

CLASSIFICATION

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Purpose

Geology started as an observational science. The history of the discipline is one of describing the earth around us. A list of descriptions is useless without some way of organizing the descriptions and making associations between similar observations. The first step in all geologic problems is to observe and to classify information into orderly categories. Classification is a process frequently performed and little understood. This project is an exercise in classification using observations and student developed criteria for an exercise involving scientific method.

Definitions

Classification - Act or result of classifying; systematic arrangement of classes.

Classify - To group or segregate in classes which have systematic relations.

Teacher Information

In geology we classify everything: minerals, rocks, fossils, maps, landscape, waves, energy, etc. Rock classification, for example, is the last step in identification and gives the rock its geological name. We classify rocks on the basis of mineralogy and texture. Texture, to a geologist, is how the minerals fit together; are they interlocking like the parts of a jigsaw puzzle or are they touching like billiard balls in a rack or pills in a bottle? But texture, to non-geologists, can also mean smooth like glass, softly textured like unfinished wood, or rough like sandpaper. If it is a piece of rock that you can hold in your hand, is it angular, football shaped, disc-like, or spherical? Mineral identification and the quantity of each mineral in the rock is used for classification. But sometimes the minerals are so small that even a trained geologist cannot identify the minerals. For times like that, we frequently work with color or shade. Is it dark or light? Does it have gray minerals, pink ones, or clear grains that look like bits of glass. Geologists even classify materials on the basis of taste (salty or gritty)! When people classify materials, some will make a few large groups of many samples each, some will make lots of little groups. We call these people lumpers and splitters: lumpers make very few groups of similar materials, splitters think everything is different. All classification systems are correct as long as the system groups together those things that belong together and separates those that do not.

Materials

What you use for this exercise can be anything! You can have the students make a collection or you can supply the materials. I have done this exercise with everyone from pre-schoolers to adults. I tell them to collect a handful of small rocks. They should end up with 10-20 pieces. You might want to suggest they look in their yards, gardens, gullies; anywhere that dirt and rocks can be seen. That's all, don't tell them anything more. If you want to supply the material, you collect a lot of different small rocks. Streams and beaches are the best places to collect. Mix them all up and let the students pick their collection from your materials. If you cannot find small rocks, you can use anything else: marbles in a variety of colors, patterns, and sizes; a lot of different vegetable seeds, wild bird seed, or nuts; all different kinds of M & Ms; a variety of bolts, nuts, washers, and screws; pictures cut from magazines; etc.; even a mixture of the materials from this list. The materials do not matter, the only requirement is that there be a variety.

Student Exercise

What really is the process of classification? The best way to describe it is that you group

together those things that are similar and separate those that are not. These are the only criteria that are to be applied in the following exercise. There is no such thing as a "correct" classification. All it must do is group together similar things and separate things that are not similar.

1. Have the students make a collection. You may tell them what kind of materials to collect and suggest places to collect them, but no more. This is the student's collection. You can have them do this as an overnight homework assignment. I suggest that you have them make a new collection for this exercise or you will get the rockhound's child bringing in a collection of exotic materials and asking you to identify them.
2. Have the student classify their collection. Tell them to make groups of the things that are the same and separate groups of things that are different. Let them decide the criteria for sameness and decide on the number of groups. Some students may find that they have no idea how to proceed. You may suggest ways for them to do a classification, but do not tell them what criteria to use. I tell them to work on their own so that the ideas are theirs.
3. When they are done, ask each student (or a few students) how they decided which rocks (materials) went into each group. You can do this orally or have them write it down. Write their criteria on the board for all to see. Watch out for hurtful comments from the other students. If you get them you can remind the students that no classification is dumb, and what appears dumb might even be a better way. You will find that they used size, color, shape, feel (texture), roundness, sharpness, taste, ... all the things that scientists use. Point out to them that the classification system that they just developed, on their own, is the one that scientists use. They are scientists! Compare what they have done with the system of classification used in their text. Let them discover the similarities and differences. Of course, you will also get classification criteria that are completely off the wall, but why not point out that as long as another person can measure that characteristic, maybe it is just as good as the way scientists do it, or maybe even better!