1,2,3 – Sand, Silt, Clay and Me

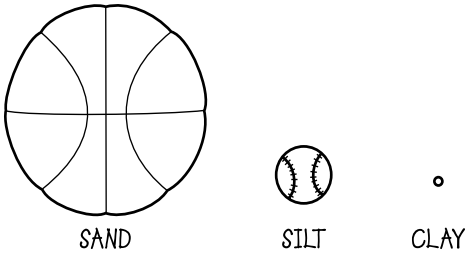
Between 1982 and 1992, 6 million acres of prime farmland in the United States were converted to some other use. This area represented in football fields would circle the earth 14 times if laid end to end.

Equipment/Materials

beach ball or basketball	softball or baseball
marble or BB	sand*
potter's clay or modeling clay	flour
soil samples from local area	water
clear, sealable containers**	test tube rack

* granulated sugar or table salt may be used if desired

** glass canning jars with lids, plastic jars, screw top vials, test tubes



Procedure

1. Collect (or assign participants to collect) soil samples from several areas in your community. Try to get samples from a variety of sites, including cultivated fields or gardens, roadsides, stream banks or areas under dense plant cover (woodlands, grasslands, etc.).
2. Use the combination of balls to create an analogy with the different sizes of soil particles — beach ball or basketball represents sand, softball or baseball represents silt, and marble or BB represents clay. Explain that this approximates the way the soil particles relate to each other in size.
3. Have participants guess which particles have the most space between them. Lead them to conclude that space between particles increases with particle size.
4. Encourage students to think about why sandy soils drain faster but dry much more quickly than soils that are high in clay.
5. Allow participants to feel the textures of the sand (or its mimics), flour and clay. Emphasize the gritty feel of sand, the floury feel of dry silt and the slick feel of clay. Note that moist clay can be squeezed between the fingers to form a ribbon of soil.
6. Have participants feel the soil samples provided, recording their guesses about the relative amounts of sand, silt and clay in each sample. Stress the characteristics they have just learned. Note that the proportion of clay in the soil is directly related to the length of the ribbon that can be formed with the soil sample.
7. Divide the group into pairs or groups of three. Provide each group with a small soil sample (enough to fill the container being used about an eighth to a third full). Have each group place the sample into a container and cover it completely (filling the container about half full) with water. Seal the container and shake it vigorously to thoroughly mix the soil with the water, then place it upright and allow the soil to settle.
8. Have the participants observe the soil as it drops out of suspension. The coarser particles will settle out first (almost immediately) followed by silt then clay. Finally the lighter organic material will settle on top of the clay layer. Some organic matter may be light enough to float on the surface of the water, and some clays may remain in suspension for a considerable length of time.
9. If desired, measure the relative thicknesses of the layers, and compare these observed values with the estimates made by feeling the soil. Remind the participants that use of this technique improves with practice.
10. Compare the proportions of sand, silt, clay and organic material among the samples. Lead participants to consider possible reasons for any differences they observe.
11. Encourage them to consider and discuss the types of soils from their samples that would be best for plant growth.