Kinesthetics in the Science Classroom

««« By Andrew Selvam

Andrew Selvam was a preservice teacher at the Ontario Institute for Studies in Education of the University of Ontario when he wrote this article. He was a recipient of the 2006 STAO Pre-service Award for this submission.

Curriculum Connection: Activity One: SNC 1D/P, SBI 3U/C; Activity Two: SNC 1D/P and SCH 3U/4C

An ancient Chinese proverb resonates the enduring truth of kinesthetic learning: "I hear and I forget, I see and I remember, I do and I understand."

Kinesthetics is and always will be one of the most successful and interactive teaching tools among the multiple intelligence continuum provided for teachers. Examples of kinesthetic learning in the science classroom may include the use of physical objects, role playing, case studies, field trips and laboratory experiments. In particular, the use of laboratories as a form of kinesthetic learning continues to provide students with an opportunity to become actively involved in the scientific process. Laboratories also help students explore their own ideas in relation to the scientific method.

Kinesthetic teaching strategies can be applied in all science disciplines and have been proven to help students' enduring understanding of key curricular concepts. Another widely used form of kinesthetic learning is role-play. Below are the instructions for two types of kinesthetic lessons in Biology and Chemistry.

Angiosperm Aerobics (The Life Cycle of an Angiosperm)

1. Ask for six volunteers to illustrate the petals of an angiosperm plant (flower). (Note: it is not necessary to have a six-petal flower; three to six petals are sufficient depending on the class size)

2. Ask the petal people to raise their hands in front of them and bow forward, so that all hands are towards the centre.

3. Ask the petal people to move their hands backward as best they can to exhibit movement of the petals (they do not have to bow now)

4. Ask for one female volunteer to represent the female part of the flower – the pistil. Ask the volunteer to lift her hands above her head with her wrists touching. Make sure that she curves her hand in the shape of a U. Also ask that she maintains a plie (ballet position involving the squatting of the legs). The hands will represent the stigma. The plie will represent the ovaries and the body itself will represent the style.

5. Ask for one male volunteer to represent the male part of the flower – the stamen. Ask that the volunteer to wrap his hands around in a circle in front of him. This will represent the anther.

6. Ask for one volunteer to be the pollinator (bird and/or bee). If time allows, antennae can be made from pipe

cleaners and beaks can be made from construction/cardboard paper. This person (representing the bird and bee) will buzz or fly around the flower – to help pollinate the plant and initiate its reproductive development.

7. The person representing the pollinator will grab the pollen (represented by a scrunched piece of yellow pastel coloured paper) from the male part of the flower.

8. The pollinator person will place or drop the yellow ball in the curved hands (U-shaped) of the female part of the flower (person)

9. This will represent the beginning of plant sexual reproduction and the formation of a seed that will grow into a new plant.

10. For self-pollination, one pollinator, one stamen, one pistil and three to six petals are sufficient. The male and female floral parts would be positioned in the centre surrounded by the petals.

11. For cross-pollination, there can be two sets of people representing the flowers with at least two pollinators – one pollinator person to move from one group to the other. In this case the pollinator person will grab the yellow ball from the male part of the flower in one group and move it to the female part of the flower in another group.

12. Optional: Make some costumes if you really have time!

Tug-of-War Bonding (The Bonding Continuum)

1. Use rope or shoestring to represent either the ionic, covalent or polar covalent bond (as your lesson plan allows it).

2. In the middle of the piece of rope, place some form of flag (tape or cloth) at the centre to represent the electrons that are either being transferred or shared)

3. Mention to students that height is equivalent to electronegativity. So the tallest individuals in the class are the more electronegative.

4. For the ionic bond, ask for two volunteers (a taller and shorter individual). Ask them to grab either end of the rope. The taller student (more electronegative) should pull the rope with more force, so the taller students hands will eventually grab hold of the flag or electrons. This shows complete transfer.

5. The covalent bond is fairly simple. Ask for two volunteers of approximately the same height. Ask each student to pull with equal force, so that the flag remains at the centre, shared amongst the two individuals (elements). This shows the sharing of electrons.

6. For the polar covalent bond, ask for two volunteers (a taller and a shorter individual). Ask the taller student again to pull with more force, so that the flag is closer but not completely in front of that student. This shows the unequal sharing of electrons. Show students the pulling force (with one arm in front of the other – to represent the drawing of electrons).

Used in both practica, kinesthetic lessons have also proven to be the most memorable as cited in evaluations. One student at St. Augustine Secondary School in Brampton, Ontario commented, "You tend to learn and remember more if you get up an do it." In an endeavour to assess the usefulness of kinesthetic learning, colleagues and I performed an action research project on the effects of kinesthetic learning. Our results suggested that kinesthetic learning has an increasing effect on student attitude conference and grades. As a future teacher, the goal of student success is clear and an endeavour I hope to continue to reach with the use of kinesthetic learning.

Special thanks to my colleagues Nicole Cheung-Seekit, Roseanna Lai and Naheed Habibzadah, Virginia Bodsworth and Jennifer Garthson for their input and collaborative work in respective research on *Creativity in the Bonding Continuum and Lights, Camera Kinesthetics* (Kinesthetic Learning).