Plant Structure

Jason Fitzgerald

Course
Biology 111, Introduction to Biology

Description
This module will help students to recognize the structural differences of monocot and dicot plants. Students will log onto the website and view various photos of monocot and dicot flowers and roots. There will be questions posted on the site that will serve as the basis for online group discussions.

Transferability
This module will transfer to any introductory level biology, general biology, or botany class that involves a unit on plant structure.

Faculty Technology Skill
The instructor must be able to operate a digital camera and be able to upload pictures from the camera to a website.

Student Technology Skill
The student must be able to log on to the Internet and navigate through a website.

Faculty Equipment
A digital camera and a computer are required.

Student Equipment
Students will need a computer with Internet access.

Cost
If the instructor does not have access to a digital camera, one can be purchased for approximately $200.

Improvement on Teaching and Learning
The students will get to see representative photos of the key differences between monocots and dicots, since the instructor will be the one who takes the photos. By using photos rather than actual specimens, the plants will remain unharmed. Even after taking photos of root systems, the plants can be replanted without any harm to them. By engaging the students in online group discussion, they may be more willing to voice their opinions or concerns more readily than they would in a classroom discussion.

Nontechnology Comparison
Textbooks typically tend to rely on diagrams to illustrate the structural differences of monocots and dicots rather than actual photographs. These diagrams can be misleading and not representative of actual plants. The instructor could take "regular" photographs of representative samples, but there is no efficient way of presenting these photographs to

the students (unless the photos were scanned and uploaded to a website). Use of the technology allows students to see good photos of the characteristics you are discussing. Since they are on a website, the students can view them at their leisure when they have time to actually study the photos.

Pertinent Issues

Since this module requires students to access the photos on their own time, the instructor will need to emphasize the importance of visiting the site and taking part in the online discussion (perhaps tying it in with class participation points). The instructor will need to make sure that students know how to post topics and replies on a message board. Also, most students won't have top-of-the-line high-speed Internet access, so the instructor will need to make sure that the photos are of a workable size and format when uploading them to the site. This will help cut down on the time it takes to download the image and thus avoid student frustration. It is recommended that JPEG format be used to ensure that all students will be able to view the downloaded photos.

How to Use in the Classroom

This module should accompany a topic regarding plant form and structure. After presenting the students with the morphological differences between monocot and dicot plants, the students should be directed to the website. The students should be informed that the questions present with the photos on the site will be the basis for online discussions that may be brought up in class or on a future exam. The students should be prepared to participate in the discussions.

Module
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Procedure

1. Upload six digital photos to a web page. The photos should be taken by the instructor and should include□□□
   - Flowers: 1 monocot, 1 dicot. Make sure that the petals or the stamens (or both) are in a position from which they can be counted. The focus should be on the flowers and not the rest of the plant.
   - Leaves: 1 monocot, 1 dicot. The entire leaf should be in the picture. Make sure that the veins can easily be seen.
   - Root systems: 1 monocot root system, 1 dicot root system. Use plants that have a well defined fibrous or tap root system.

2. Randomly label the photos A, B, C, D, E, F.

3. Questions for Discussion
   - Which photos represent plants that began with two seed leaves during embryonic development? How can you tell without the seed present?
   - Which photos represent plants that began with only one embryonic seed leaf? How can you tell without the seed present?
   - What are some other morphological differences between monocots and dicots? Perhaps some microscopic differences?
   - Are there any physiological differences between monocot and dicot plants? What are they?

Note: You may adapt the discussion questions to the depth of content covered in your class.