UF IFAS Extension UNIVERSITY of FLORIDA

ENH1263

A Manual for the Design and Implementation of Teaching and Demonstration Gardens[1]

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LEARNING LANDSCAPES (also called teaching or demonstration gardens) can be effective and valuable tools for learning about plant material, landscape design, and related care and maintenance practices. Studies have shown that people learn and retain information better in real-life settings and that they are more likely to adopt landscapes when they can relate the displays to their own yards. Depending on their purpose, teaching/learning landscapes can represent many different types of gardens and landscapes.

Garden Types and Their Characteristics

Florida-friendly gardens demonstrate Florida-friendly principles in a residential setting.

Edible plant gardens demonstrate various ways (raised beds, trellises, arbors, liners, and hydroponic methods) to grow many types of edible plants.

Plant collections are composed of various types of plants organized for viewing. Specialty collections include arboretums for trees, viticeta for vines, pineta for conifers, and fruticeta for shrubs. Other types of collections include grasses, palms, bamboo, annuals, perennials, bonsai, and succulents.

Wildlife/pollinator gardens demonstrate habitat for birds and small animals and include plants that provide food, shelter, and nesting. Gardens with brightly colored flowers attract bees and butterflies.

Sensory gardens contain plants that can be experienced through sight, scent, sound, taste, and touch.

Healing/contemplative gardens arrange plants and spaces in ways that enhance a feeling of calmness and serenity through immersion in nature.

Water gardens contain plants that grow in garden water features such as ponds and water falls.

Medicinal plant gardens feature plants used for medicinal purposes.

Plants for people gardens showcase plants used in non-food products such as cosmetics, fuel, paper, fabric, etc.

Dry gardens consist of plants that thrive in very dry conditions. Usually includes other materials such as gravel.

Rock gardens are composed of interesting and unusual rock formations with plants arranged around and on rocks.

Historic gardens usually mimic features from well-known historic and traditional styles such as knot gardens, topiary gardens, and parterres.

Cultural gardens are designed in the contemporary or historic style of different cultures such as Japanese, Chinese, Indian, and Balinese.

Regional gardens have natural features and plants from a specific region (coastal, desert, tropical, etc).

Classic gardens feature layouts and plants that have become the hallmark of a type of garden such as cottage, contemporary, modern, formal, informal, etc.

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Form theme gardens feature plants and pathways laid out in specific forms including formal/geometric (circles, squares, triangles), or informal/organic (meandering fragmented forms).

Sculpture/art gardens use plants arranged around sculptures and art pieces to enhance the aesthetics of the art piece.

Color gardens feature plants demonstrating color combinations.

Ornament gardens highlight features such as planters, pergolas, arbors, and fountains.

Vision Development

Developing a vision statement for a proposed garden will provide direction and focus for making design and budget decisions and developing the education program and the curriculum. The vision statement should consider why the garden is being proposed, who it is intended for, and what the garden will include. A garden may be considered for several reasons, including teaching, research, demonstration, marketing, resource protection, and recreation.

It is generally best to plan for visitors of all ages and education levels. However, some gardens may serve their purpose better if specific groups are targeted and the garden is designed to facilitate activities to the interests of these groups. Activities and visitors are often directly related to the resources the site has to offer. Activities may be limited by the size of the garden, the budget, the facilities, and maintenance considerations.

Identity Development

The vision statement can also be the starting point to create a marketable identity. A well-defined identity can help with grant writing, fund raising, and marketing to targeted visitors. Elements of a marketing program such as a logo and name on brochures, web-sites, and signage are easier to develop with a well-defined identity.

Vision Statement: Why, Who, and What

Issues to consider when developing the vision statement include why the garden is desired, who the expected or desired visitors are, and what will be included in the garden to meet the needs of the visitors and the goals of the program.

Why: Teaching Mission and Goals

- How will it help serve the overall teaching and Extension mission?
- What specific goals will the learning landscape help achieve?
- What will the demonstration landscape provide that cannot be achieved with other teaching methods?

Who: Visitors' Needs and Preferences

- Who are the target visitors?
- What information are they seeking?
- What experience are they seeking?

What: Resources and Site Opportunities

- What resources are present on the site?
- Will the site resources allow for the intended use?
- Will the site meet the visitors' needs?
- Will the site allow for the proposed design?

Landscape Design Principles

Design principles include unity, rhythm, emphasis, scale and proportion, and balance. These principles create a garden that facilitates learning and is visually pleasing and functional.

Unity: The concept of unity is to visually unite or link the features by repeating elements and using a linear feature (such as a path) to connect them, or using a consistent theme (Figure 1). In a teaching garden the theme is typically based on the plant material, such as trees, grass gardens, aquatic plants, or drought tolerant plants.

FIGURE 1. Repeating planters of similar colors create a consistent theme. (Credit: Center for Landscape Conservation and Ecology)

Rhythm and repetition: Rhythm is achieved through repetition such as repeating the same materials in built

structures or repeating basic planting patterns with similar plants (Figure 2). In demonstration and teaching gardens, it is difficult to repeat planting patterns because most gardens need a great variety of plants. The best way to create rhythm is to use information signs with the same graphics throughout the garden and use similar building materials.

FIGURE 2. Similar planted circles repeat along the pathway. (Credit: Gail Hansen)

Emphasis: Emphasis is the use of a focal point or dominant feature to organize a space and control circulation by directing attention to an area and enticing users to move to the space. A focal point might be a particularly interesting or unique plant or a built structure (Figure 3). In demonstration gardens, focal points are useful to highlight significant plants and keep visitors moving throughout the site.

FIGURE 3. A wood sculpture adds whimsy to a garden and creates a focal point. (Credit: Gail Hansen)

Scale and proportion: The size of the space will determine the layout and relative sizes of the display areas for the plant material. Pathways, gathering areas, built structures, and outdoor "rooms" where plants are displayed should be sized relative to people, a concept known as human scale (Figure 4). Visitors feel more comfortable in garden spaces that match their proportions and do not feel too enclosed or exposed. Plant materials in demonstration gardens are typically arranged in clusters based on the garden intent and the goals. These clusters create outdoor "rooms" that can be arranged along the pathway.

FIGURE 4. Visitors gather in a "room" where displays and structures are scaled to humans. (Credit: Center for Landscape Conservation and Ecology)

Balance: Balance is used primarily for visual effect. The garden will be more pleasing to the eye if the visual weight of the features is equally distributed in the site. Some areas of the garden can be more formal with symmetrical balance (Figure 5) showing identical mass on both sides of an axis, and other areas may be more informal with asymmetrical balance, or the appearance of equal mass on both sides of an axis (Figure 6). The intent and goals of the garden will help determine if a formal or informal arrangement of the displays will work best. The arrangement of the plants should be a part of the learning experience and should relate to the specific curriculum intent and topics. For example, if curriculum topics include plants forms found in historic gardens, the layout would be more formal and symmetrical.

FIGURE 5. Identical plant masses on both sides of the path provide symmetrical balance for a formal look. (Credit: Gail Hansen)

FIGURE 6. Large masses of plant material with equal visual weight on both sides of the path provide asymmetrical balance. (Credit: Gail Hansen)

Design Process

Designing an effective learning environment requires particular attention to the visitors' needs and the features needed to meet the learning goals. Visitor needs such as physical comfort (temperature, noise, and glare) and psychological comfort (safety and security) must be considered so learning will not be compromised by distractions. Landscape design is a four step process that includes 1) the statement of intent or the overall goal of the project, 2) site analysis, 3) determination of user needs and program development (adapted from the curriculum), and 4) conceptual designs and the final design. The conceptual design stage incorporates the basic design principles and elements to ensure a functional, visually pleasing, ecologically healthy, and safe and secure site. The final design includes all the details, the final location of features and exact dimensions such as widths of pathways, size of plant displays, location of educational signs, and location of benches.

Step 1: Statement of Intent

Begin the process with the statement of intent, which links the design to the curriculum. The statement, based on the goals and objectives of the education program and curriculum, should include the who, what, and how explained above. For example, a statement for an arboretum might read as follows: "The purpose of the arboretum is to teach Florida citizens the important concepts of tree identification, selection, and care. The garden will include a variety of common residential yard trees arranged in an aesthetically pleasing manner to allow visual and tactile study and exploration of each tree by garden visitors."

Step 2: Site Inventory and Analysis

Site inventory and analysis will determine the conditions on the site such as sun and shade, wet or dry areas, existing circulation, and existing vegetation. An analysis of the conditions as they relate to the goals and objectives of the curriculum will determine the opportunities and constraints of the site for selection and placement of the desired features.

Step 3: Program Development

The program is often formulated as a list of visitor needs and required features to meet those needs. For example, a teaching arboretum program might include:

- Trees commonly used in residential landscapes
- Trees arranged in a logical order to facilitate learning
- Easy access and viewing by groups and individuals
- Design promoting healthy growth of the trees
- Design protecting trees from damage by visitors
- All plant material arranged in an aesthetically pleasing manner
- Safe and pleasant pedestrian access
- Seating and rest areas
- Gathering areas for small and large groups
- Informational signage

Step 4: Conceptual Designs

Conceptual site design and final design begin with a functional diagram used to organize the garden spaces in ways that maximize circulation and function. If possible, the spaces of the garden should be arranged in a sequence that follows the curriculum learning sequence. As learners progress through the site, the information they receive from signage or presentations should be logical and progressive in nature.

Functional Considerations

It is important to consider the functional aspects of the garden during the conceptual design phase. The goal is to have the site function in an efficient and comfortable manner for the visitor while protecting the resources from unintentional and intentional damage. Visitors should be able to explore the garden on their own, and they should feel physically and psychologically comfortable while in the garden. Functional aspects include wayfinding, spatial definition, user comfort, resource protection, and maintenance.

Wayfinding: Also known as orientation, wayfinding is the use of unique features, or landmarks, and spatial organization to guide visitors through a space. The goal is

to encourage movement to all areas of the garden by giving visitors a reason—for example—an interesting plant display or unique feature, to want to move from one space to the next. Wayfinding is often facilitated with a map or diagram of the garden to guide visitors (Figure 7).

FIGURE 7. Diagram showing the layout of Claude Monet's garden in Giverny guides visitors through the site. (Credit: Gail Hansen)

Spatial definition: Define space by creating outdoor rooms through the arrangement of plant material and structural features. The pathway serves as the connecting element that leads people from room to room. Rooms are often created with an open space with low plant material that is surrounded by taller plant material or structures that act as the "walls" to separate the rooms. In a teaching garden the "room" might be an open space on either side of the path with a plant display of shrubs or trees to create the walls (Figure 8).

FIGURE 8. Creating rooms with benches and tall shrubs at Joy Creek Nursery in Scappoose, OR. (Credit: Center for Landscape Conservation and Ecology)

User comfort: Visitors will spend more time in the garden if they are comfortable and feel safe and secure. Arrange plants and other features to create microclimates, which are sunny or shady areas that offer temperature control (Figure 9). Visitors also want to feel safe from possible injury and secure from any possible threats. It is important to address psychological comfort with well-designed amenities such as pathways, and clearly marked perimeters with entry and exit points.

FIGURE 9. Wisteria covered trellis provides a beautiful and comfortable walkway. (Credit: Gail Hansen)

Resource protection: It is important to protect existing resources and those that will be added to the garden. Any garden with high visitor use will show signs of wear—some through standard daily activities and some through intentional damage from vandalism. Existing resources include the soil and established plant materials. The plan should include provisions for path material that will prevent or minimize soil erosion and decorative features that prevent trampling of plants (Figure 10). Design around existing plants, especially trees, when possible and protect the trees with barricades at the drip line during construction.

FIGURE 10. Protect plants along the pathway edge with a small decorative fence. (Credit: Gail Hansen)

Maintenance: The design phase is also a good time to consider installing rainwater harvesting systems and an efficient irrigation system to keep plant material in good health (Figure 11). It is also important to consider access to the plant material that will allow for regular maintenance such as trimming and pruning.

FIGURE 11. Small runnels direct rainwater from the hard surface to the tree wells. (Credit: Gail Hansen)

Plant material selection: Plants for the garden will be based on the garden type. Avoid placing potentially dangerous plants with thorns or stickers along pathways (Figure 12).

FIGURE 12. Raised beds separate the spikey plants from the pathway. (Credit: Gail Hansen)

Hardscape material selection: Select hardscape materials for pathways that are durable and easy to clean and that meet ADA (Americans with Disabilities Act) requirements. Use site furniture that matches the theme and is durable. Structures and buildings should be built from sustainable materials.

Design Features

Design features are the physical structures on the site. Features are designed and built to allow the visitor to participate and use the site as intended by the program. Features should facilitate movement, provide shelter and rest areas, and facilitate learning.

Pathways: Pathways are critical to the movement of visitors throughout the garden. The path is a dominant feature in the landscape because it is where most visitors will spend most of their time and it visually and physically connects the garden. The width of the path depends on the size of the garden, but a large garden requires a path that is minimum 4 feet wide to meet ADA standards. The path will also require a firm surface that allows for wheelchair access (Figure 13). Compacted soil, limestone, or decomposed granite or shells will also provide an accessible surface. Pathways should be curvilinear and meander throughout the site with gentle twists and turns that create interest and a little mystery. The layout is carefully designed to treat each visitor to a different view around each corner and a hint of something new to explore as they reach the next corner. Each "room" of the garden should have a slightly wider area in the path for the gathering of a small group of people to stop and discuss the surrounding plant material. Views of the plant material should be clear in these areas.

FIGURE 13. Concrete pathways create a smooth wide surface for easy mobility. (Credit: Center for Landscape Conservation and Ecology)

Seating facilities: Seating should be strategically located at logical points along the pathway for rest or learning (Figure 14). Several things to consider when locating benches include sun or shade areas for comfort, views from the bench for observation while sitting, and distance between the benches. Several benches can be located along the path at learning areas for small groups. Small areas off the side of the path, sometimes referred to as eyebrows, should be large enough so that the feet of the bench sitters do not extend into the path and present a tripping hazard. Other benches could be located in the larger open areas where a presentation for large groups might take place. A few benches, for quiet study or contemplation, works well tucked away from the path.

FIGURE 14. Backless benches along the path allow the visitor to face the plants or the pathway. (Credit: Gail Hansen)

Signage: Signs, including welcome signs, informational signs, directional signs, and educational displays, are used strategically and minimally throughout the site for several purposes. General rules such as using simple fonts, legible font size, contrasting colors, and the least amount of text possible to convey the information apply to all signs. Symbols and images often aid in comprehension of the message and are appropriate for children and non-English speaking visitors. Colorful and well-designed graphics will attract attention and encourage more people to read the signs. Welcome signs should be located at the entrance and include rules such as hours of operation, expectations for behavior, and a map of the path system. Informational signs include plant identification tags and facilities identification. Directional signs keep visitors on the path and help them find their way around the garden. Educational displays often have large signs that convey more in-depth information about the features or plants that create the displays (Figure 15). These signs are often part of a master interpretation program for the entire garden.

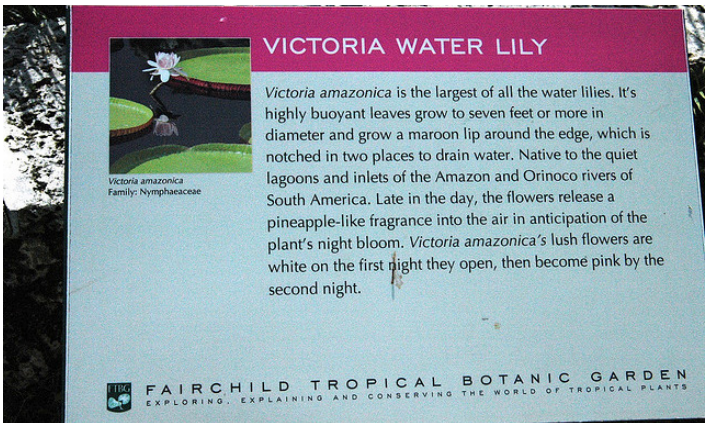

FIGURE 15. Educational signs generally include more detailed information. (Credit: Center for Landscape Conservation and Ecology)

Gathering areas: Small gathering areas are typically located at the educational displays. These areas are cleared spaces along the path that can accommodate the instructor and about 5 to 10 standing people. They may also include a bench or two for sitting (Figure 16). Large gathering areas should accommodate groups of 30 to 40 people such as 4-H clubs and school children. Depending on size, some gardens can offer a very large cleared area adjacent to the garden for large events (plant sales, annual gatherings, etc.) that might include the use of temporary structures such as tents or shade structures.

Learning displays/exhibits: Displays should be located along the loop path in a sequence that is appropriate to the curriculum or learning plan. Appropriate spacing along the path will allow the pacing of several small groups without overlap. Exhibits should be clearly visible from the path and should allow access to the plants for close-up inspection and touching. Arrange plant material to clearly show the important, identifying features of the plant. Short path loops can be designed for special topics or grouping of displays by topics. Display signs are often set to the side of the display so that readers can stand to the side and those who choose not to read have clear access to the display (Figure 17).

FIGURE 16. Students sit on benches in a small gathering area to take notes. (Credit: Center for Landscape Conservation and Ecology)

FIGURE 17. Edible plant display includes informational signs on the side. (Credit: Center for Landscape Conservation and Ecology)

Overhead structures and amenities: Structures may be designed primarily for physical comfort for visitors, for decorative purposes, or for maintenance and storage on the site. Picnic pavilions, small shade structures, and tables and benches are for the comfort of the visitors. Decorative structures include birdhouses, small garden gazebos, and little follies that are used as focal points and contrast to the plants (Figure 18). Decorative structures can also include arbors, trellises, planters, and other features that enhance the display of plants. Maintenance structures include storage barns, greenhouses, compost bins, and shade houses for equipment and plant protection.

Aesthetic appeal: Learning gardens must be functional but should also be aesthetically appealing, drawing visitors and helping them gain an appreciation for the plant material. Although learning gardens' primary goal is to teach visitors scientific information about plants, it is also important that gardens appeal to the senses (vision, scent, hearing, and touch) and create a sense of wonder and excitement

about plants. Visitors are more likely to remember the facts about plants when each plant makes an impression on them through the different senses. These experiences also help visitors gain a lifelong affinity for plants. Aesthetic appeal is enhanced through the use of the design elements (color, texture, and form in a cohesive and unified manner) (Figure 19). Although the teaching plants are often displayed in separate groups throughout the garden, repetition of the design elements can be used to connect these display areas in the garden. It is also important to design the spaces between the teaching plants with supporting plants. These plants can be thought of as background or linking plants that enhance the garden feel but do not take too much attention away from the teaching plants. The goal is to make visitors feel that they are in a cohesive garden and not simply a collection of plants.

FIGURE 18. A small gazebo and decorative fence add visual appeal to the garden. (Credit: Center for Landscape Conservation and Ecology)

FIGURE 19. A mix of color, textures, and forms creates a visually pleasing plant display along a turf pathway. (Credit: Center for Landscape Conservation and Ecology)

Work/maintenance areas: Depending on the purpose of the garden, maintenance areas can be hidden from view or be a feature in the garden. If visitors are also volunteer workers and the work area such as a compost bin is important to the program, the work area should be integrated into the visitor area. Work areas that include tools should have a storage facility that can be locked for safety and security. The storage facility can be hidden or incorporated into the design theme (Figure 20). The entire garden should have plant displays designed to be accessible to people performing maintenance duties.

FIGURE 20. Maintenance area demonstrates repotting of plants. (Credit: Gail Hansen)

Education Program Development: Services and Experiences

The education program has two components: education services and education experiences. Services are what you provide and experiences are how you provide them and how you communicate. The primary focus of the education program is for visitors to enjoy the education activities and experience the garden in a fun and inspirational manner and, as a result, to change or improve their gardening and landscape management behavior. The education program should enhance the visitor experience. It is also a marketing tool and helps accomplish management goals. Education themes are the key stories and concepts that the visitors should learn about and understand.

Education Services: What You Provide

As they relate to the garden:

- A visually pleasing, well-designed garden with the characteristics significant to the garden type
- Garden designed to protect the resources (plant material) from damage from visitors
- Garden designed for easy maintenance
- Garden design that is appropriate for annual maintenance budget

As they relate to IFAS and the university:

- Garden that facilitates the mission and vision of the Extension program

As they relate to the visitor:

- A well maintained, safe garden
- A garden designed to facilitate the desired learning activities and experiences
- The use of appropriate educational materials (signs, brochures, etc.)
- Garden and educational activities designed to inspire and change behavior

Education Experiences: How you communicate

How do you decide what the visitor should learn?

- Determine the environmental behaviors you want to influence.
- Determine the topics that relate to the type of garden and develop the key concepts the visitor should learn based on the topics.
- Relate concepts to the type of garden or learning landscape. Depending on the type of garden, concepts might be historical, technical, environmental, cultural, artistic, or psychological.

What do you want the visitor to do?

- Activities such as touring the garden to view plant- and landscape-related displays
- Use educational signage and other media to learn about the displays
- Join planned group teaching activities that will require an instructor or guide
- Participate in management and maintenance activities
- Use the garden to enhance classroom instruction

Curriculum Development

To be successful, learning landscapes also need to incorporate the basic principles and elements of design for a visually pleasing and functional garden. A well-developed curriculum will guide the design process in many ways, including determining how the goals and objectives inform the design and the organization of the features on the site. To facilitate the design process, the curriculum should, at minimum, include the teaching topics and objectives from the education program and the elements needed to carry out the objectives. Information in the curriculum will also be used to determine the overall size of the garden, the number, location, and type of learning stations, circulation routes, the type of signage and other facilities, plant materials to be included, and maintenance considerations.

Teaching Topics

Determine topics based on the landscape type. Typical topics include:

- growing techniques
- maintenance strategies
- gardening techniques
- design strategies
- historical value
- cultural value
- value to humans
- value to the environment
- material choices

Teaching Objectives

Typical visitors: Determine who the typical visitor will be and what he or she will need. Information about typical visitors includes

- typical number of expected visitors,
- age and comprehension level:
  - whether they are adults in the general public interested in gardening and plant material,
  - whether they are educators or students, who are usually interested in horticulture, landscape design, plant medicine, wildlife, history, art, and psychology,
- visitor needs such as safety, security, and comfort, and
- whether the visitor will find the garden interesting, visually pleasing, educational, and accessible.

Activities: Determine the activities related to the educational objectives. Typical activities include:

- Self-guided tours with maps, brochures, QR codes, and smartphone applications
- Classroom/lab exercises and school groups activities

- Special interest group tours (landscape designers, maintenance personnel, farming industry, plant science, landscape materials industry, sustainable design practitioners, etc.)
- Research projects and plant trials
- Special events that could be held at the garden

Organization of the space: Determine how the spatial organization of the garden and the layout of the features will facilitate learning.

Other Considerations

Personnel: Determine who should be responsible for programs and maintenance. Issues to consider are

- long-range planning,
- budget and fund raising,
- day-to-day operations, and
- maintenance.

Supplies and facilities: Determine the supplies and facilities need to fulfill the goals and objectives. Typical supplies and facilities include

- plant materials,
- pathways and structures (benches/tables, rest areas, pavilions, restrooms, etc.), and
- educational signage and directional/informational signage.

Summary

When they are well designed and well-maintained, demonstration gardens are educational and inspiring. A poorly maintained garden with little planning will be a negative teaching facility that will discourage, rather than encourage, visitors to adopt the use of sustainable landscape practices and plants. An important consideration when designing a teaching landscape is available resources such as the budget for personnel, construction, and maintenance and the availability of volunteer workers. Remember to scale your garden to your resources, and you will have a successful learning landscape.