



INTEGRATING GARDENING, NUTRITION, & 4-H POSITIVE YOUTH DEVELOPMENT: AN OVERVIEW

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Introduction

Gardening has long been a popular 4-H project among youth and families and is increasingly integrated into schools as part of class time and after school clubs. Research is growing in support of the many positive impacts of gardening on youth nutrition.

Overall, youth who plant and harvest their own produce (Figure 1) are more likely to eat it (Morris and Zidenberg-Cherr 2002). Youth in gardening programs are also more likely to try new healthy behaviors, including cooking, gardening, and eating new and healthy foods (Beckman and Smith 2008). Research also shows improved recognition of vegetables, increased preference for vegetables, and a greater willingness to taste more varieties of vegetables among youth in garden-based learning. (Ratcliffe et al. 2011). However, simply exposing youth to gardening by itself may not translate to desired outcomes like improved vegetable intake;



Figure 1. Students planted and harvested pumpkins at the Wahkiakum School District's garden, and they took home their pumpkins as part of the school's fall harvest festival.

it's important to be thoughtful and targeted in gardening program delivery and to work with youth in hands-on activities to grow skills in gardening and food preparation (Odera et al 2013).

Considerations when building strong youth gardening programs include delineating adult and youth leadership roles, designing the site, and integrating nutrition and other life skills.

Garden Leadership

Youth gardening programs are often well supported by school and community members, and may attract a cohort of volunteers interested in youth development, nutrition, food preparation and gardening. Groups with associated interests may be good partners and sources for willing and knowledgeable volunteers, including WSU Master Gardeners, community garden members, food bank organizations such as Northwest Harvest, school parent groups, and other like-minded organizations. Master Gardeners familiar and interested in positive youth development are particularly helpful as volunteers in the youth garden, providing expert guidance and education during the start-up phase of the garden and throughout the gardening season. Listed below are some essential roles that lead volunteers in youth gardening programs can play.

Adult Leadership Roles

Garden Coordinator

The coordinator helps keep the youth and other adult volunteers on track with garden plans and lessons. The garden coordinator keeps everyone up to date each week during the growing season, which might include weekly emails with the next week's plans. The garden coordinator also helps find youth and adults willing to take on other necessary roles in the garden as explained here. The garden coordinator should learn volunteers' interests and time availability and help them find well-suited roles within the garden. It's essential to keep everyone in the loop regarding the overall game plan and structure, as well as necessary jobs and next steps. Youth and volunteers can become easily frustrated if they are unsure of work or activities needed to be done for the day.

Some youth gardens have good success with Americorps members in this role. Host sites, like school or community gardens, provide initial funding that is matched by Americorps to provide a monthly stipend to the Americorps member over the year. This steady monthly presence allows the Americorps

member to take on a consistent, more formal leadership role, and invest the necessary time to get the youth gardening program off the ground and well established into the future. Community, school, or local health foundations may be an avenue for stipend support.

Community or School Liaison

The liaison works with the school or other administrators of the garden space. If the garden will be at a school, this can mean meeting with school administrators, including the principal, superintendent, and school board. In school environments, it's also essential to gain teacher buy-in, as they may determine how the school garden can be integrated into their curricula. If the teachers are enthusiastic, the kids will be too. It will be important that the liaison ensures that facilities and maintenance operators are also aware of and in support of the garden. If the youth garden will be in a community garden, the liaison will need to work with the administrator or coordinator of the community garden to understand the rules of the garden and expectations for how the youth can and will use the space. Community gardens may sometimes be a challenge for youth gardens, as other nearby plot owners may not be very patient with beginning, youth gardeners. It will be especially important to stay on top of weeding, harvesting, and other garden maintenance in a community garden setting.

Treasurer

The treasurer should work toward getting funds and donated materials to build, plant and maintain the garden. Mini-grants are available for youth gardens, as well as material donations from hardware, garden, or chain retail stores. Youth and volunteers may also raise funds through plant sales or garage sales. These funds and expenses, as well as an inventory list of garden equipment and assets, will need to be managed by a treasurer. Sponsoring organizations such as Parent Teacher Organizations (PTO) or 4-H Leaders Councils may be able to help fundraise and hold the youth garden treasury.

Youth Leadership Roles

Tool Wrangler

Many tools, large and small, are used in the garden. The tool wrangler helps designate secure storage space for these tools at the garden, ensures that youth put them away properly at the end of each session, and makes sure that the tools are maintained for ongoing use. This role is a prime opportunity for a positive youth-adult partnership; an adult volunteer shows the youth tool wrangler initial proper care, storage, and maintenance of the garden tools, while the youth leads their peers in caring for tools and putting them away correctly.

Small Group Leader

When working with large classrooms or afterschool clubs, it is a good idea to break the large group into smaller teams. To help identify these smaller teams, the youth can come up with their garden team name and nominate a group leader to help distribute materials and lead the group in routine activities, such as recitation of the 4-H pledge and overview of the garden rules. The adult garden coordinator may want to take extra time with these small group leaders to get their involvement in garden planning, particularly as youth get older and get more experience in the garden. This is another prime opportunity for positive youth-adult partnerships.

Record Keeper

Record keeping has a strong tradition in 4-H and is a valuable life skill, and the garden is a perfect situation to learn the value of good records. The youth record keeper can help keep the garden calendar, recording when the group meets in the garden and when crops are planted and harvested. The adult garden coordinator can help the youth record keeper set up the initial record keeping system. Often, a simple daily calendar works well, with enough room to write planting times and conditions, varieties planted, and harvest times and yields. A basic food scale can work well in measuring and recording yields. A white board or chart in the garden shed with the scale allows youth to share the responsibility of recording yields as produce is harvested, and they can see the numbers change as the season progresses. The record keeper's role is very important as it will be used to determine variety selection and planting times for following years.

Site Design

Youth garden design depends largely on the site available. When working at a community garden or on school grounds, the site will likely be wherever there is room deemed by the community garden leadership or school administrators. This could lead to a situation where growing conditions are okay, but far from ideal.

A soil sample is a necessary first step in building a youth garden. Soil is made up of physical and chemical properties. The soil test should indicate macro and micro nutrients, heavy metal levels, and other potentially toxic chemicals in the soil. This will help youth and leaders learn about soil nutrients and amendments needed to grow a productive garden. The local county Extension office and [WSU Master Gardener Program](#) are good resources for information on soil testing, including interpreting results from the test and making recommendations on amendments. A good resource for more information on soil nutrients and amendments is WSU Extension Publication EB1971E [Home Gardener's Guide to Soil and Fertilizers](#).

When beginning a youth garden, it's important to take stock of resources and human capital available before getting started. It's better to start small and achieve success with a couple of raised beds than to start with a large site that is more than the youth and volunteers can maintain.

Some key considerations for the garden design are:

Plant Varieties

Varieties chosen should include perennials that can peak interest from year to year as they grow and change, like herbs, berries, and fruit trees, as well as plants that will produce good harvests during the school year. This will vary by location and hardiness zone. Check with the [United States Department of Agriculture \(USDA\) Hardiness Zone map](#) to find your growing zone, and your local Extension office and Master Gardeners for recommendations on vegetable varieties harvestable during the school year in your area. The WSU Extension Publication EM057E [Home Vegetable Gardening in Washington](#) gives detailed information on vegetable planting times for growing zones in Washington State; plant-specific seed starting, transplanting, and harvesting times; and direction on seed starting, garden design, and integrated pest management for vegetable gardens. Much of the growing season is outside of the school year, so finding varieties of fruit and vegetables that produce well in the spring and fall is important (Figures 2 and 3). Spring months are good times to sample the many kinds of leafy greens and herbs.

Summer Maintenance

Summer can be a very difficult time to maintain and support a school garden when multiple jobs need attention, such as weeding, watering, insect control, removing over-mature crops, and replanting. All of these jobs need attention so students have something to come back to in the late summer when school starts. However, youth aren't at school to help, and adult volunteers often become busy with summer plans. The garden coordinator may need to think through back-up plans should their helpers become fewer than expected. This might include scaling back plantings or enlisting more help from the PTO or other local service organizations. Summer might also be a good time to integrate more 4-H or Master Gardener programs in the school garden, continuing both gardening education and maintenance from the school year.



Figure 2. Beans and sunflowers have large seeds that can be easily started by small hands in the classroom or directly sown in the garden through the spring.



Figure 3. Day-neutral strawberry varieties, like Tristar, begin flowering early in the spring, regardless of day length, and into the fall, making them a good choice for the school garden seasons.

Perimeter Fence with Drive-In Gate

A perimeter fence of at least six feet high is needed to avoid damage by deer or elk and neighborhood pets (Figure 4). A walkthrough gate and a drive-in gate are needed for access. Having the garden accessible by vehicles makes soil or tool deliveries much easier.



Figure 4. The Wahkiakum School District's garden has a 6-foot perimeter fence to prevent deer and elk damage. Painted fruits and vegetables decorate the fence with names of local community members and businesses who have contributed to the garden.

Raised Beds

Raised beds are easier to access by youth and adults. Because they are raised from the ground, they're ready to work earlier in the spring, particularly in rainy climates. Growing outdoors as soon as possible is especially important in school gardens, as much of the growing season falls outside of the regular school year. More information on raised beds can be found in WSU Extension Publication FS075E [Raised Beds](#).

Bed Width

Garden beds need to be easily accessible by both sides from a child's arm length. This means that the ideal bed width when working with younger children is about eighteen inches. Older youth, such as middle school youth, can manage three-foot-wide beds.

Water Access

Stringing a garden hose over long distances is labor intensive and a tripping hazard. Having a water source within a few feet of the garden area is ideal. A sink station is also helpful to remove soil from produce. Folding camp sinks, often found at outdoor stores, can serve this purpose well.

Proximity to Bathroom

Kids and adults need a spot to wash their hands before and after working in the garden, preferably in a nearby building or a portable facility, at a sink with warm running water and soap. When this isn't available, check with your local health department about suitable alternatives, such as a portable water cooler with warm water, soap, paper towels, and a catch basin.

Food Safety

Youth and adult gardeners must be mindful of food safety in the school garden. Similar to farms, follow Good Agricultural Practices to ensure all food eaten from the garden comes from clean soil, clean water, clean hands, and clean surfaces (WSDA 2016). Garden soil should be tested to ensure it's free of harmful contaminants. Water used to wash produce should be drinking water quality. All youth and adults should wash their hands in warm water with soap for at least 20 seconds before and after working in the garden, especially when harvesting produce for tasting or sharing. All surfaces and containers used for storing or preparing produce should be washed and sanitized before use. [Washington State Department of Agriculture's Farm to School Toolkit](#) explains food safety practices for the school garden in detail.

Gathering Space

A large space is needed for youth to gather with leaders at the beginning and end of each session to introduce and reflect on the lesson, or to work together on written elements of the lesson, such as garden journaling. Consider asking your local public utility district to donate their leftover cable wire reels to the school garden for use as tables (Figure 5). With their round



Figure 5. The public utility district's cable wire reels make for useful gathering areas in the Wahkiakum County School District's Garden.

shape and smaller size, they work well in the garden. At the Wahkiakum School Garden, volunteers covered the tops of the tables with colorful plastic made from recycled chicken feed sacks. This makes them easier to clean and draw or write on, than the bare wood.

Herb Circle

Circular raised beds filled with easy-to-grow, good-smelling herbs are great additions to a youth garden. Herbs grow well in a circular garden that is easy to reach by little arms (Figure 6). Herbs like rosemary, mint, or thyme are easy to grow and maintain, and they grow through more of the traditional school year than many vegetables. A container is also a perfect planting space for herbs since some of them, particularly those previously mentioned, can be quite aggressive in the garden.



Figure 6. A round herb garden is started by a student. Several round planters were made with donated plastic culvert materials from a local excavation company.

Lesson Integration

Research from Extension youth gardening programs demonstrates that it's critical to take time before the lesson in the garden to frame the upcoming activity (Rodriguez et al. 2015). This session should include an overview of expected tasks and who will be doing them. This helps put that day's lesson in context and limits confusion among youth as to what their role will be in the garden that day. The better prepared youth feel, the more likely they will be engaged in the activities in which they are participating (Rodriguez et al. 2015).

For many youth participants, especially those new to gardening, it takes time to build confidence in the garden and feel comfortable when speaking with adult garden leaders. Taking time before the garden lesson allows for the youth to

meet and interact with Extension educators and volunteers and increases comfort levels for everyone involved (Rodriguez et al. 2015).

A set of garden rules should be agreed upon by youth and adults to help everyone work, learn, and have fun together in the garden. These should be reviewed before every lesson. Lower Columbia School Gardens, a non-profit organization supporting school gardens in southwest Washington, recommends a set of garden rules that have been adopted by the Wahkiakum School Garden. They are easy to review before each lesson and are well-received by youth and adults. The garden rules are: 1) "Walk in the garden," 2) "Wait to be invited," and 3) "Listen: to the adults, to each other, to the plants and living creatures in the garden" (Lower Columbia School Gardens 2016).

In the Wahkiakum County School District, the school garden volunteers work with teachers to gather with students in a circle at the beginning of each session. Together, they review the garden rules and introduce the lesson and activities planned for the session that day. The class then divides into three smaller groups, each with an adult leader to work through hands-on activities. At the end of the session, the groups gather together again in a closing circle and review and reflect on the day's garden activities and lesson. This fits with the "Frame-Do-Reflect-Apply" learning model used in WSU's 4-H Youth Development program (Brandt 2014).

It's important to integrate food preparation and taste testing as part of gardening lessons to improve fruit and vegetable consumption, particularly among youth who may not normally be exposed to fresh fruits and vegetables regularly. They are not likely to increase consumption through gardening as a stand-alone activity (Odera et al. 2013).

WSU Extension has extensive experience developing and using research-based curriculum for youth gardening programs. Most recently, as a part of the People's Garden School Garden Pilot Project, WSU Extension led the Healthy Gardens, Healthy Youth study, which utilized the community-based Cooperative Extension System to develop and implement school gardens at schools in which at least 50% of students qualify for the federal free or reduced-price meals program. This study, a collaboration between Washington State University, Iowa State University, the University of Arkansas, Cornell Cooperative Extension NYC, and Cornell University, used a true experimental design (or randomized control trial) in an effort to determine the effects of school gardens on (1) children's fruit and vegetable consumption and preference, (2) knowledge of nutritional and plant science, and (3) science, technology, engineering, and math (STEM) self-efficacy.

This program reviewed 17 existing curricula against specific criteria for inclusion in the program’s educational toolkit, including lessons from the following curricula:

- [Eating from the Garden.](#)
- [Food, Land & People: Resources for Learning.](#)
- [Got Veggies? Nutrition, Physical Activity & Obesity Program.](#)
- [Got Dirt?](#)
- [Growing Healthy Kids.](#)
- [Iowa’s Growing in the Garden: Local Foods and Healthy Living.](#)
- [Seed to Salad.](#)
- [Garden Mosaics.](#)
- [Harvest of the Month.](#)
- [Kids Cook Farm Fresh Food.](#)

For more information about this project, visit the [WSU People’s Garden website](#). There, you have access to the educational toolkit, which includes a Tips for Working with Kids in Gardens (developed by Iowa State University) and Garden Implementation and Beyond Guide (developed by Cornell University), and peer-reviewed publications of the results from the research trial.

For the 4-H club setting, curriculum developed by 4-H and the USDA is research-based and readily available online or through your local Extension office.

Dig In!

Dig In! is available from the USDA and created for grades 5 and 6. This curriculum has ten lessons, with posters and handouts available. Topics include soils and nutrients, reading food labels, serving sizes, and understanding the USDA’s [MyPlate dietary guidelines](#).

National 4-H Gardening Curriculum

Developed by Purdue Extension (McKee 2016), this four-part series includes See Them Sprout (3rd and 4th grades), Let’s Get Growing (5th and 6th grades), Take Your Pick (7th to 9th grades), and Growing Profits (10th to 12th grades). Topics vary by grade level. They begin with lessons and activities in basic plant science and plant parts and progress to plant genetics and food preservation for high school grades. This [curriculum](#) is well suited to 4-H club activities as they incorporate the experiential learning model and numerous hands-on activities that work well in the club setting.

Targeting 4-H Life Skills

Life skills are defined in 4-H youth development as skills that help us be successful in living a productive and satisfying life (Hendricks 1998). The major difference between a “skill” and a “life skill” is that a skill is learning to do something, while a life skill is the way we apply the information learned to real-life situations. 4-H life skills are organized under the four H’s: Head, Heart, Health, and Hands.

When designing a 4-H gardening activity, it’s helpful to be thinking from the start about what particular life skill(s) the activity will be building and how to reinforce them. It’s important to help youth reflect on the skills they used in the activity and how they might be used in other situations in their lives, now and in the future. Reflection can be as simple as a few questions asked by the leader in a discussion after the activity or fun reflection games, where reflection questions can be asked and answered in fun ways, like the Dice Reflection. The Dice Reflection is where each number on a dice represents a different reflection question. Youth take turns rolling the dice and answering the associated reflection question. [WSU 4-H Youth Development Adventure Education](#) has several resources for reflection activities, along with other tools for integrating life skill development into 4-H activities.

We can target these life skills in a variety of ways when we integrate 4-H youth development and gardening. There are several routine garden activities that could seem mundane but, in fact, can develop 4-H life skills with some thoughtful reinforcement and reflection. Listed below are the 4-H life skills (Hendricks 1998), and some examples of reflection questions to reinforce some of the life skills developed in that activity.

Head. 4-H Life Skills: Thinking and Managing

- Thinking: Service Learning, Critical Thinking, Problem Solving, Decision Making, Learning to Learn
- Managing: Resiliency (Adaptability), Keeping Records, Wise Use of Resources, Planning and Organizing, Goal Setting
- Garden Activities
 - Plant variety selection: How do we know what will grow well in our area? What plants do we think will grow well this year and why?
 - Garden records: How do we measure the amount of produce we grow? How can this help us decide what to grow next year?

Heart. 4-H Life Skills: Relating and Caring

- Relating: Accepting Differences, Conflict Resolution, Social Skills, Cooperation, and Communication
- Caring: Nurturing Relationships, Sharing, Empathy, and Concern for Others
- Garden Activities
 - Garden task assignments: What are the common tasks we do each time we work in the garden? How do we assign those tasks fairly? Why is it important for us all to take a turn on these tasks? How do these tasks help our garden now and in the future?
 - Helping others in the garden: Who did I appreciate today in the garden? Why? Who did I see helping someone else today? How did they help?

Health. 4-H Life Skills: Living and Being

- Living: Healthy Lifestyle Choices, Stress Management, Disease Prevention, Personal Safety
- Being: Self-Esteem, Responsibility, Character, Managing Feelings, Self-Discipline
- Garden Activities
 - Preparing a snack with garden produce: What did we do to make sure our produce was clean and safe to eat? Why is it important to make sure we're handling our food safely in the garden and at home in our kitchen?
 - Dealing with challenges in the garden: What went really well in the garden today? Why do you think that worked out so well? What didn't go well in the garden today? What would you do differently next time?

Hands. 4-H Life Skills: Working and Giving

- Working: Marketable Skills, Teamwork, Self-Motivation
- Giving: Community Service and Volunteering, Leadership, Responsible Citizenship, Contributions to Group Efforts

- Garden Activities
 - Gardening as service: What do we do if we have more than we need? Who in our community could benefit from our surplus? What other ways can we use our garden to serve our community now and in the future?
 - Working as a team on a garden project: Did our group communicate differently when we worked together as a team on this project? Did anyone assume leadership? How did the team work together? What did you learn about our group during this project? How would working as a team be important in other areas of life?

More information on integrating life skills into youth activities is available through your local 4-H program and on [WSU's 4-H Youth Development Program website](#).

Conclusion

Building a youth gardening program can bring multiple benefits to adult and youth participants, including positive peer, adult, and family interactions, and improved health and nutrition. Keys to positive experiences in the garden by youth and adults are strong youth and adult garden leadership in defined roles; safe and practical garden design; community support and funding, thoughtful integration of 4-H life skills and nutrition education; and using research-based, hands-on curriculum like those suggested here. By integrating nutrition and life skill development with garden fun, leaders can set the stage for youth to appreciate gardening, eat more fruits and vegetables, and develop strong life skills.

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