Ages:

9 & up

Make a Key to Everyday Objects

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Main idea: Introduce students to dichotomous (two-choice) keys. Keys are usually used to help discover the names of plants or animals. For example, you can use a key to find the name of a tree by looking at a leaf. This activity (see below) uses common classroom objects, such as pens, erasers, rulers, etc., to teach students how keys are made and how they work.

Objective: By actually creating a simple key to everyday objects, the students should have a firm understanding how keys work and how they're created.

Materials: Pencil and paper for each group and 6 to 8 common objects. The example key in this activity uses a ruler, pencil, ballpoint pen, eraser, paper clip, scissors, rubber band, thumb tack, and glue stick.

Motivator: Once technique is learned, students can set up a key to the students in their class.

Initial questions:

Is it important to know the name of an animal or plant? Yes, knowing the name of an animal or plant is crucial for us to learn more about it. Names provide a kind of "key" for unlocking the secrets that have already been learned about a plant or animal. Knowing a name allows us to tap information others have already found out.

How would you go about identifying an animal or plant you found if no one in our group knew its name? You can always ask someone else, you can find out what other kind of organism you know about that looks similar and use that to help you find its name. You can use a field guide to birds, reptiles, flowers etc. to try and identify. Or you can use a key (if you can find one) for your specimen.

Activity:

How to introduce your students to the use of keys: Keying is a special kind of sorting, and should be understandable to students who have done sorting activities. Third or fourth grade is a good level to start working with keys although higher grades are very likely never to have used a key. Common classroom objects, such as pens, erasers, rulers, etc, can be used to teach students how keys are made and how they work. It's easier to learn this activity by doing it, but the following explanation will help teachers who have never done it before.

To begin, collect six to eight objects from the students. None should be identical. Ask the students to suggest a definition (criterion) that could be used to divide the collection into two groups. (The groups don't have to be equal in number.) For example: Metal or nonmetal.

As ideas are voiced, ask if they're clear to all. Discard any suggestions that are ambiguous for dividing the group. Now, physically divide the group into two subgroups. Write the criterion used to divide it in the form of two choices, each preceded by the number 1. For example:

1. contains metal …….go to number 2

1. does not contain metal

Chose one of these choices and write "go to number 2" after it. Now look at that subgroup. Find a criterion that can be used to divide that group into two smaller groups. Write those choices, each preceded by a number 2. (See pair #2 in the example below.) Remember, the choice only applies to the group or subgroup you are currently working on.

Whenever the division of a group produces an individual item, follow that choice by the object's name. (See pair #3 in the example below.) Whenever there are two or more items left together, find another criterion for dividing them and write another pair of choices.

Once you finish the first subgroup, go back to the other and go through the same process of looking for criteria that you can use to divide it into smaller groups. You will have to leave some of the "go to number___" parts unnumbered until you are ready to write the pair of choices used to divide that group. Once the original group is completely separated, you should have a series of sequentially numbered pairs of choices, and you should have written the names of all the objects somewhere in the key. It might look something like this (next page):

1a. Item made of at least some metal…….go to 2

1b. Item does not contain any metal…….....……go to 6

2a. Item used as writing instrument……..……go to 3

2b. Item not used as writing instrument……...…..go to 4

3a. Item writes with ink…….....……ballpoint pen

3b. Item writes with carbon……..….....…pencil

4a. Item has sharp cutting edge…….....…scissors

4b. Item does not have a sharp, cutting edge….....go to 5

5a. Item has a sharp, pointed end…….....……thumb tack

5b. Item does not have a sharp, pointed end……....…..paper clip

6a. Item is hard…….....…….go to 7

6b. Item is not hard …….....……..rubber band

7a. Item is numbered in equal divisions……....……ruler

7b. Item not numbered in equal divisions…….....…go to 8

8a. Item can write on paper…….....……..pencil

8b. Item can't write on paper…….....…..go to 9

9a. Item has a sticky, central core……...……..glue stick

9b. Item does not have a sticky, central core…….....…..eraser

Once the key is made, ask students to test it by working in pairs, one thinking of an object from the original group and the other asking questions from the key to determine the name of the object. This simple key can also be used to illustrate the problems that occur if the key is applied to an object not in the original group, or if someone tries to start in the middle instead of at the beginning.

Once the students understand the concepts involved in preparing a key, have the students prepare a key to the students in the class. This is a good activity to do in the beginning of the year for name recognition. Using one's classroom peers is a good second step and is a fun activity in itself. Caution does need to be made so that students are respectful of each other throughout the process. Teacher participation is highly recommended.

Background:

Dichotomous keys are used to help us identify all kinds of things that are unknown to us. Using keys can be a scary task, but with a few hints, anyone can learn to use them. Creating a dichotomous (two-choice) key is a practical exercise that the students can perform and come to a real understanding how they work. Students will create a key using simple, everyday objects..

Why use keys? Keys are a great learning tool! Whatever it is you're keying, be it plant, animal or soils, you will notice details that would otherwise have escaped you. Also, keys connect objects with names, and names provide access to information.

Where to start: Always start at the first line of the key. This may be number 1, or letter A, or any similar designation. If you don't start at the beginning, you're much more likely to get the wrong answer.

How to proceed: Most keys offer choices in pairs (dichotomous keys), one of which is true and the other false. Every choice leads either to a name or to another choice. The task of the user is to decide which choice is true. If that choice leads to another number or letter, go to that place in the key and decide between the next 2 choices. If the choice you make leads to a name, you have probably identified your object. However, it is always a good idea to read a description of that object to make sure it fits. If it doesn't, go back to the beginning of the key and check each of the earlier choices you made.

Some keys may provide three or more choices instead of just two found in dichotomous keys. But understanding the procedure, working with only two choices in this basic key, will make others much easier to use.

What you need to know to use a key: You must speak the "language" of the key you are using. That means looking up terms that you don't understand. Also, it requires participants to look more carefully at objects than they're accustomed to. This alone provides a valuable learning experience.

When you can't use a key: Keys are connected to a place. Trying to apply a key to a different place or habitat from which it was prepared will not work. It should be quickly apparent that a key designed to identify plants in Hawaii won't work in New York state. The students will understand this concept if a key is made for their school classroom and someone suggests it be applied to a different school. It just doesn't work!