. Currently, there is a long grassy area in front of the school. The site we chose was right outside the windows of both the Life Skills classroom and the Life Science class. There are also faucets on the building that will provide the area with a water source. This area is west facing and will receive plenty of light.



Figure 3 - Aerial view of the planned site area and proximity to the classes that would be primarily using the site.

Determine a Year-Round Plan

Since you have determined why you are installing a school garden, and you know where and how big your site will be, you should have a pretty good idea of what you will be planting. The next step is to set up a plan for the year. The plan will include what is going to be planted, pruned, treated, and harvested, and also any other maintenance projects that need to be done. For most counties, a planting chart or plan is available from according to the local climate. You should contact your local university's college of agriculture extension office or gardening society for details.

In creating the planning calendar for the Wilsonville High School, we used the Westside Gardener website for a timetable catered to our local needs. We wanted to have a lot of vegetables and fruit that the students could watch grow from seeds or starters, and then to be able to harvest and eat the final product.

Detailed Planning Calendar

September

Plant cilantro

October

Harvest tomatoes

Harvest peppers

Harvest Basil

Plant garlic

Tomato Dissection Lesson

Make bruschetta!

November

Harvest Cilantro

Plant winter rye and hairy vetch as winter cover crop

Make salsa after using onions for lab!

December

Keep an eye on things.

This is a good time to clean, oil, and sharpen tools

January

Test soil pH

Mend soil with appropriate minerals.

February

Start cauliflower indoors

Start broccoli indoors

March

Plant carrots

Plant strawberries

Start tomatoes indoors

Start peppers indoors

April – National Gardening Month

Plant cauliflower

Plant broccoli

Plant onions

Start basil indoors

May

Harvest carrots

Harvest broccoli

Harvest cauliflower

Veggie party!

June

Plant sunflowers

Plant tomatoes

Plant peppers

Plant basil

Harvest strawberries

Make Strawberry shortcake!

July

Watch water needs

August

Harvest garlic

Harvest onions

Watch water needs

<http://westsidegardener.com/quick/timetable.html>

Results

We moved the project from its original projected placement to an area that would receive a little more sun. We began by laying out remnant gardening cloth that was donated over the area and staking it into the ground. Next, we began to build our boxes (see Figure 5).

The lumber donation we received was twenty foot lengths of one by thirteen inch vinyl decking planks. Orepac was gracious enough to cut each twenty foot length into eight and four foot lengths. We were able to make two raised beds out of the donated material. Since the beds were going to be in a somewhat high traffic area, we decided to use four foot lengths of four by four redwood in the corner of each bed (see Figure 6). In order to attach each box to the ground, we put each four by four post in a post stake.

This was our first Work Day. While there was a plenty of adults to supervise, students in several of the special education and drafting classes did the work. Many of the male students enjoyed using power tools and hammering in heavy posts. The drafting classes were there to come up with ideas for future gardening projects.

Our next Work Day was to add wood chips around the boxes over the gardening cloth (see Figure 7). The West Lynn-Wilsonville School District Maintenance Department had plenty they were willing to give to us. The Life Science class was able to wood-chip the area around the boxes as well as most of the other planters in front of the school.

Once the weather got warm enough, we were able to put soil into our beds. First, we needed to reinforce the eight foot long sides of the raised garden beds, because they were bulging out a bit. We also lined the sides of the beds with gardening cloth to limit soil and water from seeping out from between the side boards (see Figure 8). During this work day, we trucked in a cubic yard of soil medium at a time and the students unloaded it from the truck into wheel-barrels (see Figure 9). The wheel-barrels were emptied into the gardening beds (see Figure 10). We also challenged the students to predict how many truck loads it would take to fill both beds.

Along with adding soil, the students also put in a border where the wood-chipped area met the pre-existing grass. An eighteen inch wide area of grass was dug up, and the students added some of the new soil medium to this space as well. During this time, we planted a few crowns of divided daylilies that were donated. We also installed a row of pavers on the new soil to keep the wood-chips from wandering (see Figure 11)

On our last Work Day, the Life Science class planted starters of lettuces, chives, tomatoes, cucumbers, and bell peppers, as well as a few strawberries and some dahlia tubers (see Figures 12-14). These plants are currently doing quite well, aside from a small aphid problem. There should be plenty of lettuce to have a salad party before the end of the school year, and possibly a few strawberries as well.

Already, the students in the Life Skills class have made scare crows to keep some of the birds away (see Figure 15) and are enjoying watching some the daylilies and dahlias emerging from the soil.



Figure 5 - Installation of the raised garden beds on our first Work Day.



Figure 6 - View of the inside of the raised garden beds.



Figure 7 - View of the wood chips that were added and the border after it was dug out.

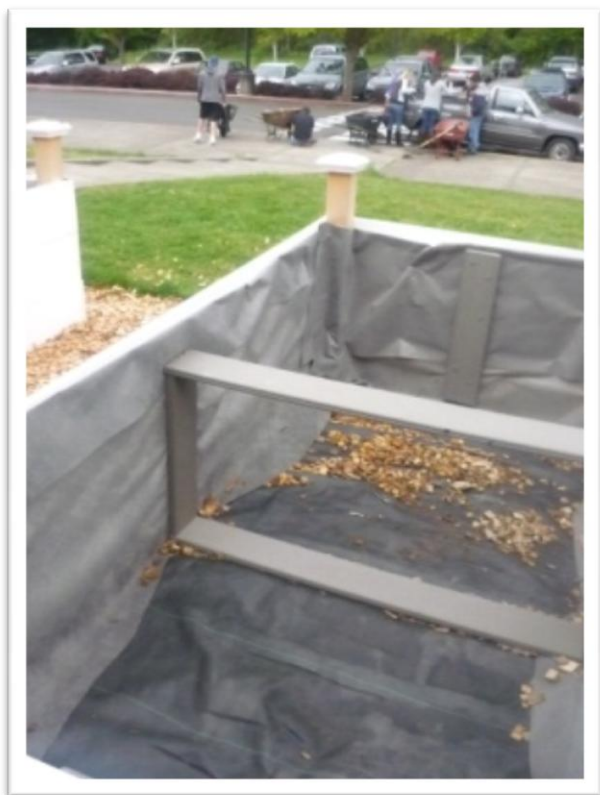


Figure 8 - View of the inside of the raised beds after they were lined and reinforced.



Figure 9 - Various students working together to unload the truck and move the soil to the raised garden beds.



Figure 10 - Students spreading the soil medium out as it is being added to each bed.



Figure 11 - Border between grass and wood chipped area.



Figure 12 - Strawberries, chives and lettuces planted by the Life Science class.



Figure 13 - Dahlias, tomatoes, cucumbers and bell peppers planted by the Life Science class.



Figure 14 - Raised vegetable beds after planting starters.



Figure 15 – Scare crow made from recycled parts by the Life Skills class.

Summary

Gardens can have positive effects on students, especially when used with student in a special education program. Gardening can be used to build science, math, and problem solving skills as well as focus students' attention, reduce stress, and give students a sense of satisfaction by doing something with their hands. The students in special education classes have varying physical and mental abilities and it is important to have something for everyone to do. Gardens, which have many possibilities and can incorporate a wide range of activities, is the perfect means to developing different skills in this student population.

During the few work days we had, all of the students involved had a sense of accomplishment and were able to contribute to a permanent fixture on campus. From the very first Work Day, we had boys who normally had troubles focusing on a project, stay after school in order to hammer in post stakes and finish a project they started.

I recommend that for the future, a master plan is developed so that the entire faculty is aware of the future goals of the Wilsonville High School garden. Already, our raised vegetable gardens took over the space another teacher was planning on using for a chestnut and apple orchard. As a preliminary plan, I have drawn up a sample idea of what the garden could become, taking into account all of the projects that have been discussed at Wilsonville High School sustainability staff meetings. I have included a small orchard, expansion of the raised vegetable beds, two greenhouses, runoff capture barrels, compost bins, and a raspberry and grape vineyard to take advantage of the sloped area in front of the school (see Figure 16).



Figure 16 - Sample Master Garden Plan to help guide and focus future projects.

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The Use of Horticulture and Gardening as a Special Education Tool at the High School Level

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