**Lesson Topic: Grade Level: Time:**

Wind Energy K-2 30 minutes

**Objective:**

Students will construct a functional pinwheel in order to observe how wind can create energy.

Students will learn about wind and its effects in order to identify wind as a form of energy.

**Teacher Background Information and Instructional Alternatives**

* <http://www.youtube.com/watch?v=zMkDwx4HZu8> This site includes a short YouTube video demonstrating how to make a pinless pinwheel.
* <http://www.kids.esdb.bg/wind.html> This site could be used during the explanation. It provides information on wind and wind turbines and also includes photographs.
* <http://www.kidcyber.com.au/topics/windenerg.htm> This site includes an explanation of wind energy that the teacher could read to the students during the explanation. It includes photos as well.

**Materials Needed:**

-pinwheel template (one per student)

-picture of wind turbine

-pencil (one per student)

-pipe cleaner (one per student)

-glue

-hole punch (for teacher)

-Windy worksheet (optional assessment, one per student)

**Engagement:**

-Have students work in partners to list all of the ways they can tell that there is wind. Allow them to brainstorm for 5 minutes, and then share ideas as a class.

**Exploration:**

-Using a lightweight object such as a crumpled up piece of paper or a craft pompom, challenge the students to move the object to the other side of a table or desk. The only rule is that they cannot touch it themselves or with any other object. The desired outcome is for students to recognize that they can blow the object to move it.

**Explanation:**

-Discuss with students how wind is created. As the sun heats the earth, it heats it unevenly. Warmer air rises, and cooler air rushes in to take its place. This is wind.

-Ask the students if they have ever heard of a wind farm. What do they think a wind farm creates? Explain to students that a wind farm uses wind to create energy, which can give things the ability to do work just like electricity.

-Ask if anyone knows what is used to collect wind so that it can be used create energy. Students may suggest a windmill, and tell them that with today’s technology they are actually more advanced and called wind turbines.

- Use the hand out that shows the wind turbine to illustrate the discussion. Ask students what they see on this turbine. When they point out the blades ask them what the wind does to the blades. The wind turns the blades, creating energy that is stored in a generator, which is a machine connected to the wind turbine. So when the wind makes the blades move it is powering a machine inside! This machine is what uses the wind to make the energy we use! The following sites display a picture for the students if you can provide additional background information.

* <http://www.kids.esdb.bg/wind.html> This site could be used during the explanation. It provides information on wind and wind turbines and also includes photographs.
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-Tell students that this form of energy is good for our earth because it can be used over and over again and does not cause pollution.

**Extension:**

-Students will be creating a pinwheel to model the way a wind turbine works. They can observe the effects of the wind (i.e. their breath) on the pinwheel.

-Directions for making a pinwheel:

1. Give each student a copy of the template. Have them cut out the outline of the square. If time permits, they could decorate both sides at this time.
2. Cut along the diagonal lines, making sure to stop cutting at the end of the line. It is important that the diagonal cuts do not go all the way to the center.
3. Put a thin layer of glue on the center circle.
4. Fold each dotted corner into the center circle. Allow it to set a moment for the glue to dry.
5. At this point, the teacher needs to use the hole punch to punch a hole in the center. You may want to punch two overlapping holes to make the opening a little larger, depending on the size of your pipe cleaners.
6. Wind one end of the pipe cleaner around the pencil 2-3 times and then remove the pencil. This will serve as a “blocker” to keep the pinwheel from falling off the pencil.
7. Put the other end of the pipe cleaner through the hole in the pinwheel, with the “blocker” in front. Wind the free end of the pipe cleaner around the pencil to connect the pinwheel to the pencil so you can hold it.

-Once the students have created their pinwheels, they can act as the wind and blow their pinwheels. If it’s a windy day, you could go outside and really put the windmills to work!

**Possible Evaluations:**

-Orally or in writing, have the students how our pinwheels are like wind turbines. Students could add a picture of the wind’s effects on their pinwheels.

-Have the students complete the prompt on the Windy worksheet, by looking at the picture and telling what will happen when Windy blows the wind turbine.

**Math Situations:**

Have the students complete math situations with their pinwheel! Using the numbers that they have found will make the lesson more relatable!

-How many times did it turn in one minute outside?

-Have a partner blow their pinwheel and the other student count how many times it went around. You could compare those two numbers, add or subtract them.

-How many more times did the pinwheel go around the first time than the second time?

 -What was the total amount of times that it went around after 3 times?

- How many times would the pinwheel go around in 2 minutes if it went around 8 times in one minute? Etc.