

Increasing Inclusion in the School Garden

A resource packet for garden educators



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Purpose of Packet

“If a child can’t learn the way we teach, maybe we should teach the way they learn.”

Ignacio Estrada
Director, Grants Administration
Gordon and Betty Moore Foundation



What is in this packet?

This packet compiles and organizes background information gathered by our School Garden Project staff on how to increase inclusion in garden-based learning programs. It includes teaching and garden design tips to better support learners with learning and/or physical disabilities. It also shares the online resources our staff found helpful.

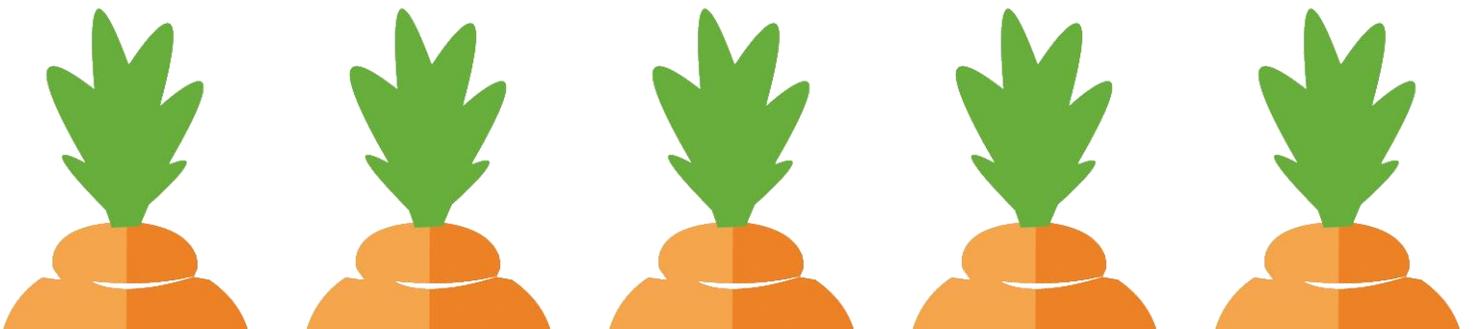
How was information gathered and synthesized?

Our garden education team observed a variety of special education classroom teachers, and worked closely with four Lane County special education teachers to provide guidance and best practices on how to better include all students in garden-based learning. We participated in webinars on inclusivity and Universal Design for Learning. We conducted internet searches to gather inclusion strategies and adaptive gardening practices that best apply to garden-based learning. Finally, we discussed and organized our ideas into this packet to share with other garden educators, as well as general and special education teachers.

Appreciations

A special thank you to special education teachers Cindy Evans, Sandy Itzkowitz, Kathryn Johnson, and April Paulson for their contributions to this resource packet and for their guidance and support of the School Garden Project education team as we seek to increase our ability to serve all of our students.

Our sincere gratitude to the Coeta and Donald Barker Foundation for their generous support that enabled us to embark on this important work.



About School Garden Project

School Garden Project's value statement on inclusivity

Garden-based education is for everyone. As garden education professionals we have a responsibility to our students to make our lessons as inclusive as possible. By increasing inclusivity we improve the quality of education for all students.

What is School Garden Project?

We are a 501c3 nonprofit organization established in 2001 to help Lane County Schools create, sustain, and use onsite gardens. We work with teachers to provide students with standards-based educational experiences in school gardens. We also supply basic gardening resources and professional consultation to more than 35 educational gardens each school year. Although we focus our education on K-8 science concepts, the garden can also be used as a venue for learning most subject areas and to help students practice leadership, cooperation, and develop a sense of community.

Why School Garden Project created this packet

As an organization, we support Lane County teachers and schools with garden-based learning efforts through presentations, workshops, lessons, and garden planning resources. Through this work, several special education teachers asked for specific resources and guidance for their work, which we were unable to offer. We realized there was a need to focus attention on special education needs in order to best support special education teachers and the many students we work with, in general education settings, who receive special education services.

In fact, according to the Department of Education during the 2013-14 school year, 13.9% of Oregon students participated in an Individualized Education Program (IEP). Additionally, according to the 2014-15 Special Education report from the Eugene 4j School District, nearly 2/3rds of all students with an IEP spend at least 80% of their school day in a general education classroom setting. This means that it is likely that at least 1 in 10 of the students School Garden Project serves through garden-based science classes has an IEP.

We know firsthand that the garden classroom environment can be a powerful educational venue that opens new possibilities for learning and engagement. So, why not work to increase the accessibility of these benefits to all of our students?

By publishing this resource packet we hope to share our learning with other educators and help increase the inclusivity of garden-based learning everywhere.

How to use this packet

The tips, techniques, and tools in this resource packet are *not* meant to be used exclusively with students who have an IEP. In fact, the idea is that they *are* meant to be used in any classroom and to support the learning of any student. You can use the information here to help revise current lessons, create new lessons, and plan and implement school garden classrooms with inclusivity in mind.

We hope you find it useful!

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Section 1:

Special Education Basics for Garden Educators

What is Inclusion?

Special Education Services

Types of Disabilities

Key Terminology

Accommodation versus Modification

Our education team has a range of experience working directly with students with disabilities; however, like many garden educators, we have limited professional training in special education. Learning basic background information about special education was a key part of beginning the process of increasing the inclusivity of our garden-based programming. By meeting with local area special education professionals Cindy Evans, Sandy Itzkowitz, April Paulson, and Kathryn Johnson, and through online research, we gained a basic foundation upon which to build our knowledge.

Guest teachers: *Where our educators fit into special education services...* School Garden Project educators are visiting, or guest, teachers. We are not a part of the IEP team for any of our students and we do not know which students in a class may have disabilities, what those disabilities may be, or even what support strategies or learning goals are in their IEPs. That information is protected and private. Nonetheless, we do have a responsibility to help each student we interact with to learn effectively and be included to the fullest extent possible in the opportunity to learn science in the garden. That's where practicing inclusion comes in.

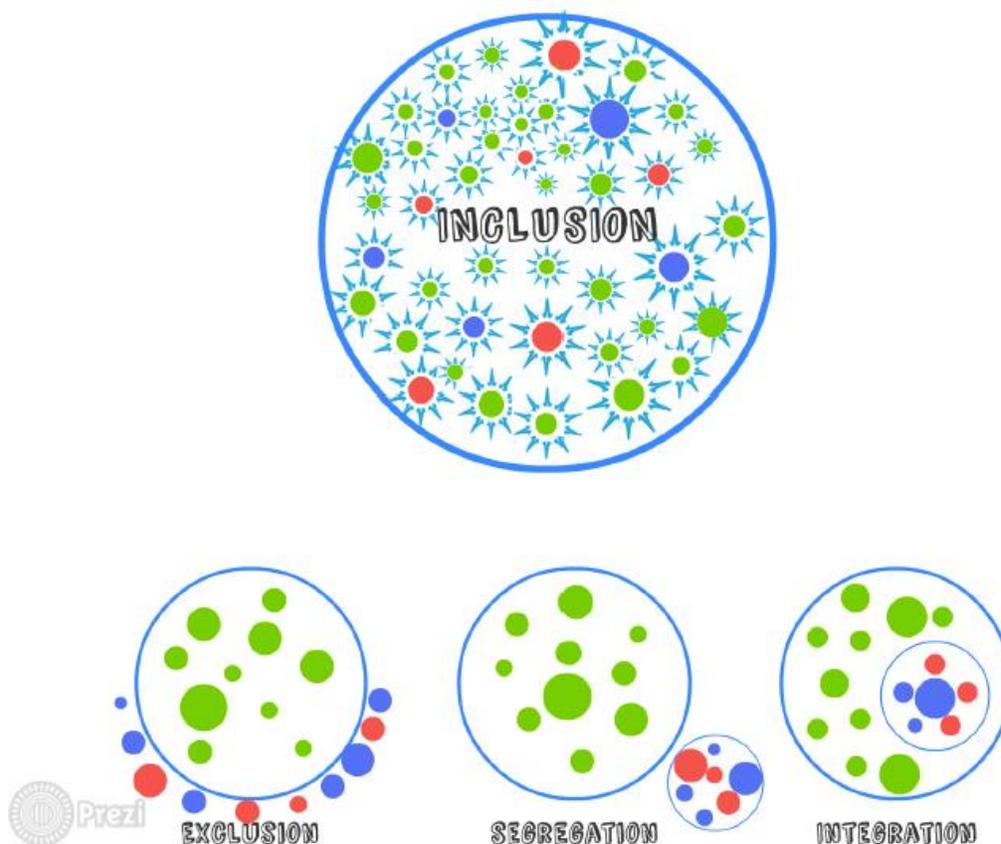
What is Inclusion?

Inclusion is a familiar term within education that describes the practice of educators to “secure opportunities for students with disabilities to learn along with their non-disabled peers in general education classrooms.”¹ At its best, inclusion means all students in the classroom feel a sense of belonging to the classroom community and actively learn along with their peers.

According to the National Catholic Board on Full Inclusion, inclusion means “giving all children access to the curriculum, supporting students who need support, having high expectations for all students and presuming competence for all students.”²

The image below was provided by special education teacher Kathryn Johnson. The diagram shows the difference between four different, but common classroom structure scenarios. In **exclusion**, students with special learning needs are simply not allowed to participate in the activities or even classrooms. In **segregation**, students with special learning needs are grouped together in a separate classroom. In **integration**, those same students would be in the same classroom as the general education population, but they’d be working on different content or tasks. Finally, with **inclusion**, students with special needs are involved in shared learning and interactions with the general education population.

Figure 1



¹ www.specialeducationguide.com/pre-k-12/inclusion/

² <http://fullinclusionforcatholicschools.org/about-inclusion/what-is-inclusion/>

Special Education Services

According to the Lane Education Service District, referrals for a student who may need to receive special education services “may come from parents, school personnel, physicians, or other persons and agencies who have contact with the student”. Then, “the district develops an evaluation plan to determine if the student is disabled and, if so, the nature and severity of the disability. (Written permission is necessary before the evaluation can begin.)”

For students who are identified as having a disability, an Individualized Education Plan is prepared by “a team that includes parents, professionals and when appropriate the student.”³ The actions laid out in the IEP guide the special services for which that student is entitled. Services will depend on the individual needs of the student. IEP’s are reviewed and revised at least one time each school year. The resources available to meet a student’s needs may include time in a specific special education setting such as a:

- Learning Center - targeted help with reading and math
- Comprehensive Learning Center – more intensive academic and behavior support
- Classroom for the Hearing Impaired
- Classroom for Emotional/Behavior Support
- Life Skills Classroom- Moderately to Profoundly Disabled Students (physical and/or mental)

Students may also receive support from a one-on-one educational aide in either a special education setting or in the general education setting. Many students with IEPs will spend time in the general education classroom without an educational aide, as well.

Types of Disabilities

According to the Eugene School District 4j’s Education Support Services website, there is “a continuum of services provided...for students, ages birth to 21, with developmental delays or disabilities...Specific areas of concern may include:

- Autism
- Communication Disorder: speech and language impairment
- Deafness/Blindness
- Emotional Disturbance
- Hearing Impairment
- Developmental Delay
- Orthopedic Impairment
- Other Health Impairment
- Specific Learning Disability
- Traumatic Brain Injury
- Visual Impairment: partially sighted and/or blind

<http://www.4j.lane.edu/instruction/ess/>

³ http://www.lesd.k12.or.us/se/images/childfind_brochure.pdf

Key Terminology

Below is a list of important special education terminology. For some of the terms, there are examples to help provide context. Of course, there are many more important terms related to special education. We chose just a few of the most fundamental.

Two particularly extensive website resources for special education terminology are:

<http://www.specialeducationguide.com/special-education-dictionary/> or

<http://www.understandingspecialeducation.com/special-education-terms.html>

- **Special Education:** Specially designed instruction, at no cost to the parents, to meet the unique needs of a child with a disability. This is a legal right of every child age 0-21 and their family.⁴
- **Differentiation:** The process of identifying a student's individual learning strengths, needs, and interests and adapting lessons to match them.⁵
- **Inclusion:** Regarding individuals with disabilities and special education, *inclusion* secures opportunities for students with disabilities to learn along with their non-disabled peers in general education classrooms.⁶
- **Individualized Education Plan (IEP):** A written statement of the educational program designed to meet a child's individual needs. Every child who receives special education services must have an *IEP*.⁷
- **Least Restrictive Environment:** The placement of a student with special needs in a manner that promotes the most interaction with the general school population. Placement options are offered on a continuum including regular classroom with no support services, regular classroom with support services, designated instruction services, special day classes and private special education programs.⁸
- **Universal Design for Learning:** A set of principles for curriculum development that give all individuals equal opportunities to learn.⁹

⁴ http://www.4j.lane.edu/wp-content/uploads/2014/05/4J_ESS_SpEdReport_2014_English.pdf

⁵ <http://www.edweek.org/ew/articles/2015/01/28/differentiated-instruction-a-primer.html>

⁶ <http://www.specialeducationguide.com/pre-k-12/inclusion/>

⁷ <http://www.parentcenterhub.org/repository/iep-overview/>

⁸ http://www.4j.lane.edu/wp-content/uploads/2014/05/4J_ESS_SpEdReport_2014_English.pdf

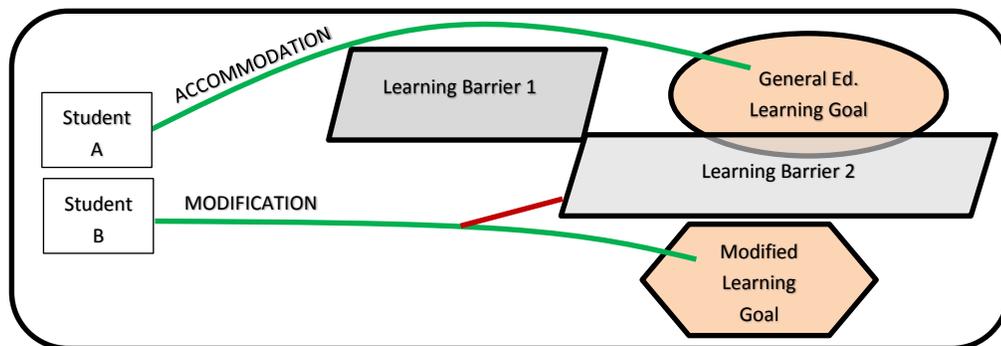
⁹ <http://www.udlcenter.org/aboutudl/whatisudl> and <http://www.cast.org/our-work/about-udl.html>

Accommodation versus Modification

We expanded upon the definitions of these two terms because they are particularly important for education practitioners. Distinguishing between the two is often a source of confusion.

One helpful way our special education advisors described the distinction between the two terms is that **an accommodation is a bridge to the same learning goal as the general education population, while a modification actually changes the learning goal.**

The diagram below shows how Student A has an identified learning barrier that can be addressed using accommodations. Meanwhile, Student B has a learning barrier that makes the general education learning goal unattainable (it may be attainable at a future time). So, a modified learning goal is created specifically for Student B.



The following definitions and examples are excerpts adapted from

<http://www.friendshipcircle.org/blog/2011/12/15/>.

Accommodation: Supports and services provided to help a student access the general education curriculum and validly demonstrate learning. *Provide tools to help students learn the same content and perform the same expectations as the general education population.* Examples include:

- Time: extend the amount of time to respond to a question
- Spaces: provide a distraction-free space so the student can focus, or move child closer to the board to be able to see
- Level of Support: provide the assistance of a paraprofessional or a peer assistant
- Sensory Items: fidgets that students can handle or “chew” necklaces
- Visual Schedules: schedules for the day or the class period

• **Modification:** Individualized changes made to the content and performance expectations for students. *Basically you are changing what you are asking students to do or show.*

Examples include:

- *Quantity* – modify the number of items a student completes or learns.
- *Output* – change the way you expect a student to respond (instead of responding to an open ended question, have them respond to a yes/no question).

Section 2:

Benefits and Challenges



Benefits: Academic and Other Benefits

Challenges: Environmental and Educational Practices

Learning outdoors can be invigorating and adventurous. It can also be scary or even physically difficult.

There are many benefits and challenges to learning outside for ALL students regardless of whether they have an identified disability or not. For this reason, it's important to take the time to think about the benefits and challenges that your garden program might present to students. It's also important to understand that for some students, challenges presented by garden-based learning might be particularly amplified for a number of reasons.

In this section you will see some of the most commonly cited benefits of garden-based learning. Then, we'll explore some of the most common challenges posed by garden-based learning.

Subsequent sections will include the many tools, tips, and techniques our team learned to amplify the benefits and reduce the challenges.

Benefits: Academic and Beyond

Garden classrooms can be a place where academic content is learned through discovery and where students are able to apply the academic skills they learn in the classroom to a real life setting.

Limited scientific studies have been conducted as to the academic impact of garden-based programming. The general consensus is that more research needs to be done to assess the impact that garden-based learning has on academic achievement. One good resource to explore the history, perceptions and impact of garden-based learning is a literature review conducted by Melanie Steward, who was a Masters of Environmental Education Candidate at the University of Minnesota Duluth. It is entitled *Student Learning Outcomes of Garden Based Education: A Literature Review*.

However, anecdotal evidence gleaned from School Garden Project's annual teacher program evaluations and student pre-post assessments points to the academic benefits our science-based garden education program offers.

Year after year, teachers whose classes participate in our programming point to many academic benefits that they see, some of which are listed to the right. Teacher feedback consistently includes comments such as, "There were several questions on the state science test that the garden lessons helped my students answer" (5th grade teacher, Walterville Elementary, 2015-16).

In addition, during the 2015-16 school year, 599 School Garden Project students completed a pre and post-assessment designed to indicate a change in science knowledge as well as familiarity and preferences for vegetables grown and sampled during garden class. Of those students, 95% demonstrated an increase in science-based knowledge. On average, students demonstrated a 28% increase in correct answers. While this assessment is run internally, it shows that School Garden Project's programming has a positive academic impact on participating students.

Of course, gardens can also be used to explore other academic content areas as well as principles of environmental education.

A sampling of the science and math skills and concepts that can be explored in school gardens:

- Pattern recognition
- Cycles
- Counting
- Addition and subtraction
- Estimation
- Measurement
- Prediction
- Observation
- Data collection
- Graphical representation of real data
- Logical reasoning
- Cause and effect
- Developing a scientific argument

We know there are many additional benefits, aside from the academic, to garden-based learning programs. According to Oregon State University's Extension Services document entitled *Gardening with Students with Special Needs* "Gardening can help students with conditions ranging from mental fatigue to physical impairment."¹⁰

Some of the non-academic benefits that School Garden Project teacher participants reported on:

- Improved self-esteem
- Responsibility
- Achievement
- Gardening skills
- Socialization and Teamwork
- Sharing a space and caring for a community area
- Patience
- Sensory stimulation
- Improvement of motor skills
- Trying new foods

Additionally, we found that 73% of students completing our pre-post assessment reported an increased familiarity of the eight vegetables we grew consistently in every school garden where programs were run. 68% of students reported an increased preference when asked whether they liked, sort of liked or did not like those same eight vegetables. The vegetables included: radish, lettuce, chard, kale, onion or garlic tops, mustard greens, broccoli and peas.

While the benefits of garden-based learning can be great, so too can be the challenges! Next we'll identify some of those challenges to involvement, engagement and success with garden-based learning.

Challenges: Environmental and Educational Practices

Challenges to effective learning for students in the school garden setting can be grouped into two major categories: *environmental challenges*, and *challenges due to educational practices*.

Most *environmental challenges* require making physical changes to the garden or to the types of activities you do in the garden area.

Challenges due to *educational practices employed by the teacher* typically require the educator to consider how they are structuring the lesson and then seek ways to create more inclusivity when implementing their lesson plans.

¹⁰ <https://catalog.extension.oregonstate.edu/em8502>

Environmental challenges to inclusive learning:

Below are three major environmental challenges the garden classroom setting poses. They are certainly not the only ones, but offer good examples of issues that can be addressed through physical changes, or may simply need to be kept in mind when teaching outdoors.

1. Physical barriers to accessibility- These can be addressed through changes to the physical space. Some examples of physical barriers are: narrow, muddy pathways, loose above ground irrigation lines, untidy spaces, or low garden beds. Many of these examples not only reduce accessibility and maneuverability of the space but are also potential safety hazards. In the picture to the right, a wheelchair is stuck in some soggy bark chips. Regular raking and replacement of old bark chips make garden paths more accessible.



- 2. Garden tools and activities not well suited for students with a variety of disabilities-** This can be addressed by changes to the equipment and materials being used. Garden educators experienced in working with young children will already have experienced providing students with tools that are a mismatch in size for their physical strength and coordination. To increase success and enjoyment, make sure that the tools we offer and gardening activities we do are well suited for the participants. Some examples of ways we might inadvertently create barriers to success include offering large and heavy shovels or asking students to plant small seeds that are difficult to see and handle.
- 3. The garden can be an unpredictable and/or unfamiliar learning environment –** The novelty, wildness and unpredictability that the garden classroom often offers can be a source of excitement, inspiration and engagement. However, it's important to recognize how those very same attributes can work against effective learning. For most students, effective learning requires practice. If students don't visit the garden and practice learning there frequently, the garden will remain an unfamiliar learning environment. Furthermore, it can be unnerving to learn in an outdoor setting. Weather, climate, living organisms, soil, water and the active nature of learning in a garden are all aspects of garden-based learning that can feel unpredictable, unfamiliar or even uncomfortable for students. In addition, they can pose challenges to mobility and accessibility as well as a student's sense of safety and security, both of which are prerequisites of effective learning. Lastly, students who thrive with order and limited sensory exposure can struggle with garden learning that can be loud and sometimes chaotic.

Educational practices that present challenges to an inclusive environment:

As educators, there are many ways we inadvertently make learning difficult for students. Some educational practices are well within our control and others are not. Identifying those that are within our control and finding tools and techniques to build bridges over barriers, or eliminate the barrier altogether, is part of the important work we do. Here are a couple of those potential barriers or pitfalls.

- 1. Making assumptions about our students:** Making assumptions is natural. Often they are valuable in helping our brains to filter and make sense of the tremendous amounts of information we are surrounded by all the time. Yet, they can also be harmful when they lead to incorrect conclusions. Think about the assumptions you may make about your students that could impact their learning, both positively and negatively. Here are two common assumptions that can impact garden learning.

First is the assumption that all students can and should learn and process in the same way. One example of this that can be insidious and difficult to realize as educators, is how much we reward students who are fast thinkers and can quickly present their ideas verbally. Have you ever called on the first hand that popped up to answer a question?

A second common assumption is that students know how to manage themselves during transitions between activities. Garden-based learning requires a transition from an indoor to outdoor learning environment. It also can require many transitions from garden tasks to tasting crops, to educational games to scientific observation, and more. How many transitions are planned into your lesson? Have you taken the time to teach, practice, and reteach what successful transitions look like?

- 2. Presentation of educational content, activities or materials that inadvertently exclude some students from learning:** As students move up in grades, traditional educational methods rely heavily on text unsupported by imagery or other helpful text features. This can present challenges for students with reading disabilities. On the other hand, consider sightedness. The majority of educators use vision as their primary sense. If you are sighted, consider how much you rely on sightedness to present educational content. This can increase learning challenges for students with visual impairment.
- 3. Rushing activities and tasks-** As guest educators, School Garden Project staff and volunteers have just 8-10 hours during the school year to bring the students to the garden but there is so much to share! Too often, the outcome is to rush through lessons. However, the general effect of rushing includes less student-centered lessons and fewer opportunities for students to make connections between what they are doing in the garden and academic content. Rushing also increases educator anxiety. This can generate a tone of anxiety for the entire class. Basically, rushing is detrimental to all students, and could be especially detrimental to learners with disabilities.

Section 3:

Increasing Inclusion in the Garden Space

**Physical modifications, garden design considerations and
small changes to increase accessibility**

The Americans with Disabilities Act

Universal Design

Basic Features to Increase Accessibility

Adaptive Gardening Tools and Techniques

It is not just the right thing to do, it is the law that in the United States spaces designed for public use adhere to the Americans with Disabilities Act. This means to the extent possible, alterations are made to accommodate all people, regardless of their disability, to access and use existing school gardens. It also means that new school gardens need to be built with ADA accessibility.

In this section, we address some of the ways you can design or modify the educational garden spaces where you work, teach or volunteer. First we'll share a small amount of information on the Americans with Disabilities Act, then the important concept of universal design. After that we'll share specific design practices you should plan to incorporate into your garden design or work toward. Finally, we'll share about how to adapt tools, and gardening practices for individualized needs.

Please note that there are a myriad of adaptive gardening resource packets on the internet. This packet seeks to provide information most specific to school gardening practices conducted by School Garden Project staff. Many of the websites from which we garnered information are hyperlinked throughout this document.

The Americans with Disabilities Act

The Americans with Disabilities Act (ADA) was signed into law in 1990. It is “one of America's most comprehensive pieces of civil rights legislation that prohibits discrimination and guarantees that people with disabilities have the same opportunities as everyone else to participate in the mainstream of American life -- to enjoy employment opportunities, to purchase goods and services, and to participate in state and local government programs and services.”¹¹

It stipulates that the design of public spaces and alterations to public spaces after 1992 be accessible to individuals with disabilities.

Figure 2



Universal Design

The Americans with Disabilities Act employs universal design practices to guide the design of spaces to meet the needs of as many users as possible. An excerpt taken from the Centre for Excellence in Universal Design from Dublin, Ireland states that:

“Universal design is the design and composition of an environment so that it can be accessed, understood and used to the greatest extent possible by all people regardless of their age, size, ability or disability. An environment (or any building, product, or service in that environment) should be designed to meet the needs of all people who wish to use it. This is not a special requirement, for the benefit of only a minority of the population. It is a fundamental condition of good design. If an environment is accessible, useable, convenient and a pleasure to use, everyone benefits. By considering the diverse needs and abilities of all throughout the design process, universal design creates products, services and environments that meets peoples’ needs. Simply put, universal design is good design.”¹²

¹¹ https://www.ada.gov/ada_intro.htm

¹² <http://universaldesign.ie/What-is-Universal-Design/>

A built-in ramp of the curb of a sidewalk is a primary example of universal design. The ramp in the sidewalk helps people in wheelchairs, but it also helps people pushing children in strollers, those with unstable footing, people using canes or walkers, free walking individuals and and people with sight impairments. Universal design is safer and more user friendly for everyone.

Figure 3



With the idea of universal design in mind, below you will find several basic design features to include in your garden designs and alterations. There are many, many sites with much more detailed information on how to design or alter your garden for ADA accessibility than what is provided below. Here is a list of some of the sites we found most helpful:

- [Grassroots Gardens](#): “A Guide to Making Community Gardens Accessible to All Members”
- [P-Patch Community Gardening Program](#): “Making Gardens Accessible for All”
- [Master Gardeners of San Diego](#), “Design Accessibility for Physically Challenged Children and Adults”
- [University of Missouri Extension Resource Guide](#) entitled “Gardening for Every Body”

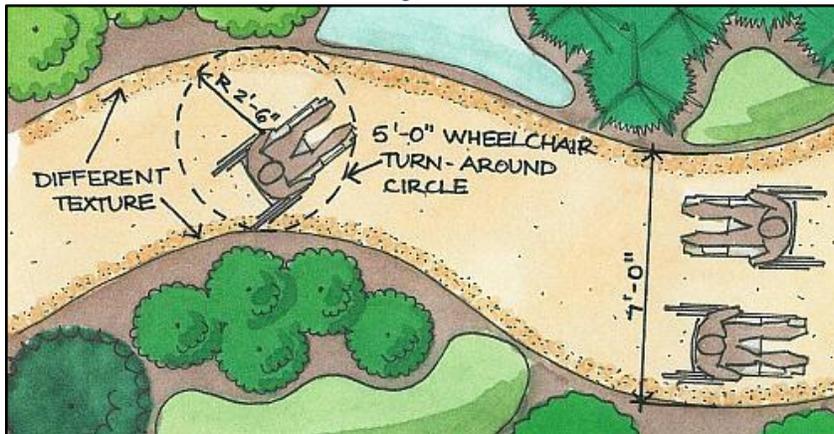
Basic Design Features to Include

Here are seven key considerations when it comes to design features to include.

Pathways

Pathways should be even, weed free and have a hard surface. Ramps with appropriate inclines should replace any steps. [The University of Minnesota Extension](#) website shares, “The slope of a walk must not exceed 5% or 1 foot of rise for 20 feet length. Cross slope must not exceed 2% or 1 foot of rise for 50 feet of length.”

Figure 4



Paths should have ample width for maneuvering in a wheelchair or a walker. This means three feet or 36 inches for one way traffic; four feet or 48” for turning wheelchairs at 90 degree angles; five feet or 60” for turning wheelchairs 180 degrees and seven feet or 84” for two way wheelchair traffic.

The illustration above, by M. Ferguson, found on [The University of Minnesota Extension](#) website shows these measurements nicely.

Accessible pathway surface materials include concrete, concrete pavers, crushed pea gravel, or brick or wood chips. One important note that we came across in our research was from ADA compliance professional and attorney, Heidi Johnson-Wright. Ms. Johnson-Wright, who uses a wheelchair as her prime mode of mobility, said about pathway materials such as brick and pavers, “What looks like tiny seams to walkers means major up-and-down bumping for wheelers”¹³. Thus, if possible, smooth concrete is the best method. Still the other methods are maneuverable with proper care. Also, it’s important to note that while wood chips are the least expensive option, they require weekly maintenance of raking to ensure maneuverability by wheelchair users. You can learn more about surfacing options by visiting the [Kaboom](#) website’s [Playground Toolkit](#).

¹³ <https://www.strongtowns.org/journal/2015/3/2/complete-street-with-inclusive-design>



Entrances and Exits to the Garden

Gates should be easily opened. A good test to do is try to open your garden gate with a closed fist. It should open and swing easily. If there is a handle, it should be at a height of 3-4 feet. Additionally, there should be ample space for someone in a wheelchair to maneuver to open the gate easily. The excerpt from below is from [Grassroots Gardens](#), a non-profit based in Buffalo New York which focuses on community gardens. It shares the specific dimensions needed for gated entries and exits:

“The dimensions of your doorway should also be considered when creating a universally-designed entryway. There should be at least 18 inches of maneuvering clearance beyond the latch side of the door and a depth of at least 60 inches to allow for the backing up and opening of the door. When door is open, there should be a clearing of at least 32 inches wide.”¹⁴



Garden beds that do not require bending down

For some students, teachers, or family members, bending down to the ground to garden can be difficult, painful, or simply not possible. Including raised garden beds in your garden is a simple way to address this. There are many different garden bed designs available online. Some require a gardener using a wheelchair to garden parallel to the bed. Others allow gardeners in wheelchairs to access the garden bed front on, by providing a space under the table where the chair can roll under.

Figure 5



Example #1 Parallel Bed Design

Pictures on the following pages show several different parallel and front rolling raised garden bed designs.

¹⁴http://www.grassrootsgardens.org/uploads/2/6/3/8/26383225/a_guide_for_making_community_gardens_accessible_for_all_members.pdf

Figure 6



Example #1 Front Rolling Bed Design

Designing Your Raised Beds

One important note on wheelchair accessibility is that although the ADA requirements below provide specific dimensions, not all people using wheelchairs will be sitting at the same height, or need the same clearance height minimum.

Consider building beds specifically for your program participants. If this is not possible, provide a wide variety of different garden bed designs.

In addition, the garden bed's width should not be too deep for the gardener to reach the back of the bed. In children's gardens, this is of particular importance. Beds need to be less deep than garden beds designed for adults. Most garden beds, whether close to the ground or raised to 30 inches should have a reach in depth of no more than two feet or 24 inches. You may want to consider a shallower depth of 1.5 or even one foot, depending on the size and mobility of the students you are working with.

Figure 7



Example #2 Parallel Bed Design

ADA requires that tables meet the following criteria:

- Table height: 28" minimum to a 34" maximum
- Knee clearance: 27" minimum from floor to bottom of table surface. For a raised garden bed with front on access, this means that soil depth will not be more than 6", unless you get creative with your designs. 6" is not enough depth for the roots of most crops. There are some ways to work with these measurements. See the pictures of the various bed designs below for some ideas.
- An inward knee clearance under the table of 19" minimum.

Figure 8



Example #2 Front Rolling Bed Design

Figure 10



Example #3 Front Rolling Bed Design

The same requirements can be used for a standard ADA raised garden bed. Please note though that if you are working with children, the clearance dimensions might be quite different. You can find this and other helpful ADA information through [ADA.gov's website](http://ADA.gov).

Figure 9



Example #3 Parallel Bed Design

Other options for upright and off the ground gardens

Penn State has a great website with a variety of garden beds built with universal design in mind. Penn-State Extension's "[The Universal-Accessible Garden](#)" contains plans for a variety of raised garden bed designs.

Many of their designs take advantage of the vertical space in a garden.

Vertical gardening is a great technique to consider. Ask yourself, how can we raise the garden to an accessible height for more of my students?

Vertical gardening can get as creative as the person designing the garden. There are a lot of great ideas for vertical gardening on Pinterest. Many of the ideas you can find there also re-use materials and can be excellent STEM based learning projects. One example is the vertical soda bottle garden that can hang from a chain link fence or other garden wall.

Figure 11



Figure 12



Container gardening

Using pots that are light enough to be lifted safely onto a table when full of soil and short enough that they are workable from a seated position is another option. OSU Extension's "[Container Planting](#)" gives the most basic information you'll need to start and maintain a container garden with your students.



The Garden Shed

The shed should of course be accessible to get to and enter. This includes having the same clearance as you would for a gate. If possible consider having a more universally designed door handle that doesn't require gripping and turning.

Having a tidy garden shed that is free of hazards and has tools at a reachable height (not higher than 4') is also important. Even if students aren't allowed into the shed, consider all who may need access. Labeling where tools and equipment go is also very important. Equipment that is not for children should be kept out of reach.



YES



NO



Multi-sensory Garden Designs and Layouts

Consider adding scent and sound features to specific areas of the garden. One of our staff members coined this as a "Scent Map or Sensory Map" of the garden. Instead of designating one bed as the herb bed, consider planting these herbs throughout the garden as place markers on a scent map of the garden. This can assist students who are sight impaired to establish their bearings in the garden. Many of these plants will double as a food source for pollinators when in bloom. A third benefit of adding scented edibles in the garden is that smelling them can invigorate the senses and have a therapeutic effect on all students. Over the years many of my students have shown me the sage, lavender, or other fragrant, or soft leaf they have stowed in their pocket to pet and smell throughout the day. In addition, including small water features, wind chimes or student made wind powered sound makers can help people with sight impairments to become oriented to the space.

Lists of edible scented plants and textured plants for the Pacific Northwest garden can be found in Section Five: Additional Resources.

Oregon State Extension has additional pointers and tips for ways to incorporate all the senses in their document, "[Adaptive Gardening Techniques for the Visually Impaired](#)".

Some of the techniques we feel are most appropriate for school gardens through that document include:

- designing school gardens with a predictable layout (straight paths);
- stretching cord along two pegs from one side of the bed to the other to create planting by feel rows;
- making braille garden vegetable signs.



Water Accessibility

It is important that students have the opportunity to water the plants they are cultivating. Consider the specific needs of your students in choosing a watering system that they will be able to operate. Watering systems need not be elaborate. Large buckets of water with small yogurt containers used to water by hand work just fine. Or, if your students have a bit more strength, you can use watering cans. Filling them only half way can make them more useable by students. Other options include simply using a hose or installing and programming an irrigation system. With any system you utilize, you'll need to teach and practice it with students.



A Designated Self-Care Spot

This is an idea that was shared with us by a teacher of students on the autism spectrum. She has a location in the garden where students can go when they identify the need to be alone. This is a really valuable tool to teach students how to use. It should include a place to comfortably sit, that is visible to you, the instructor, and also be clear of clutter.

The idea is that if a student identifies that she or he needs to be away from the group (due to feeling anxious or overwhelmed) they can go there for self-care until they are ready to return. This time can also include a simple activity, such as drawing or journaling, if helpful. Self-care can also extend to students being allowed to complete certain productive garden tasks that they enjoy, such as watering, weeding or raking. Students should be pre-taught how, self-identify when they need solo time and also how to communicate that need to the teacher.

Adaptive Tools and Gardening Techniques for Specialized Use

Adaptive Tools

Adaptive tools are tools that have specific physical modifications that make it possible for a gardener to use the tool or complete a gardening task effectively. Adaptive tools allow people to be gardeners even if they aren't able to stoop down, grip tightly or see the garden bed.

Websites such as [Carry on Gardening](#) and [Wright Stuff](#) specialize in the sale of pre-made adaptive garden tools. Even better, you can create personalized equipment with a few easy to find, inexpensive supplies and a creative approach.

The best website we have found to help guide the creation or procurement of adaptive tools and approaches is [Handi Help](#). This website was created and is run by Rich Fabend, a former high school and special education teacher who was paralyzed during an accident in 1999.

On the website, Fabend shares an excellent piece of advice: *“Let your mind run free and don't allow yourself to look at a particular product as only useful for its intended purposes.”*¹⁵ This was similar to the advice given to our staff by one of our special education teacher consultants, April Paulson, who shared that getting creative and working with individual students to design tool modifications that work for them doesn't need to be expensive or prohibitive.

If you have a student with a physical disability, check in with the student, as well as the student's educational team, and request to take some time outside of class to modify garden equipment for him or her. Bring a kit (or request that the education team bring one) filled with versatile and inexpensive equipment like the supply list to below, adapted from Mr. Fabend's webpage.



Figure 13

Garden Tool Modification Kit

- Hose clamps
- Pipe insulation
- PVC pipe
- Duct tape
- Webbing, string, shoe laces
- Grip tape (sold for bicycle handles)
- Wooden dowels
- Compression bandages
- Zip ties
- Foam for cushioning
- Velcro

¹⁵ www.handihelp.net

Next, we would like to share some specific ideas for ways to adapt gardening equipment and practices that were suggested by our special education teacher consultants, found on the Handi Help website, or via Oregon State University Extension Service's "[Adapting Garden Tools to Overcome Physical Challenges](#)". Remember, get creative and try out different modifications.

Figure 14



**Lightweight,
Composite Trowel**

Figure 15



**Perpendicular
Handled Trowel**

Figure 16



**Trowel with
Cord Loop**

Easy ideas to adapt hand tools such as trowels and digging forks or longer tools such as rakes:

- Choose lightweight tools like composite plastic hand trowels, in place of metal and wood tools.
- Work with the student to identify the easiest, most effective and comfortable way to dig. The student might hold the tool differently than the traditional way. What matters is finding the best way for that person to use it.
- Place a loop of cord or a shoelace string through the hole at the top of the trowel's handle so that the tool can be worn (like a lanyard), and the user doesn't have to worry about dropping it.
- Add on a handle that is situated perpendicular to the tool. Use hose clamps, PVC pipe or a wooden dowel and pipe insulation or grip tape to create the handle.
- Add easy grip foam if needed or grip tape.
- For increased grip strength, add a Velcro strip to the handle and around the person's hand or use webbing to make a strap. Another good material for this is compression bandage.

Planting

Here are some simple tips to increase ease of planting seeds and even transplants for students with limited mobility, vision, grip strength or gross or fine motor skills.



Plant Using a Tube

Here are the basics on how to do this: Take a length of PVC pipe (with a 1 inch diameter, and cut to the length needed-between 2 and 3.5 feet). Duct tape a tin can or plastic container to hold the seeds near the top (optional). Then, the gardener/student can put a seed down the tube at appropriate intervals. The end of the tube can be used to brush soil over the seed, or another tool can be used.

Figure 17



Plant Large Seeds

Using large seeds for plantings can be helpful for students who struggle with fine motor skills. Some of the larger seeds that are fun to plant in the garden include: winter squash, corn, peas, bush and pole beans, sunflower and nasturtium. These same seeds are excellent for indoor germination observation inquiry projects.



Plant by Feel Using String as a Guide

Another suggestion we found was to string a line of yarn or wire across the shorter distance of the garden bed attached by two stakes, nails, staples or eyelet loop screws in the garden bed at one foot intervals. Gardeners can use the string as a guide to seed along or use the grid created for spacing transplants. As a practice, we use twine or jute in school gardens to reduce hazard. If you choose to use wire or nails, take extra care to reduce risk of injury.

Diagram of Garden Bed with String Guides

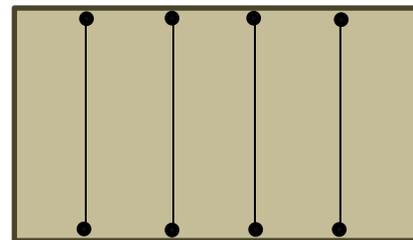


Figure 18



Plant Tiny Seeds Using Seed Tape

Using seed tape can be helpful for students who struggle with fine motor skills or sight impaired students who can then lay the tape in rows by feel.

You can purchase or make your own seed tape or seed disks. If you purchase it, students can simply unroll pre-made tape or place discs on the soil and cover with soil.

Making it requires a fair amount of fine motor skills. You can also make your own seed tape or partner with another class to make it. ([Youtube Instructional Video](#)). Making it can be a fun indoor project during the winter.



Establish a work station table where containers for container gardening can be placed (on the table) and worked on at a comfortable height. This allows for seeding, transplanting, weeding and general maintenance.



To plant really tiny seeds without handling them each individually students can simply broadcast or sprinkle them with their hands or shake them out of a tin can or plastic container with holes poked in the bottom. To get a more even distribution and preserve seed, fine sand can be mixed in (1 cup sand to 1 average seed packet) and used to help prevent over-crowding.

Figure 19



Section 4:

Educational Practices to Increase Inclusion

Establish Individualized Support

Design Accessible Educational Materials

Apply Universal Design for Learning

Scaffold Your Lessons

Bring the Garden Inside

Get to Know Your Students, the Staff and District Resources

Adopt a Positive and Creative Mindset

The seven topics above focus on the approaches, actions and teaching strategies you can take to increase the level of inclusion in your general education garden class. They are presented in a progression from the most specific and individualized support strategies to the most generalized and broad strategies you should employ.

For the most part, we avoided identifying teaching strategies based on specific learning or physical disabilities. This is because every student is a unique and individual learner. What works for one student with a specific disability might not work for another student with the same disability. In addition, our School Garden Project education team members are not experts in the field of special education and we are not qualified to suggest specific strategies based on specific disabilities.

Many of the suggestions we make are simply good teaching practices. In researching for this project, it became clear that some of the most powerful and effective practices are also the simplest. Implementing these practices is the difficult part. It takes time, reflection and practice to develop an inclusive garden classroom. We encourage you to devote time to find out which practices are the most valuable to add to your teaching toolbox.

Establish Individualized Support

Communicate regularly with the education team.

The biggest take away for our education team throughout the increasing inclusion project was learning how important it is to communicate regularly with your students' teachers, educational aides, and even students themselves when appropriate, to identify and use accommodations, modifications and practices that best support your students' learning.

You may or may not be a part of any IEP teams for any particular student. In our case our educators are never a part of the IEP team. Nonetheless, if you teach the same group of students regularly, it is your responsibility to reach all your learners. Additionally, students in Life Skills classrooms have a homeroom general education classroom. If possible, consider speaking with the general education teacher about inviting any students who are in their homeroom, but may be in Life Skills most of the day, to garden class. Garden lessons can be a valuable opportunity for students in Life Skills to interact with and learn alongside their peers.

For students who do need additional individualized support, here are some concrete ways to approach communicating and working with classroom teachers and educational aides.

1. Speak regularly with teachers, specialists, educational aides for students, or in some cases, the students themselves, about how to best support their learning. Ask about specific strategies being used to increase learning. Ask about student strengths. After identifying specific strategies, follow up with check-in conversations to refine them together.
2. Provide the educational materials from the lesson for use before, during and after. According to our special education advisors, many students benefit greatly from seeing the materials and exploring the educational concepts multiple times.
3. Ask what sort of additional materials might help make learning more accessible to your student. Be sure to ask during appropriate moments that don't call unnecessary attention to the student. Also, note that time is limited for educational aides and teachers; make sure your communication is appropriate, focused, quick, and productive. Email correspondence with teachers can be a great way to share educational materials and communicate after your initial reach out.
4. If a student has an educational aide, consider asking for a specific aide to consistently assist the student while in garden class so you can work collaboratively with them to support that student's learning.

Some questions for general education teachers, education aides and Life Skills teachers are:

- How can I help to best support (student name)'s learning during garden class?
- What are some of (student name)'s strengths as a learner?
- May I provide educational materials before or after the lesson to help support (student name)'s learning?
- What might help (student name) with success when we (learning task or activity that has been challenging)?
- What are some strategies or tools I can use to help support (student name) to participate more fully (or learn the concept)?
- What sort of behavioral support strategies help (student name) while in class?

Self-care spaces or activities

Self-care spaces or gardening activities are powerful tools you should develop along with other educators working with you and the student, when appropriate. This idea is also explored in Section Three: The Garden Space. We've chosen to repeat the concept here to emphasize its value.

A self-care space is a location slightly removed from the group (but visible to you) for the student to go for self-care, or some quieter time. Educators should work with the student over time to teach them how to self-identify when they begin to feel too much anxiety in a situation and then use the self-care spot or activity. The location can be as simple as a bench; basically any area the student finds calming. An activity could be weeding or digging, anything they find calming or soothing, so long as it is productive and not destructive.

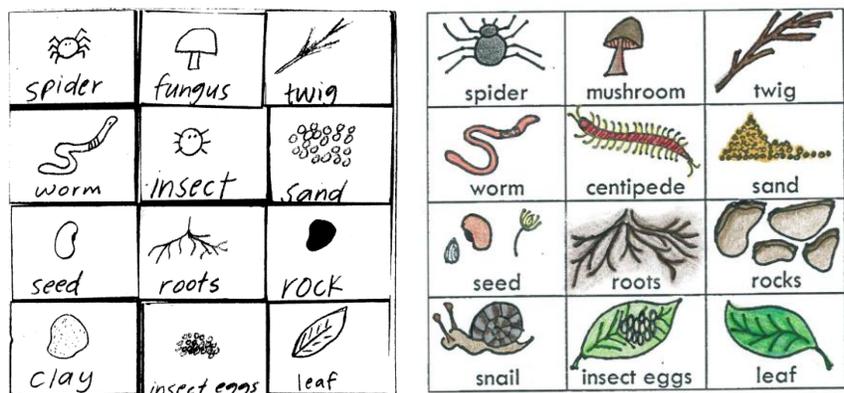
The value of the self-care spot or activity is that it can be used to help the student develop a sense of self-control in the face of anxiety-producing situations. It is important to work with any teachers and aides to help the student self-identify when they need the self-care space and when they feel ready to return to group-based activities. The amount of time your student stays there should be something that you work out with the student and the educational aide if the student has one. If you don't have experience or training developing a tool like this, ask for guidance from a teacher or aide that does. This way you can set up a system that is effective, supportive and empowering. The key part of success with such a spot or activity is its intentional development and consistent use as a tool, not as a punishment or reward.

Design Accessible Educational Materials

Educational materials can aid greatly in the learning process by providing visual, auditory and tactile models and examples. The way they are designed can support or inadvertently confuse learners. Below are general tips to increase accessibility to general education materials provided by a local area special education teacher.

1. Enlarge lesson materials such as plant or insect identification cards. *Many of our materials were 1 or 2x2 inch cards. We are moving to 2-3x4 inch cards.*
2. Font: Use a consistent font style and size (Choosing a font with the handwritten 'a' is also helpful. Some example fonts are: **Berlin Sans FB**, **Century Gothic**, **Comic Sans**, **Two Cent MT**. This also helps students who may be tracing instead of independently writing.
3. Place words on image cards in a consistent location for every card, with clear separation from the image, for example, the text could be centered below the image in a text box
4. Require students to generalize less by:
 - a. providing multiple examples of the object (for example three different leaves)
 - b. providing real images (with white backgrounds) or accurate illustrations of the object
 - c. using color, not black and white
5. Add icons or images above key vocabulary to support emerging readers, and use the same images consistently throughout the material. This gives emerging readers a visual on which to attach concepts.
6. Use jars, gloves and bags when kids are not ready to touch an object directly (like a worm, or soil).
7. For students with sight impairment, consider using glue to create a raised outline of images on your educational materials. For example, during a lesson about leaf structure, you could create a raised glue outline of a leaf's venation patterns and margins for students to feel. Include braille lettering on the cards. Check with the general education or special education classroom and resource teachers to see if it would be possible to have materials produced in braille if needed.

To the right: example of a revised educational material that uses some of the suggestions from above, such as font consistency and accurate illustrations of the object and color. More materials can be found at www.schoolgardenproject.org





Accommodations that Support Observations

In addition to these suggestions, consider what simple materials you can bring to help students with sensory sensitivity feel more comfortable with learning outside. This does not refer to the student who is reluctant to touch something because it is new, though the ideas below can be used to help that student as well. This note is focused mainly on the student who finds certain sounds or sensations overwhelming, uncomfortable, painful, or anxiety producing.

There are some simple things we can do as garden educators to support students with sensory sensitivity. For example, if the sensation of a slimy worm is too much for a student, you can simply put the worm in an observation jar (just make sure there are holes in the lid for breathing). Or, if the students are learning about soil through touch, sight and smell, you can



simply put some soil in a bag for them to touch through the bag. Have bug jars, observations containers, magnifiers, baggies, non-latex gloves, spoons and “popsicle” sticks around to aid observation without direct contact. A final note about this, it is essential to never coerce or force any student to touch, smell or taste something in the garden. Creating a safe environment where students feel some control over when and how to engage in tactile, smelling and tasting activities is important for reducing fear and barriers around experiencing unfamiliar tastes, smells and sensations.



Sensory Vocabulary Support

Consider producing image-supported lists and texture kits to help introduce, and practice, important and potentially unfamiliar garden-based sensory vocabulary. At School Garden Project we’ve developed vocabulary lists for tastes and food qualities such as texture and feel to be used during tasting and plant identification activities. We’ve also developed a common garden materials texture-by-feel kit for students to explore rough, smooth, gritty and other textures before adventuring out to the garden to find those textures. You can find some of our vocabulary lists on the resources page of School Garden Project’s website:

www.schoolgardenproject.org.



Provide Additional Educational Materials for Students Who Thrive with Repeated Exposure to a Concept or Practice with a Skill

Learning increases and is deepened through multiple and varied exposures to the content for all learners. For some students, this is even more essential and beneficial. By providing educational materials for students to preview with their educational aides, such as vocabulary cards, or plant identification cards, you can help the student be more prepared for your lesson in the general education setting.

Also, it may be beneficial to provide supplemental materials to support that student's learning during your lesson. This could be as simple as real examples of plant parts that a student with sight impairment would be able to feel during a plant part introduction. It could also be a modified activity such as a matching activity that could be done one on one with an aide if the student needs some individualized learning time apart from the main lesson. While this would be more of an *integration* rather than inclusion practice (see diagram on page 3), it can help keep the student engaged in the content until they are ready and able to join the group activity. Finally, at the end of a lesson, you can leave lesson materials with the teacher or educational aide to provide the opportunity for students to revisit the learning as needed. Below is a picture of a student reviewing seed dispersal methods inside, using supplemental materials.



Apply Universal Design for Learning

It would be hard to count the number of times our garden educators have heard or witnessed the way students deemed as “difficult” in the classroom seem to flourish in the outdoor setting. This speaks to the way garden based learning naturally lends itself to many of the approaches of Universal Design for Learning, or UDL.

By learning more about UDL garden educators can intentionally use it as a framework to help identify ways to improve lesson effectiveness and inclusion by thoughtfully incorporating its principles into the learning experiences we offer our students.

So, what is UDL?

UDL is an educational framework “to improve and optimize teaching and learning for all people based on scientific insights into how humans learn.”¹⁶

It seeks to represent or present new content and skills to students in a variety of ways and to provide students multiple ways of interacting with the material. Importantly it also seeks to find ways to engage students more fully in the material.

“UDL doesn’t specifically target kids with learning and attention issues. It’s about building in flexibility that can be adjusted for every student’s strengths and needs.”

-Understood.org

You can learn more about Universal Design for Learning by visiting the websites listed above or the website for the collective impact non-profit, [Understood](#). According to one of our increasing inclusion project consultants, Life Skills teacher Kathryn Johnson, the [CAST website](#) was recommended as “...the website used for teaching teachers about UDL. It speaks of engagement, representation, and action/expression as the key areas to look at the ‘what’, ‘why’, and ‘how’ of learning.”

To apply UDL in your garden classroom you will need to make purposeful adjustments to your teaching strategies.

¹⁶ <http://www.cast.org/our-work/about-udl.html>

Simple Example of UDL in the Garden

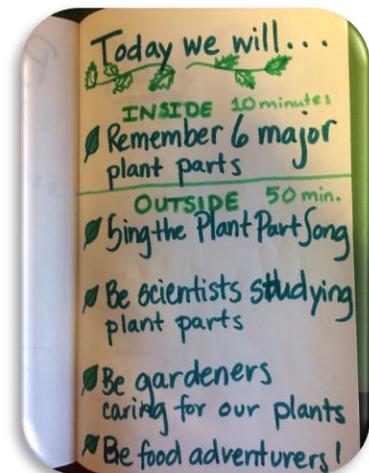
Here is one simple example of a way that UDL could be applied in the garden classroom. Imagine you are planning a lesson on the form and function of a flower. For one activity, you want students to learn to identify flowers. Consider structuring the activity to include a blindfolded or eyes closed challenge game that uses the sense of smell to identify different flowers. Visual identification could be the secondary approach. This makes learning more accessible for a student with a visual impairment and equally helps all students meet the learning goal of identifying flowers in the garden. Furthermore it could incorporate an exploration of how pollinators locate and identify food sources (nectar) by smell. This activity doesn't diminish the value of visual identification. Instead it makes identification possible, through other senses, for more students. The picture below shows School Garden Project students exploring a daffodil through sight and touch. In future programming we are working to incorporate more touch and smell first.



Scaffold Your Lessons

In education, scaffolding refers to “a variety of instructional techniques used to move students progressively toward stronger understanding and, ultimately, greater independence in the learning process.”¹⁷ “Scaffolding is breaking up the learning into chunks and then providing a tool, or structure, with each chunk.”¹⁸ Accommodations for students with IEPs can almost be considered individualized scaffolding strategies. Scaffolding your lesson takes more time, but more students learn much more effectively if you do it.

The scaffolding techniques listed below can support most students with garden-based learning. The majority of these teaching practices listed below are encouraged as UDL techniques as well. The list is a compilation of ideas from our educators, our special education consultants, Rebecca Alber, education consultant for Edutopia and Kristin Houser, education consultant for [Ms. Houser.com](http://Ms.Houser.com).



1. Remember to always **share the garden class agenda and a timeline** with students. Do your best to stick to it! This way students know what to expect and when. Some students often do better when they can see the plan and how long each activity will take.
2. **Pre-teach vocabulary.** Choose only the key terms. Consider providing these to classroom teachers and educational aides if you are a guest teacher.
3. Take time to **explicitly teach and re-visit important routines in the garden** such as transitions from one task or activity to the next. In a new learning environment, such as the garden classroom, most people will benefit from clear communication around what the learning environment should sound like and look like.
4. Provide ample time and opportunities for students to **activate prior knowledge, and experiences** with the concept or skill being taught.
5. Allow for **think time** before calling on the first hand that shoots up. If you need to, count silently to 7 before calling on someone.

¹⁷ <http://edglossary.org/scaffolding/>

¹⁸ <https://www.edutopia.org/blog/scaffolding-lessons-six-strategies-rebecca-alber>

6. Allow for **pair-sharing or small group discussion** before asking students to respond with an answer. Pair-sharing is simply asking students to pair up and discuss their thoughts or ideas regarding a question before calling on individual students to answer in front of the entire group. This provides more time to cognitively and verbally process the question at hand.
7. Take the time to **model**, instead of just explaining, how to do the activity. For example, if you are teaching how to transplant a young plant, show the students. As you are showing them, talk them through the process, focusing on key points of a successful transplant. Model how to work cooperatively as well. Once students are familiar with a task, you can provide leadership opportunities by having peers model the skill the next time the group prepares to transplant.
8. **Provide multi-sensory opportunities for exploration.** Before tasting a new garden veggie, start by having students smell, look at, feel and even listen to how it sounds when they tear or squish it. Always give the option to taste or not to taste it. At School Garden Project, we have found that choice reduces reluctance to taste. Multisensory observation can be applied to anything new you are introducing students to in the garden, minus the tasting aspect of course. Encouraging students to use their senses to explore is a clear yes!
9. **Offer student choice** in how to respond, reflect or express what they've learned before, during or at the end of an activity. Choices can be limited based on the stage of the lesson (intro, activity or wrap up), the amount of time you have and your group's needs. Options for student demonstration of knowledge can include writing, drawing, sharing through discussion, performance or demonstrating.
10. Purposefully and thoughtfully **include students who are being included from Life Skills classes and may need more processing time** (don't ignore them!). Our special education consultants suggest calling on students to share with the group when they have a high chance for a successful response. For example, after another student has already answered the same question and you are looking for another example, or when the student is modeling the thinking or behaviors you are working to teach the class. In addition, our Life Skills teacher consultant shared that an alternative way to effectively include students who may struggle to verbalize, or may not understand the material, is to ask them if they agree with another student's response during class discussions.



Photo Courtesy Ephraim Payne

11. Ask students to **summarize** the main take away or point of a given activity in their own words, through pictures or even through physical actions.
12. Use a **white board and dry erase markers** to present information to the whole group. Use mini white boards or clip boards for kids to record information or for students who need additional educational materials to support their learning.
13. Use **visual aids and graphic organizers** to help students conceptualize mental models into shared models and to capture their ideas or work through problems. In the garden this could look like colored and laminated posters that explain processes that you might teach in the garden, such as decomposition or the nutrient cycle.
14. Pre-teach and frequently use **sentence frames** to help students respond to the questions effectively.
 - a. Example: I noticed that one leaf was _____ (texture) while the other leaf was _____ (texture).
 - b. Example: I predict that _____ will grow more quickly than _____ because _____.
15. **Ask for non-verbal responses** sometimes with directions such as “Point to the part of the plant that is a stem.” See the picture below for an example of this type of instruction with 2nd graders.
16. **Repetition:** Provide repeated opportunities for students to learn about a given concept or practice a given skill. You can repeat the same activity or change the activity but retain the learning concept.



Bring the Garden Inside

Often people think indoor garden activities should only be for rainy day plans. However, bringing parts of the garden indoors can be a powerful tool to introduce garden-based learning and make it a familiar part of your students learning experiences. This is good for all students and can particularly support students who need additional time to get used to learning in the outdoors.



Bringing in a tub of soil, or a variety of leaf samples can help students to prepare for successful learning in an outdoor setting (which has more stimulus). Invertebrates like worms or caterpillars can also be brought indoors for observation. Providing repeated exposure to something unfamiliar (like garden soil or a new food) will help students become familiar and comfortable being around it. It helps students feel more comfortable and confident once it is time to go outside to learn.

There are of course, a vast array of garden related indoor activities. Below is a small sampling inspired by our work as well as Oregon State Extension Service's document "[Gardening for Children with Disabilities*](#)"

- ***Carpentry Projects:** birdhouses/feeders, mason bee houses, sign making
- **Indoor Gardening:** *container gardening, *propagating plants from cuttings, growing seedlings for the garden and *terrarium gardens
- **Food Related Activities:** *creating recipes and cookbooks, *drying herbs for teas, identifying fruits, vegetables and staple crops, preparing and eating from the garden
- **Scientific and Mathematical Garden Study:** measuring and charting leaf size, observation of invertebrates in a built habitat, observation of plant parts, plant part dissections and observations, practice using magnifiers and microscopes and soil observations
- **Garden Inspired Art or Research Projects**
- **Garden Planning**

Get to Know Your Students, Staff and District Resources

The practices below will help to strengthen your garden program through increased student engagement, understanding of school culture and resources.



Get to know your students

This will help you create a garden classroom environment and a teaching plan that is tailored to your students. A program that reflects its participants' identities and interests demonstrates to participants that they are valued.

To the extent possible, take the time to get to know your students. Learn what they enjoy doing in and out of school. Find ways to incorporate these interests and values into garden lessons, when possible, and into the garden itself. This can be done by providing students with choice and voice in garden planning, food production and preparation. Even how students demonstrate learning during a lesson can validate and affirm your students' voices. Finally, sharing stories, biographies and having guest speakers during garden who represent a diverse array of cultures, and specifically the cultures of participants, is really valuable.

Of course, the less frequently you see your students, and the more students you have, the more difficult this can be. Nonetheless, it is very important for students to feel represented and personally connected to the garden.

Additionally, be sure to "bring the garden inside" through pictures on bulletin boards of students working in the garden or with artwork or classwork they have done that is related to the garden. This way students see themselves and their work represented both out in the garden and inside the school building.

If you are working on designing or building the garden, find ways to incorporate student interests and identities into the design and implementation of the school garden as well.

A note on inclusion:

While inclusion in the school setting refers to the specific practice of including students with IEPs to the maximum extent possible in learning environments with their peers, it can also refer to the inclusion of student interests, cultural identity, representation and values into the classroom.

This is especially important in a garden classroom. Gardening and food harvesting, preparation and consumption are cultural acts.



Get to know the staff and school culture

If you are a visiting educator, as School Garden Project educators are, it will be very helpful to get to know school staff. With regards to increasing inclusion for students with IEPs, it will be most important to get to know the general education teachers you are working with as well as educational aides working with students. Also getting to know any other special education staff working with students you teach will be beneficial. Generally speaking, it's always good to get to know other teachers and staff who are particularly interested in garden education as well as administrative, custodial and office staff.

With regards to school culture, seek answers to questions like:

- How do the school leadership and staff promote a positive and inclusive school identity?
- In what ways are the student body and families represented throughout the campus?
- How are students encouraged to interact with one another?
- What behavior management systems are utilized?
- How does the school garden fit into the school?
- Which school rules and positive behavior management systems to encourage engagement and consistent behavior will be helpful for you to adopt?

Find answers to these questions by observing in the classroom, in the halls and during lunch and recess. You can also consider attending school functions when appropriate.



Get familiar with district resources

With regards to learning about district resources available to you to help improve inclusivity and effective learning, it is best to ask a staff person you work closely with for guidance. All districts provide special education services and may have resources you can utilize to increase inclusion.

Approach Teaching and Learning with an Open and Creative Mindset

Begin by taking a strength-based approach to your learners

Consider your students' abilities before considering their limitations.

Instead of asking, "What limitations does my student with an intellectual disability have that I'll need to work around?" why not reframe the question to, "What can my student do well?" or "How can I utilize their strengths to shape or adapt this lesson for success?"

Ask yourself, and other educators (and when appropriate your student), how she or he is oriented toward expression and processing.

For example:

- How do they best absorb and process new information?
- How do they best express their ideas, knowledge and opinions?
- What learning modalities are most effective and engaging with the student?

Consider and incorporate learning modalities in a balanced way

Garden-based learning provides easy opportunities to incorporate multiple learning modalities into the educational experience. Incorporate them thoughtfully and you will optimize the value of garden-based learning experiences for your students.

There are many learning theories seeking to conceptualize how we learn. One such model is the VAK(T) Model. VAK(T) is an acronym representing three and sometimes four identified ways that people receive and learn new information based on three major senses. VAK(T) stands for Visual, Auditory, Kinesthetic (and Tactile).

"According to the VAK theorists, we need to present information using all three styles. This allows all learners the opportunity to become involved, no matter what their preferred style may be."¹⁹

Educators at School Garden Project are beginning work to purposely incorporate all three styles into each lesson when possible. For example, with our photosynthesis lesson, we introduce the topic by drawing a scientific diagram which students also draw in their science journals, then students observe leaves up close with loupe magnifiers and microscopes. Students compare



¹⁹ <http://www.nwlink.com/~donclark/hrd/styles/vakt.html>

flavors of different edible leaves. Sometimes we'll play a photosynthesis relay game, commonly known in environmental education, called Race for the Sun. The game is an opportunity for students to learn through physical play AND also serves as a shared model to explain the phenomena of photosynthesis.

VAK(T) and many other learning theories have been developed and researched by educational psychologists. With or without official learning style labels, it is valuable to provide learning opportunities that lend themselves to a diverse array of learning styles. By diversifying what learning looks like in your garden class you can help all students become more well-rounded learners. To see examples of how teachers can utilize different learning styles, visit University of Massachusetts Dartmouth webpage on [“Tips for Educators on Accommodating Different Learning Styles.”](#)



Make teamwork, cooperation and collaboration essential elements of your garden classroom.

Thinking about the unique learning styles and attributes of your learners is essential to reaching each student, but it is equally important to consider how you can work with your students to establish and practice a positive classroom culture that values and engages all members of the group. Ask yourself how you can leverage teamwork to increase inclusion.

You can intentionally weave teamwork skills and intentional pairing into physical garden tasks such as preparing a garden bed, seeding or transplanting. Food or flower harvesting and preparation also lend themselves well to cooperation. Individuals can be assigned leadership roles. These can be coined as jobs, teacher-helper tasks or special responsibilities related to garden care. Intentional pairing of students can be used to encourage positive peer to peer interaction and peer support. Also, some garden-based learning games can be adapted to focus on teamwork. Finally, inquiry-based science and engineering projects can also provide rich opportunities for effective teamwork. It is imperative to set ground rules and expectations about what successful teamwork looks like. Remember to also set time aside to hone teamwork skills as a group.



Continue to learn!

Learn more by seeking resources and community support to help you think creatively about how to create a more inclusive educational setting. There are good online professional networks for educators. By creating an account on networks such as [EdWeb](#), you can gain access to free webinars and learning communities such as: Growing School Gardens, STEM Learning: Full STEAM ahead, Teaching Students with Autism, Teaching All Students: Practical Strategies for Inclusive Classrooms and more. Additionally, you can listen to podcasts on inclusion from [The Inclusive Class](#) online. To learn more about Adaptive Gardening, contact your local Extension Office and ask the Master Gardeners for resources on Adaptive Gardening.

Section 5

Additional Resources



Tactile Plant List

Olfactory Plant List

School Garden Project's Favorite Edible Crops

Direct Quotations and Website References

Image Credits

This section contains materials and resources you may be able to use during your garden-based lesson planning, as well as during class. The following plant lists are purposefully simple, use common names and have been identified as plants that grow easily in the Maritime Northwest climate that we are subject to in Lane County, Oregon. For additional educational materials for your garden classroom, please visit our website: www.schoolgardenproject.org. Since most of the information gathering was done online, a website reference list and image credit list have also been provided.

Tactile Plant List

These are common names of plants with distinct textures that can be grown in the school garden. Most are edible. Any that are not recommended for eating in the school garden are marked with an asterisk*. Those that are pictured to the left of the plant lists, under the “Texture” column are *italicized*.

Texture	Plants
<p>Frilly or Feathery</p> 	<p>Cosmos*, <i>Fennel</i>, Dill, Mizuna, Mustard Plants, Russian Frills Kale</p>
<p>Thick</p> 	<p><i>Sedums</i>*, Purslane</p>
<p>Bumpy, Rigid</p> 	<p><i>Tuscan or Lacinato Kale</i>, Savoy Cabbage, Curly Kale</p>
<p>Smooth, Rubbery</p> 	<p>Swiss Chard, <i>Butterhead Lettuces</i>, Onion Leaves, Fava Bean Leaves</p>
<p>Fuzzy, Soft</p> 	<p>Lamb's Ear*, Dusty Miller*, <i>Mullein</i>*, Sage, Lady's Mantle*</p>

Olfactory Plant List

	<p>Lavender has a distinct floral-herbal smell, and beautiful purple flowers. Kids often like to brush their hands over it to release the smell. Leaves are narrow. Be aware of bees pollinating.</p>
	<p>Sage: There are many different varieties that have different scents. One fun variety is pineapple sage, although it is frost sensitive. Leaves are also soft and flat. Some students like to “pet” it.</p>
	<p>Thyme: Like sage, varieties of thyme can have a wide range of scents. It can grow tall or creep along the ground. Leaves are very small and can have variegated color.</p>
	<p>Lemon Balm is a type of mint that has a citrus-like smell and flavor. It has fuzzy leaves too. Kids generally love the scent. Be aware that lemon balm will self-seed rapidly. It is best to plant it in a pot and trim flowers before they produce seed.</p>
	<p>Mints: There are many, many types of mints including a chocolate mint (that actually does smell like chocolate and mint together)! Because mint spreads via rhizomes under the ground, it is good to plant it in containers. One idea would be to plant mint container garden with at least 5 different varieties.</p>

	<p>Tarragon is a very strong tasting herb with narrow leaves. It is also very fragrant. The smell is released nicely when the thin leaves are squished between your fingers. It tastes similar to licorice and is quite sweet.</p>
	<p>Oregano, coined the pizza herb by one of our students, is a wonderful addition to the school garden because it smells like pizza sauce! Leaves are small and flat. Be aware of bees when it flowers.</p>
	<p>Chives aren't very fragrant until they are cut, but their grass-like leaves and puffy globe shaped flowers are a wonderful addition to feel in the garden and taste as well. Many students like to chew on chive leaves like a piece of straw.</p>
	<p>Rosemary is extremely fragrant and can grow tall and wide. Make sure the space you give it is ample. Leaves are narrow and waxy.</p>
	<p>Fennel has fine, delicate leaves, smells like black licorice and feels feathery and light. It will self-seed in abundance and has a hard to remove taproot. Seeds are also edible. Some students love the smell and taste, while others really don't like it.</p>
	<p>Violets, violas and pansies are known for their fragrant, edible flowers with a wonderfully floral flavor that is reminiscent of bubblegum. They grow late into the fall and early in the winter.</p>

School Garden Project's Favorite Edible Crops

These 24 crops all pass the test of our garden educators as winners for school gardens! Over the years, we have refined what crops really are the best fit for a school garden setting in the Willamette Valley of Oregon. These are crops that are: fairly easy to grow, can handle a little neglect (think inconsistent watering), are culturally significant, lend themselves nicely to science exploration, support the garden ecosystem and are harvestable during school months.

Crops in **blue** are crops you can plant in the **fall**. Some of them you harvest in the fall and some in the spring. Crops in **orange** are crops you must plant in the **late spring**. They all grow over the summer and will be harvestable in the fall. Flower crops are in **purple**. These can all self-seed or can be planted in the spring and sometimes even in the fall.

Winter-Spring	Summer-Fall	Flowers
Kale	Cherry or Currant Tomatoes (Sungold is one delicious variety)	Nasturtium
Radish	Lemon Cucumbers	Bachelor Buttons
Lettuce	Potatoes	Calendula
Arugula	Beans- Dry Beans (Bush) (Dragon Tongue, Tiger Eye, Orca Beans & more)	Fennel
Mustard (Red Giant, Green Wave, Mizuna)	Beans- Fresh (Pole) (Runner Beans or Red Yard Long)	Pansies and Violas
Green Onions, Garlic Tops or Chives	Mini-Pumpkins	Marigold
Winter Grains: Oats, Barley and Wheat	Popcorn (Calico, Early Pink or Tom Thumb- a miniature popcorn)	Sunflowers
Broad Windsor Fava Bean or Broad Beans (Leaf, flower, & seed all edible)	Summer Squashes: Zucchini, patty pan, crook neck and more	Borage

Website References

The following websites provided invaluable information for this project and are listed in order of references within the body of this resource packet.

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Image Credits

We want to acknowledge all of the following people and websites for the great imagery that supported the information in this packet. Photos taken by School Garden Project staff are not credited below. Page numbers where the image can be found as well as the host site are listed below.

FIGURES

Figure 1- pg.

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Figure 2- *Vectorimages.org*

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