Utilizing Demonstrations in Teaching, with an Example Demonstration of Plant Propagation via Cuttings[1]

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Introduction

In a learning environment, it is important to provide instruction to each type of learner. There are visual, auditory, and kinesthetic learners. Individuals each learn differently, and there are educational tools that can be used to appeal to multiple types of learners (Leopold 2012). Through varying teaching styles and the use of effective tools, teachers aim to reach all of their students. Tools are additions to instruction that aid in providing a more complete lesson. One of these tools is the use of demonstrations. A teaching demonstration is a process that teaches learners how to compete a task using actual materials. The audience level and size can impact the effectiveness of the demonstration (Smith, Wenderoth, & Tyler 2013).

Bandura's Social Cognitive Theory suggested that individuals learn from one another. This theory is a medium between traditional behavior and cognitive learning theories (Bandura 1999). This theory encompasses individual motivation, attention, and memory. To successfully model a demonstration, an individual must have adequate attention to detail, motivation to complete the task, and proper recollection of the steps. Social Cognitive Theory states that individuals learn via observation, imitation, and modeling (Bandura 1999). Through demonstration, instructors are able to model proper behaviors and techniques for tasks. Students are able to observe the instructor, imitate the action, and model the instructor's technique.

There are benefits to using demonstrations as a teaching method when teaching agriculture. Demonstrations assist in teaching a skill with multiple steps. They engage the audience and encourage audience participation. Finally, demonstrations are a way to engage the audience in a more complete way, rather than focusing on simply auditory or visual teaching strategies. Demonstrations, like many other strategies, aid some learners in a more complete understanding of the material.

How to Conduct a Demonstration

When conducting a demonstration, there are certain considerations the instructor must take into account. First and most importantly, safety precautions, proper tool identification, and technique must be outlined. Safety should always be the top priority when using demonstration as a teaching method. It is important to explain the purpose of the demonstration to the learners and to gauge their level of understanding, as well as to ensure all learners have equal opportunity to learn. It is also important to adjust the demonstration so that it is universally accessible, so all learners benefit from instruction. If the audience is large, it may be appropriate to have an assistant complete the demonstration simultaneously in a different area of the room to ensure everyone is able to see, hear, and participate. While conducting the demonstration, it is important to explain each step fully, show steps multiple times (if applicable), have learners perform the task, and review the

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demonstration. Once the instructor has demonstrated the task, the learners should perform the task that was demonstrated. After the learners have demonstrated the task, the instructor should review the performance with the learners. It may be beneficial to repeat the entire demonstration. If the demonstration is complex (for example, disassembling a small gas engine), a recording may be used. With a recorded demonstration, the instructor can pause, explain, and repeat the demonstration without wasted materials or extended time conducting the process.

There are many different types of demonstrations that may be used. Visual aids should be used during demonstrations. These may include models, specimens, graphs, charts, videos, etc. Additional items such as whiteboards, chalkboards, and overhead projections of materials (using an Elmo or smart board) may be used to enhance demonstrations. When using a projector or slides, it is important to ensure all students are able to accurately see the screen, especially if the instructor is unable to describe each step in enough detail through oral instruction.

When using demonstrations as a teaching method, the following five-step process is important to remember when designing the lesson. Table 1 describes the five-step process.

Table 1. Five steps to teaching with demonstrations.

Prepare	The instructor should gather materials for the demonstration and prepare the room or area for the demonstration to take place. Readings or videos that the students should view at home should be provided well in advance of the demonstration.
Tell	The instructor should tell the learners the importance of the demonstration and explain each step of the process to complete the task.
Show	The instructor should demonstrate to the learners each step of the process to successfully and safely complete the task.
Do	The learners are given the opportunity to complete the task, or steps in the task, on their own.
Review	The instructor provides the opportunity for the learners to review the steps involved in the task.

Considerations

It is important to be aware of a few key considerations. Safety is the most important consideration when performing *any* type of demonstration. Safety precautions should always be outlined to the audience before they attempt the process and reiterated a throughout the process. It is vital that the learners understand any risks or precautions they must make. The second most vital consideration is the amount of time needed to demonstrate and allow for practice. It is important to fully explain the demonstration and not try to rush the process. The learners must have an appropriate amount of time to complete the task that is demonstrated. To ensure safety and understanding, they must not rush. Additionally, audience members will be seeing a mirror image of the task (Roberts 2012). This could create confusion in some demonstrations. Not all audience members will grasp the demonstration, and different individuals will struggle with different steps. Adapting your material to be universally accessible will ensure that all of your students are reached. It is important to be aware of these considerations when using demonstrating as an effective teaching tool.

Conclusions

Demonstrations are a valuable teaching tool that aids in teaching a specific task or project. Demonstrations can appeal to different learning styles and aid in a more complete understanding for individuals. However, for a demonstration to be effective, certain considerations must be made. A demonstration must be fully explained in a way that all audience members have equal opportunity to understand. Potential physical, financial, and mental limitations may be present for both the presenter and the audience. However, if a demonstration is done effectively, it can be a powerful teaching method. The following example can easily be modified as you develop appropriate demonstrations for your classroom.

Plant Propagation via Stem Cuttings

EQUIPMENT REQUIRED

1. Sharp knife, scissors, or nippers
2. Plant pot or something to use as a plant container
3. Growing media
4. Pencil
5. Clear plastic bag
6. Rubber band
7. Stem or leaf cutting

HOW TO TAKE PLANT CUTTINGS

1. Use premixed growing media.
2. Saturate the growing media with water.
3. Make a hole in the media for the cutting.

4. Prepare the stem cutting.

5. Cover the rooting portion of the cutting with media.

6. Cover the pot with a clear plastic bag or put under shade with a misting system.

7. Take care where you place newly potted cuttings.

See below for more detailed information and images.

STEP 1. USE PREMIXED GROWING MEDIA

Use premixed media, making sure there is enough media for each student.

Allow students to feel different mediums and make observations on texture, smell, and visual differences among the components. This can be an opportunity to talk about particle size, water holding capacity, and other important factors for proper medium selection.

Safety: Some media has irritants in it that may irritate the skin or eyes and potentially be harmful if inhaled. It is important to explain the safety precautions used with the media you are using, especially if the medium contains sphagnum or pearlite. Sphagnum is irritating to the skin, and pearlite dust can be damaging to the lungs if inhaled.

STEP 2. SATURATE THE GROWING THE MEDIA WITH WATER

STEP 3. MAKE A HOLE IN MEDIA FOR PLACING THE CUTTING

Use a pencil to create a hole in the growing media to place the plant stem. This prevents the rooting hormone from being displaced during planting.

STEP 4. PREPARE STEM CUTTING

Using a sharp knife, scissors, or snips, cut a 6-inch piece from the stock plant, cutting ¼ inch below a leaf joint. Remove the leaves from the bottom 1 inch of the cutting. Once leaves have been removed, dip the cut end in water and insert the cut end in the rooting hormone powder.

Safety: Ensure the student is being supervised when using any sharp and potentially dangerous tools. It is important for the instructor to demonstrate how to properly and safely use the tools.

Safety: Rooting hormone can be an irritant on skin, eyes, or when inhaled. It is important that students wear proper PPE (gloves, masks, glasses/goggles) when handling rooting hormones.

Figure 1.

Figure 2.

STEP 5. COVER THE CUTTING WITH MEDIUM, GENTLY

Figure 3.

STEP 6. COVER THE POT WITH A CLEAR PLASTIC BAG OR PUT UNDER SHADE WITH A MISTING SYSTEM

Place the newly potted stem cutting in a plastic bag and tie the top with a rubber band or zip tie to provide a warm, moist environment for the rootless cutting.

Additionally, you can put the plant in a shade house with a misting station if one is available at your school. The plants should be misted every hour for five minutes.

STEP 7. TAKE CARE WHERE YOU PLACE NEWLY POTTED CUTTINGS

To prevent overheating, do not place in direct sunlight. If kept indoors, place under fluorescent lights. Make sure to check the cuttings weekly for moisture level and root growth. Once rooting has been established, transplant the plants to larger pots, and gradually increase pot size as root density increases.

If you are working with a student who is visually impaired, you may rinse the roots and allow them to feel the roots of a freshly propagated cutting versus their two-week-old propagation. It is important to have universally accessible learning opportunities.

Figure 4.

Figure 5.

References

Bandura, A. (1999). Social cognitive theory: an agentic perspective. *Asian Journal of Social Psychology*, 2, 21–41.

Hartmann, H. T., D. E. Kester, F. T. Davies, & R. L. Geneve. (2011). *Plant Propagation Principles and Practices* (8th Edition). Prentice Hall.

Leopold, L. (2012). Prewriting tasks for auditory, visual, and kinesthetic learners. *TESL Canada Journal 29*(2): 96–102.

Roberts, T. G. [Cornell SIPS]. (2012, October 25). Facilitating meaningful learning experiences [Video]. YouTube. https://www.youtube.com/watch?v=6n5FTq7mEd0

Smith, M. K., Wenderoth, M. P., & Tyler, M. (2013). The teaching demonstration: What faculty expect and how to prepare for this aspect of the job interview. *CBE—Life Sciences Education*, 12(1), 12–18. doi:10.1187/cbe.12-09-0161 https://doi.org/10.1187/cbe.12-09-0161