

Reading the River, Summer 2003

Biological Classification – Eighth Grade

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Grade Level: 8th Grade

Objectives

In this lesson, students will:

1. develop a personal definition of classification.
2. test this definition as it applies to several situations
3. apply the definition to the concept of scientific classification

Materials

Science Text- Prentice Hall *From Bacteria to Plants*

Paper

Pencil

Box

Assorted junk

Tape

File folders

Index cards

KDFW Fish booklet (*minimum of 15, one per student preferred*)

Program of Studies

Scientific Inquiry

Scientific Ways of Thinking and Working

S-8-SI-1

Students will identify and refine questions that can be answered through scientific investigations combined with scientific information.

S-8-SI-2

Students will use appropriate equipment (e.g., barometers), tools (e.g., meter sticks), techniques (e.g., computer skills), technology (e.g., computers), and mathematics in scientific investigations.

S-8-SI-3

Students will use evidence (e.g., computer models), logic, and scientific knowledge to develop scientific explanations.

Conceptual Understandings

Patterns, Systems, Scale and Models, Constancy, and Change Over Time

Life Science

S-8-LS-5

Students will analyze diversity and adaptations (e.g., changes in structure, behaviors, or physiology).

Applications/Connections

Patterns, Systems, Scale and Models, Constancy, and Change Over Time

S-8-AC-7

Students will demonstrate the role science plays in everyday life and explore different careers in science.

S-8-AC-8

Students will recognize that science is a process that generates conceptual understandings and solves problems.

Core Content for Science Assessment

Conceptual Understandings: Life Science

Academic Expectations: 2.2 Patterns of Change, 2.3 Systems, 2.4 Scale and Models, 2.5 Constancy, and 2.6 Change Over Time

Biological Change

SC-H-3.4.3 Biological classifications are based on how organisms are related. Organisms are classified into a hierarchy of groups and subgroups based on similarities that reflect their relationships. Species is the most fundamental unit of classification. Different species are classified by the comparison and analysis of their internal and external structures and the similarity of their chemical processes.

National Standards Addressed by this Lesson

Life Science: Diversity and Adaptations of Organisms

Procedure

Day 1:

Pass out parade of life books, record numbers, and have students report damage to their book.

Have students do a KWWL on classification. Don't share with class the common responses until after the activities are complete.

Have students brainstorm common household items found in a grocery store. On the board, list the common items such as; Frosted Flakes, Comet, Dawn, Oatmeal, Apples, Hamburger, Pledge, Era, Woolite, Bread, Chicken, and have the students come up on their own with categories for these household items based on where you would find them in a grocery store.

Have groups of four students come together and negotiate their supermarket aisles.

Ongoing assignment: All students are to copy down the aisle organization of each group that presents, including the new improved versions.

Have each group present their aisles and their reason behind them. Have them check to see if they included all the items. Ask to see if they could think of any item found in the market that would not fit into their categories. This is the testing portion of the process, looking for exceptions to the rule. If exceptions are found, then have them go back and retool their aisles to include these new items.

Day 2:

Continue to go over the grocery store classifications that the students working in groups of four have come up with.

How was each aisle organization scheme the same? How were they different?

Could you go to another group's supermarket and quickly find what you were looking for? Why or why not? Discuss the problems that come from having 7 different classification systems. Confusion, hard to communicate with other groups about the individual items since there are so many names for them, not always logical etc. Relate to them that these are the same types of problems that early scientists had to deal with.

Hand each student a small box containing junk, batteries, containers, paper goods etc.

Have each student organize their individual box, then meet with a group of 3 other students. Come up with a common organization scheme for the group. Present their scheme to the class. The class will then have to adopt a universal organization scheme for the junk box. All students will then organize accordingly.

Question time: Have students answer the following questions in their journals, then discuss in class. Could you go to another group's box and quickly find what you were looking for? Why or why not? How is this activity different from yesterday's activity? How is it the same? Can we apply what we have done today and yesterday to the idea of classifying living things? Why or Why not?

Day 3 and 4:

1. Have students brainstorm the common names of living things.
2. Share with the class and put on the board or overhead.
3. With student input make a description of each organism.
4. Have students classify the living things based on their physical descriptions.
5. Assign one organism to each student and have them spend some time in the library and find out how scientists classify the organism. Students should find the kingdom, phylum, class, order, family, genus and species of the organism. Mini-lecture on classification paying particular attention to terminology.
6. Share the scientific classification of each organism with the class. Each student will chart out all of the organisms.
7. Compare your initial classification to the accepted scientific classification. Did you group them similarly or is your different and how is it different?

Day 5:

1. Hand out Kentucky Department of Fish and Wildlife Fish booklet
2. Go through the booklet and show the students how the booklet is laid out.
3. Discuss how dichotomous keys are made and how they are used. Explain that a dichotomous key will be easier and quicker to use than just flipping through the booklet to find a specific species of fish.
4. Handout keys from Reading the River to use as examples of dichotomous keys. Point out to students that these keys tend to use scientific language that describes the outward appearance of the organisms that are being keyed out. These descriptors are universal,

but you can make your own keys using language that you understand to help you identify organisms in your area.

5. Describe the project for today and tomorrow. Each student will be making their own dichotomous key to identify 10 common fish species found in our area. We will use the Kentucky Department of Fish and Wildlife Fish booklet as a resource. Our first task is write at least 5 descriptors for each of the 10 species. We need to pay attention to shape, size, and location of fins, scales, and eyes; as well as total body length and body shape. We will choose 2 fish to do with the whole class to generate a list of descriptors for each fish. This will serve as a model for how to write descriptors for the rest.
6. Assign description writing for homework.

Day 6:

1. Check homework for completion
2. With the descriptors, we will now go through the first few steps of the key as a class; this will help the students to get started writing their key for the 10 common fish. The teacher will need to circulate around the room when the students begin working on their own.
3. Toward the end of class have some the students who have good keys made share with the class. Encourage everyone to look over their key as these students are presenting their keys. If they see something wrong in their key now is the time to fix it.
4. Assign the completion of the key for homework, explain to them they will be testing it out tomorrow.

Day 7:

1. Show the students a picture of a largemouth bass. Have them use their keys to identify the fish. If everyone does well, then its time to give the performance assessment.
2. Hand out pictures of fish labeled with numbers. Have students get out a separate sheet of paper and number it 1-10. As students identify a fish write the scientific name next to the corresponding number on their paper.
3. Take up and grade.
4. Discuss with students what worked and what didn't, so they can improve their keys.
5. If needed re-teach and rework keys. And present them with a similar assessment tomorrow.

Definition/ Explanation of Concepts

Binomial Nomenclature - system of nomenclature in which each species of animal or plant receives a name of two terms of which the first identifies the genus to which it belongs and the second the species itself

Class - a major category in biological taxonomy ranking above the order and below the phylum or division

Classification- systematic arrangement in groups or categories according to established criteria

Dichotomous Key- a key for the identification of organisms based on a series of choices between alternative characters

Family - a group of related plants or animals forming a category ranking above a genus and below an order and usually comprising several to many genera

Genus - a category of biological classification ranking between the family and the species, comprising structurally or phylogenetically related species or an isolated species exhibiting unusual differentiation, and being designated by a Latin or Latinized capitalized singular noun

Kingdom - a major category (as Plantae or Protista) in biological taxonomy that ranks above the phylum and is the highest and most encompassing group

Order – a category of taxonomic classification ranking above the family and below the class

Phylum - one of the usually primary divisions of a kingdom

Species - category of biological classification ranking immediately below the genus or subgenus, comprising related organisms or populations potentially capable of interbreeding, and being designated by a binomial that consists of the name of a genus followed by a Latin or Latinized uncapitalized noun or adjective agreeing grammatically with the genus name

Assessment

Various assessments will take place during the 7-day unit. Informal assessment will include group and individual questioning, and direct observation. Formal graded assessments will include the group presentation of supermarket aisles, journal assignment, scientific classification assignment, dichotomous key homework assignment, and dichotomous key performance assessment.

Resources

Kinman, Benjy T., Kentucky Fish, Kentucky Department of Fish and Wildlife Resources, 1993, 9/25/03.

Padilla, et. al., *Prentice Hall Science Explorer: From Bacteria to Plants*, Prentice Hall School Group, April 2002.

Merriam-Webster Online Dictionary, 9/25/03.

Various Dichotomous Keys from the Reading the River Project