Teaching

Language Arts, Math, & Science
to Students with

Significant
Cognitive Disabilities

edited by

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with invited contributors
The individuals described in this book are based on the authors’ experiences and are
composites or real people whose situations have been masked. Names and identifying
details have been changed to protect confidentiality.

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Adapted Lesson Plan on Leaf Classification to Include a Student with Significant Disabilities in a Seventh-Grade Science Lesson

Unit: Classification  
Lesson: Leaf Classification  
Time: 1 hour

Summary  
All leaves possess numerous physical characteristics. These characteristics can be used to create a simple classification system.

Main Curriculum Tie  
Seventh-grade science: Use and develop a simple classification system.

Materials
- Paper and pencil
- Set of 5–10 leaves for each group of two to three students. (Ideally, the set should include leaves from several evergreens and several deciduous trees; e.g., pine needles, spruce needles, juniper needles, oak leaves, elm leaves, maples leaves, and so forth.)

Background for Teachers
It is helpful if some understanding has been developed on classification systems where things are divided into categories and given names. Larger categories are divided into smaller categories and so on until everything that is different is in a group by itself.

Intended Learning Outcomes
- Develop and use categories to classify observations.
- Develop critical thinking skills.
• Use the language and concepts of science as a means of thinking and communicating.

STATE STANDARDS (NORTH CAROLINA STATE BOARD OF EDUCATION AND DEPARTMENT OF PUBLIC INSTRUCTION, 2005)

Science

1.03 Apply safety procedures in the laboratory and in field studies.
• Recognize potential hazards.
• Safely manipulate materials and equipment.
• Conduct appropriate procedures.

1.04 Students will understand that structure is used to develop classification systems.
• Classify based on observable properties.
• Use and develop a simple classification system.

1.05 Analyze evidence to
• Explain observations.
• Make inferences and predictions.
• Develop the relationship between evidence and explanation.

1.06 Use mathematics to gather, organize, and present quantitative data resulting from scientific investigations:
• Measurement
• Analysis of data
• Graphing
• Prediction models

1.08 Use oral and written language to
• Communicate findings
• Defend conclusions of scientific investigations

1.09 Use technologies and information systems to
• Research
• Gather and analyze data
• Visualize data
• Disseminate findings to others
Math

**Competency Goal 1**  The learner will understand and compute with rational numbers.
1.01 Develop and use ratios, proportions, and percentages to solve problems.

**IEP Goals**

*Bart will follow a picture direction sheet to participate in the lab experiment.*

*Bart will point to 3–5 lab safety signs and state what they mean. (Science objective 1.03)*

*Bart will answer 3 science questions based on the lab experiment using pictures or the actual objects. (Science objective 1.08)*

*Bart will sort 2 different types of items into the correct groups. (Science objectives 1.04 and 1.08)*

*Bart will press a switch to activate a search on the Internet. (Science objective 1.09)*

*Bart will press a switch to select a pie chart using Excel to graph his proportion of leaves. (Math competency 1 and Science objectives 1.06 and 1.09)*

**Instructional Procedures**

Whole class will review 5 safety signs present in the lab, prior to beginning any class experiments. **During this time Bart will point to his personal set of safety signs (same as the class) and state what each sign means to his lab partner, Drew. Drew will place the correctly identified cards in the correct envelope and the incorrectly identified cards in the incorrect envelope. See Systematic Instruction Plan for safety signs (Figure 10.9).**

1. Define classification as the systematic grouping or arranging of things into categories based on similar characteristics.

   Review previously gained knowledge pertaining to classification by asking students what they know about classification. How is it done? Why is it done? Who does it?

   Discuss as a class some ways that we use classification in our everyday lives to make keeping track of large numbers of things easier. Examples of classification systems that we use in our everyday lives may include: mailing addresses (country is divided into states, states into cities, cities into street addresses or Post Office Boxes, and so forth), finding items in a grocery store, finding a phone number of a particular individual or of a business in the yellow pages, a book in a library, and so forth. Make a list on the board or overhead of any examples the students can think of.

2. Introduce class activity. Divide the class into lab partners and give each group a leaf packet. Tell students that they will design a classification scheme that correctly identifies each leaf. (To facilitate communication, assign each of the leaves a number or a name. If the leaves are not identified in some way beforehand, the students will not be able to communicate their classification.)
Bart will pair up with Drew, his regular lab partner. Bart will use his lab direction in picture form to follow the lab experiment and participate in the lab experiment.

3. Brainstorm several physical traits that differentiate each leaf. Look at things like general shape, location of veins, shape of leaf edge, color, and so forth.

Ask the question: How could we make a classification system for these leaves? Listen to student ideas.

4. Direct students to separate their leaves into two groups. Most likely the first grouping would be to separate the leaves into needles and broad leaf. Have the students calculate the ratio, proportions, and percentages of each type of leaf in relation to the whole sample. Record and report the results. Why do you think these percentages resulted? Ask the students to again separate the two groups into two more groups. Repeat the ratio, proportions, and percentages calculations. Record and report the results. Why do you think these percentages resulted? Listen to their suggestions on how the grouping be done. Instruct the students to continue separating the larger groups into smaller groups until each leaf is in its own separate category. What would be the ratio, proportion, and percentage of these samples? What does this mean? The students will graph their findings using pie charts and the Excel program.

Bart will sort a pile of leaves into two separate piles of maple leaves and pine needles. The pine needles will go on a paper with a pine needle already on the paper. He will put all the maple leaves on the paper with a maple leaf already on the paper. See Systematic Instruction Plan on sorting (Figure 10.7). Bart will make a pie chart using Excel to show which portion of the maple leaves came from the sample and which part of the pine needles came from the sample. Note: Half of Bart’s sample is pine and half is maple. Bart will enter the data and select the pie chart using using Excel software and a switch and the IntelliKeys assistive technology.

5. Instruct students to write down their classification systems. They should record the characteristics they used to separate the leaves at each level of the classification system.

6. Have a couple groups share their classification system. Point out that all the systems are not the same. Does that make one right and one wrong? (No, scientists often disagree about classification schemes. Also, many classification systems take different routes but end up with the same identification.) Classification schemes are valid if they are based on the observation of distinguishing characteristics and use a series of logical steps.

Ask Bart and Drew about their classification system. Ask Bart 3 questions about the system. Bart can point or verbally answer questions: What did you sort? Show me the leaves that are green. Which leaf is big? What types of leaves did you sort?

7. Discuss the system (Five Kingdom system of classification) used by scientists to classify living organisms.

8. Use a plant key to identify the leaves that the students examined.
Web Sites

Animal Bytes (http://www.seaworld.org/AnimalBytes/animal_bytes.html)

Animal Bytes was specifically designed to help quickly find information about some of the unique creatures found in the animal kingdom. Most files include the scientific classification, fun facts, and biological value.

Bart and Drew will search for this web site. Drew will type in the address and Bart will hit the switch to begin the search.

Assessment Plan

1. Ask students to exchange classification schemes and see if they can correctly identify leaves using each other’s schemes.

2. Give students rocks, bones, flowers, or some other set of objects and ask them to create a classification scheme to be used to identify those objects.

3. Give students a simple flower key and ask them to identify a flower using the key.

Author  Kendall Benson (http://www.MyUen.org/7866; 1997)

Modified by Karena Cooper-Duffy to include a student with significant disabilities.

Created Date  Jan 29 1997 17:30 PM Modified Dec 1, 2004.
Figure 10.7. Systematic instruction plan on Bart's sorting leaves in the general education lesson for classification purposes.
Figure 10.9. Systematic instruction plan to teach Bart the science lab safety signs.

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### Student: Bart  Date plan started: 9/20/2004

### Target skill: Safety signs  Routine: Safety in lab

### Specific objective:
Bart will look at 5 safety signs and state what they mean with 100% accuracy for 4 out of 5 days.

### Materials:
Personal picture set of the safety signs in the school. Signs can be in a small photo album that goes with him. Drew will be his peer tutor.

### Setting and schedule for instruction:
During science class, whole-class review, lunch, prevocational instruction, hallway, all day long

### Number of trials:
5 trials at zero delay for 3 days, 2 warm-up trials at zero delay and 3 trials at 5-second delay for 1 day, 5-second delay only for 1 day

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**INSTRUCTIONAL PROCEDURE**

**Prompting**

Specific prompt or prompts to be used (list in sequence):

1. specific verbal and physical point to picture
2. __________________________
3. __________________________
4. __________________________

Type of prompt system (check which applies):

- System of least prompts
- Time delay  X  Constant OR  _____ Progressive
- Most to least intrusive prompts
- Graduated guidance
- Stimulus fading or shaping
- Chaining  _____ Backward OR _____ Forward
- Other (describe):

Fading schedule for time delay: 5-second delay

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**Feedback**

Correct responses: *Super stating fire, get burned*

Fading schedule for praise: Only praise after every other correct response

Error correction: Return to zero delay. Stating correct response.

Generalization and maintenance plan: Bart will have the opportunity to point to and identify safety signs throughout the school

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