Sideways Thinking

Grades: 4 to 9
Duration: 1.5 to 3 hours
Materials: Cardboard file cards, rulers, thermometers, zip-lock baggies, drawing paper, pencil crayons or felt markers, calculators, digital camera or camcorder.

Objectives

To encourage students to look at their environment differently, stretching their imagination and creativity to its fullest potential.

Prescribed Learning Outcomes

It is expected that students will:

- predict the results of an experiment
- perform an experiment by following a procedure
- use appropriate tools to assist in observation
- construct simple definitions based on their experiment
- demonstrate an ability to recognize a valid interpretation of their results
- present their interpretation of the results from an experiment
- use a variety of media to present information
- demonstrate responsible action when using the scientific information and skills they have developed.

Suggested Instructional Strategies

- Make a set of cards with one of the tasks listed below on each card. There are two main options.
  1) Divide your students into groups, and assign one task to each group.
  2) Assign each task to all the groups over a longer time period. Allow sufficient time for students to work their way through each activity (15-30 minutes).

- Their first reaction may be, "That's impossible!" They will probably want to give up quickly, so the teacher might have to do some coaxing along. Sooner or later, an idea will surface, and once the thought barrier is breached, more ideas will emerge. Example: "Map something you cannot see." Suggestion - the temperature of the air at varying distances from a hot air register; from a cold window.

Tasks:

1. Go outside and construct a map of something you cannot see.

2. Find something in your environment that is increasing in number and prove it! Find

something that is decreasing and prove it.

a. Classify the increases and decreases you find as good, bad, or neutral.
b. Find something that increases or decreases but not in numbers.
c. Find something that always increases or always decreases.
d. Make a poster showing things that are increasing or decreasing and your feelings about those things.

3. Go outside and observe and record indirect evidence of a population of something.
   a. Find evidence of a population that no longer inhabits this place.
   b. Estimate the size of the population from the indirect evidence.

4. Go outside and prove that some living thing in your environment changes.

5. Make a list of things in your environment that can't be photographed ... then photograph or obtain a picture of one. (A microphotography site is a great start!)
   a. Repeat using a medium besides photography.
   b. Measure the amount of one of the things photographed.
   c. Find examples of invisible things that may become visible. (Fossils, sediment layers…. I.e. woolly mammoth baby discovered in Canada's permafrost…or, asteroid revealed in sediment)
   d. Map one of the things photographed.

6. Go outside and find evidence of a good change, and a bad change, and a change which can be neither good nor bad. A US marine biologist offers some insights here.
   a. Go outside and make a good change, or stop a bad change.
   b. Measure the changes, predict the size and direction of future changes.
   c. Create a poster illustrating a good change, or discouraging a bad change.

7. Find the youngest and oldest thing in the school; outside the school.
   a. Rank the things they found in order by age.
   b. How is age determined?
   c. How do they feel about old things? Very young things?
   d. Describe oldness, youngness without using those words.

8. Go outside and bring back things that make you feel:
   - angry - afraid - sad
   - happy - beautiful - tough

   a. Instead of things, use colours
   b. Try some of your own words

9. Make a list of things which appear to be impossible to count, then count any three.

a. Do the numbers of a thing which appears impossible to count change from time to time?
b. What makes something impossible to count? How does it become impossible?

10. Map the places in your environment in which you feel the most and least comfortable. How does your comfort conflict with the comfort of others?

11. Take or find a picture that is positive evidence that something natural happened. Go outside and find joy in the environment. Find living and non-living things.

Invent ways to bring more joy into your classroom, your school, your environment. How does nature affect your mood? What is funny or sad? What affects your mood?

12. Take three familiar objects from your environment and invent a new use for them. Find a new use for numbers; words; and demonstrate them.

13, Take a walk around the school and find one million of something - and prove it. (Blades of grass, pebbles in a nearby creek, grains of dirt….)

Suggested Assessment Strategies

Each task offers an opportunity for class discussion, and many of the results can only be evaluated subjectively. Results could be displayed on whiteboards etc. An important goal is to have the students realize though this discovery activity that their environment can be viewed in so many different ways, and that we should always be open to new ideas. Creativity can be learned - it just takes opportunity, and an accepting mindset, and practice.

Extension Activity

- A NASA scientist once said "There are no difficult problems - just interesting situations that require solutions." These tasks are already an extension of our traditional way of problem-solving. No doubt, more ideas to explore our environment exist. Teachers should challenge their students to create more tasks.

Cross-Curricular Interests

Science-Technology-Society
Social Studies, Math, Fine Arts, Writing, C.P.P.

Suggested Links
http://www.earthrangers.org/wp-content/uploads/2016/08/math_in_the_schoolyard.pdf
http://www.schoolyards.org/teaching.science.html

Lesson plan submitted by: Ken Pugh
Prepared/adapted by: Audrey Perun for FORED BC