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Natural Disasters: An Adventure in Non-Fiction

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Introduction

Natural Disasters: An Adventure in Non-Fiction is an eight-week study designed for the first grade classroom. The unit is formatted in three sections. The first focus is learning to read non-fiction text and recognizing its format. The second section of the unit is using non-fiction text to perform experiments related to natural disasters. The third portion will be a writer's workshop which will allow the students to use data from their experiments to write their own non-fiction text.

Using natural disasters as an exciting subject, I hope to introduce that content, vocabulary text features and text structure are unique to non-fiction. The students will experience the science in connection with reading, and use these new skills to create their own text to be published and shared with other classes.

My unit will be taught to a self-contained first grade in New Haven, I have a class of 26 mostly six and seven year olds with a possible eight year old. Our neighborhood magnet setting is a rewarding environment, with students coming to school each day from many home settings and at many different academic levels. As a result of these variables, the children have differing levels of background knowledge and life experiences. The classroom is a mixture of varied ethnicities, economic strata and social and emotional strengths and weaknesses. The unit will help to prepare the students for the Connecticut Mastery Test by exposing them to new experiences in science and non-fiction reading and writing.

Unit Purpose

Many teachers in primary grades are teaching in self contained classrooms, generally focusing on literacy and math. I would like to build background knowledge for teachers to feel comfortable teaching about our Earth, its natural disasters and performing experiments to build understanding. Often as primary level teachers, we do not have specific training or knowledge of a specialized content area. My goal with this unit is to bring the

excitement and fascination associated with science exploration into classroom reading and writing.

First grade students come to school in the fall ready to learn to read. During their young lives they have heard stories read to them or told to them. This type of literature, fiction, is their first introduction to reading, through modeled story-telling. Comprehension is assessed through the child's ability to retell the story, including plot sequence, characters, setting, personal connections. In contrast to this, children are often less exposed to non-fiction at younger ages. But, what really is nonfiction? Non-fiction, or expository text, provides information with the purpose to explain, inform or persuade. Non-fiction surrounds us in daily life in many forms - newspapers, maps, assembly instructions, recipes, signs. Teaching students to read non-fiction is essential as we teach them to develop as readers.

Learning to read in the content areas begins in the primary grades. Young children can learn through text. Research shows that being able to learn from text takes several exposures and should be coupled with rich experiences to provide children with a firm foundation. This will enable them to be prepared for the more difficult materials they will encounter as they move up through higher education. It has been maintained for some time that children prefer storybooks to other genres, such as information books. In a study of the books first graders chose during recreational time, it was found that many children showed a preference for information books (Donovan, Smolkin, and Lomax, 2000). Consequently, elementary grade classrooms should include a balance of genres. And as young children already have the motivation to read and hear non-fiction, this makes the teacher's task of providing that foundation an easier one. It will help prepare the students for the shift in the materials and content they will read in later grades.

As our students progress through school, more and more of their reading is non-fiction: content area textbooks, reference books, periodicals, articles on the internet. Unlike narrative text, a story, expository text explains facts and concepts, many complex and difficult to understand. Readers are asked to not only comprehend ideas but to extrapolate and remember significant main ideas and integrate with information from prior knowledge. Students must recognize cause and effect, compare, synthesize information, and evaluate proposed solutions to problems as they read. Developing readers are quite challenged with these tasks!

Children love learning in an exciting event-filled environment. Creating this in the classroom can be a challenge for the primary teachers. Allowing students to try things out, test ideas, and have first hand experience with cause and effect enhances the learning experience and gives children a relative understanding of complex information.

The Layers of the Earth

The earth is made up of four different layers. Geologists believe the earth wasn't always made up for four layers. Instead, they believe that as the earth cooled as rapidly as it did that the heavier materials sank into the inside of the earth and the lightest materials rose to the top. This explains why crystal rock, oceans, and atmosphere are on the surface of the earth and the much heavier things such as iron are located in the earth's core.

The Crust - the part of the earth that we live on

The Mantle - a hot area that has the ability to flow which includes:

the lithosphere or upper mantle, the solid rock plates resting on the lower mantle

the asthenosphere, the layer that flows very slowly to move the plates of the earth

The Outer Core - the heaviest parts of earth in a hot liquid state

The Inner Core - the heaviest parts of earth in a solid state

Plate tectonics

The theory of plate tectonics says that the lithosphere is broken into pieces called tectonic plates. The plates have a thin layer of crust above a thin layer of cooler, rigid mantle rock. Most of them have both continental and oceanic crust. These tectonic plates fit together like a jigsaw puzzle. There are about twelve large plates and a few smaller ones that make up the earth's surface. The plates float like rafts on the asthenosphere which is a flowing layer below the stiffer top layer of the earth's mantle called the lithosphere. When one plate moves, it affects all the others. The movement of some of these plates causes sea-floor spreading, collisions, and faults like San Andreas Fault.

There are several types of plate boundaries. Most are found on the ocean floor.

The first type is a divergent boundary. This is where two plates move away from each other. A mid-ocean ridge is an example of this type of boundary. The mid-Atlantic ridge is where new ocean floor is made, causing North America and Europe to be moving apart. When the plates move apart, magma flows up between them. It cools and forms new crust. This is why divergent boundaries are also called constructive boundaries. New ocean floor is being constructed at mid-ocean ridges.

Another type of boundary is called a convergent boundary. This is where plates come together and one plate is pushed under another. These boundaries are also called destructive boundaries since plate material is destroyed by subduction here; in particular, it is stirred back into the mantle. A deep-sea trench is an example of a convergent boundary. Along the edge of the Pacific plate, the largest plate is an area called the Ring of Fire. This is a line of volcanoes that are found along major trenches in that area. As plates collide along convergent boundaries, there is much friction and pressure causing earthquakes to occur. Such earthquakes can be severe. As the plate material is subducted, ocean crust and sediments are dragged down and at several hundred kilometers depth, they break down and release water that was dissolved in their minerals; the water weakens the overlying mantle rock and makes it easy to melt them rises to form volcanoes.

Other boundaries are called transform faults. A fault is a deep crack in the earth's surface. At these fault boundaries, the plates slide past each other. For example, one plate may be moving toward the north while the other moves south. Crust is neither produced nor destroyed at these boundaries. Most of these boundaries are found on the ocean floor.

Earthquakes

Most earthquakes are caused by fault movements associated with tectonic plates. The stresses are located within the crust and upper mantle of the Earth. Pressure builds up until the stress is so great that rocks eventually break, and the stored stress is released as energy in the form of earthquakes. This can be simply demonstrated in the snap of a pencil as it bends and breaks. In the case of the Earth, the transfer of energy can be great, and can extend over large distances. For instance, if you drop a pebble in a tub of water, you will notice that as the pebble hits the water, waves of energy migrate away from the initial drop. The ripples transfer the energy of the impact of the pebble a great distance from where it hit the water.

The energy released during an earthquake migrates from the focus of the earthquake (the location where the first rocks break) as waves. These waves are called seismic waves. The two general types of vibrations produced by earthquakes are surface waves, which travel along the Earth's surface, and body waves, which travel through the Earth. Surface waves usually have the strongest vibrations and probably cause most of the damage.

The vibrations produced by earthquakes are detected, recorded, and measured by instruments call seismographs. The zigzag line made by a seismograph, called a "seismogram," reflects the changing intensity of the vibrations by responding to the motion of the ground surface beneath the instrument. From the data expressed in seismograms, scientists can determine the time, the hypocenter, the focal depth, and the type of faulting of an earthquake and can estimate how much energy was released.

The severity of an earthquake can be expressed in several ways. The magnitude of an earthquake, usually expressed by the Richter Scale, is a measure of the amplitude of the seismic waves. The moment magnitude of an earthquake is a measure of the amount of energy released, an amount that can be estimated from seismograph readings. The intensity, as expressed by the Modified Mercalli Scale, is a subjective measure that describes how strong a shock was felt at a particular location.

Volcanoes

Volcanoes form when molten rock, created inside the crust or upper mantle of the Earth, moves upward and erupts on the Earth's surface. Molten rock is less dense than the surrounding rock, so it is buoyant and rises, just like hot air. Each eruption can produce layers of lava that will later become volcanic rock. These layers build the volcano.

Volcanoes have several shapes, which are controlled by the composition of the magma and the nature of its eruption. If a volcano produces very fluid lava (low in the compound SiO_2, or silica, which is what glass and quartz and most of sand is made of), the magma flows a long distance before it cools, making a flat, shield-shaped volcano. If the volcano produces very sticky magma (high in silica) it tends to have an explosive eruptive style that includes lava, pyroclastic flows, and ash. This material piles up right around the volcano, forming a steep cone, a classic volcano shape.

Depending on the pressure that forces the magma up, and depending on the viscosity (how liquid the magma

is) and amount of gas in the magna, eruptions vary in size, explosiveness and danger.

Caldera, plinian, and vulcanian eruptions are the most dangerous and explosive. Caldera-forming eruptions are the largest of the violent and explosive volcanoes. As a result of releasing high volumes of magma, these volcanoes will actually collapse back into the earth, into the void created by the emptied magma chamber. The plinian eruption carries magma high in viscosity and gas content to a lava plume up to 30 miles high in the air. Vulcanian eruptions carry material over a wide area and are commonly considered the early phase in the eruption of a volcano, sometimes referred to as "clearing their throats" before a more violent eruption.(Abbott, 2004)

Non-explosive type eruptions are divided into Strombolian, Hawaiian, and Icelandic. Strombolian eruptions are characterized by the intermittent explosion of lava from a single vent or crater. Each episode is caused by the release of volcanic gases, and they typically occur every few minutes or so, sometimes rhythmically and sometimes irregularly. Each eruption tosses magma and volcanic rock tens to hundreds of meter in the air. Hawaiian-type eruptions, after an initial venting of gas, have lava outpouring onto the ground. These eruptions can last for days or up to a year or more and are less dangerous. The magma released in these eruptions has lower viscosity and levels of gas. Icelandic-type or fissure eruptions are considered the most peaceful as they occur when magma flows up through cracks in the ground and leaks out onto the surface. These often occur where plate movement has caused large fractures in the earth's crust.

Hurricanes

Hurricanes form in the tropics where extremely moist air and heat are concentrated over the ocean, near the equator. The water temperature must be at least 80? Fahrenheit both day and night. Evaporation of the warm water into the atmosphere over the ocean makes the air very moist. Winds blowing across the ocean in different directions begin to push masses of warm, moist air toward each other. When the air masses collide, the air in the center starts to rise, forming an updraft. The moist air of the updraft begins to cool and water droplets form. These water droplets form clouds. This weather event becomes large enough to be influenced by forces created from the Earth's rotation. The energy of a hurricane comes from the heat released when water vapor condenses to liquid water. The atmosphere above a tropical ocean is the only place enough warm, moist air is available to produce the energy necessary to create a hurricane. The movement of a hurricane is somewhat predictable. It is so large that it moves with the Earth's wind currents that surround it. These wind currents are very large and steady and don't change course abruptly. Therefore, hurricanes usually travel in one of these wind currents until they meet another wind current, then they may change direction.

Hurricanes generally form in the southern Atlantic Ocean, the Caribbean Sea, the Gulf of Mexico, and the entire tropical Pacific Ocean and the Indian Ocean. They are called different names in different parts of the world; hurricane is the term used in the Americas, cyclones in the Indian and South Pacific Oceans, and typhoons in the west Pacific Ocean.

One very dangerous part of a hurricane is the eye-wall, which is near the center of the storm. Hurricanes move in a counter-clockwise direction around the eye of the storm. At some point, a hurricane may hit land. When this happens, the strong winds and heavy rains can cause serious damage. When the hurricane comes

on land, the mound of water pushed ashore by the wind is known as a storm surge, another quite dangerous part of a hurricane.

Hurricanes are placed into one of five categories. Once a storm reaches a wind speed of at least 74 miles per hour it can be classified as a hurricane. The categories are set up based on the storm wind speed and how it progresses. Wind speed and the chance to cause damage are factors that are looked at when deciding how to rate the storm, which helps people plan and be more prepared. Hurricane season is typically between June 1 and November 30.

Hurricanes are given names in order to help storm meteorologists track and identify them as they move across the ocean. Often a given ocean will have more than one hurricane moving across it at a time.

Tornadoes

Tornadoes are the most dangerous storms that nature creates. There are different levels of severity that a tornado can have. Some tornadoes just have strong winds but other levels can be deadly.

A tornado is rapidly rotating column of air descending from a large thunderstorm. For a tornado to occur from an ordinary thunderstorm several conditions must occur simultaneously: warm moist air from the Gulf of Mexico, dry cold air moving down from Canada or the Rocky Mountains, and jet stream winds racing east. These three air masses all moving in different directions collide into each other. Warm air rises by convection to form a vertical cloud mass. Cooling condenses water vapor in the air into the rain falls back down through the cloud cooling the lower air. Wind shear can tilt the thundercloud mass, causing rotation of the spinning roll of air.

Although the air is rising in a tornado, the funnel itself grows from the cloud toward the ground as the tornado is forming. The term "funnel cloud" refers to a tornado-like vortex that doesn't reach the ground. When a funnel cloud touches the ground, it becomes a tornado.

Tornadoes are also relatively small. An average tornado will be 400 to 500 feet wide and travel four or five miles on the ground, lasting only a few minutes. A mile-wide tornado is an extremely large one and tornadoes this big is rare. Many tornadoes are small, less than 100 feet wide, and last only a few minutes.

Some states are in a place called Tornado Alley. This is an area of the United States that is more likely than other places to have tornadoes. While other states can have a tornado, these states are the most likely to have them on a regular basis: Arkansas, Iowa, Kansas, Louisiana, Minnesota, Nebraska, North Dakota, Ohio, Oklahoma, South Dakota, and Texas.

In order to understand how dangerous a tornado is, weather specialists created a scale to measure how much possible damage is expected. This scale looks at the speed that the tornado travels and the size of the tornado. The scale is known as the Fujita scale. The scale moves from 0 to 5. Zero is the least amount of damage and is sometimes referred to as funnel clouds. There is not much damage expected with these. The highest level is the F5 which is the most destructive type of tornado.

The Unit

With the science background knowledge now in place, the next component is the reading and writing strategies. The three strategies to be used in the process are shared reading, guided reading, and writer's workshop. Many school districts supply a large quantity of non-fiction titles for shared and guided reading. All non-fiction books would work as the text features will be a highlighted piece of the unit. It is good have a planned supply of shared and guided reading materials, at least one to two books for each per week for the eight weeks.

Shared Reading

During a shared reading lesson, the children and the teacher sit close together to read and reread an enlarged text together. Children will be engaged in lively and enjoyable reading experiences while encouraged to attend to the print and share their responses to the text. While children have various levels of knowledge of reading, books and literacy in general, the teacher is challenged to engage and provide learning experiences to all students. The use of shared reading as a strategy allows all students to experience the joy of reading and to develop a deeper understanding of the content. This whole group instructional tool is part of a balanced reading program. With the teacher demonstrating and modeling the reading process, the students become co-readers. Shared reading builds a sense of community. Big books containing large pictures and print provides the environment for all students to read together. This creates an opportunity for the teacher to encourage predictions and discuss the story with scaffolded instruction and vocabulary relative to the students' levels. It also enables children to read more confidently as they are encouraged by the enthusiasm of the group.

Guided Reading

Guided reading is a component of balanced literacy that has specific instructional, diagnostic and evaluative intent. It supports the development of strategies for independence in reading within a small group (usually 4 to 6). Each child has a copy of the selection from a set of leveled books at that group's instructional level. The students are grouped according to similar levels with these groups remaining flexible and ever changing. Guided Reading provides children with opportunities to problem solve and use reading strategies while reading for meaning. There are great advantages in working with a small group, with each child holding their own text. This allows the teacher to monitor the reading process of each child, provide feedback and instructional guidance and give the readers an opportunity to ask questions and respond orally to the text. In addition, the teacher may extend the learning from that text through written response. Guided reading encourages and supports students becoming fluent, established readers. Learning how to read and reading to learn are the goals.

Writer's Workshop

The idea behind Writer's Workshop is for each student in the class to be a working author. The teacher is a writing professional and peer coach, guiding authors as they explore their craft. Instead of spending time on spelling tests, grammar worksheets, handwriting practice, and other isolated sub-skills of writing, Writer's Workshop is designed to emphasize the act of writing itself--students spend most of their time putting pencil to paper, not just learning about it. Over time, students learn to choose their own topics and to manage their own development as they work through a wide variety of writing projects in a sustained and self-directed way.

In Writer's Workshop classrooms, full class lessons are short and tightly focused on practical real-world issues. Emphasis is placed on sharing work with the class, on peer conferencing and editing, and on the collection of a wide variety of work in a writing folder, and eventually in a portfolio. Teachers write with their students and share their own work as well. The workshop setting encourages students to think of themselves as writers, and to take their writing seriously.

The students will begin writing and publishing their own non-fiction text based on our classroom experiences and discussion, using the learned format. This will forge a deeper understanding of a science text book, a tool and resource they will use for their entire school career, and hopefully beyond. The intent is to develop a true interest and understanding of the use of non-fiction as a learning and research tool.

Pacing Guide for Lessons

Week 1 - Non-Fiction reading
Week 2 - Non-Fiction reading
Week 3 - Plate Tectonics
Week 4 - Earthquakes
Week 5 - Volcanoes
Week 6 - Hurricanes
Week 7- Tornadoes
Week 8 - Complete and Publish Text

As the pacing guide lists, this unit will take one marking term of lessons to complete. Each lesson will be approximately 30-45 minutes, with two, possibly three per week during some weeks. The first part of the unit will be the introduction of non-fiction texts and beginning to identify the various unique parts of non-fiction. Several titles will be introduced through shared reading (big books) as a whole class and leveled guided

reading with small group instruction. The leveled books will be appropriate for the reading level of the group ranging from DRA Level 2 - 20. As this is a fall to winter unit, there will be a heavy focus on the lower level books, recognizing the beginning skills on much of the class.

This will be the focus of the second part of the unit. Children this age have a genuine excitement for big changes, generally because at their young age it is a first experience, or the first one they remember. The more dramatic the experiments, certainly the more memorable they become. The goal is to design demonstrations of natural disasters - earthquakes, volcanoes, hurricanes, tornadoes - at a first grade level with available materials. As we work through our experiments the students, as any scientist, will maintain a journal of processes and results. This of course for many will be mainly illustrations with some writing. These science journals will be the foundation for what will become their own published text. As the students learn to collect, organize and record data, the two areas of reading and science will begin to come together. The students will have knowledge and use of weather/disasters vocabulary, scientific terms to use in their writing, and the comprehension to discuss their findings. These, of course, will all be age appropriate.

Understanding the developmental levels of first grade learners will help to present the intended material to achieve maximum understanding. Students should be able to have the experiences allowing learning in a concrete and sensorial manner, having the opportunity to "live the experience." Even as adults sometimes an abstract view of an event is not a satisfying learning experience, reminding me of, for example, storm chasers in this area. Because the six to seven year old has not achieved abstract thought and has not had enough relative experience, the event or experience needs to be visual, auditory, and/or tactile.

Connecticut State Standards

The testing process in reading in the primary grades is a reality the students need to become comfortable with. The Developmental Reading Assessment (DRA), the testing tool in the New Haven Public Schools, is administered using fiction and non-fiction texts. Using the subject of natural disasters, this unit on nonfiction will springboard the students into learning the format of the text, comparing non-fiction and fiction, learning to locate the facts, locating information using the index and chapters headings. To connect this to the Connecticut Standards for Reading Achievement, I will be focusing on the following standards:

Standard 1: Reading and Responding

1.1 Students use appropriate strategies before, during and after reading in order to construct meaning.

1.2 Students interpret, analyze and evaluate text in order to extend understanding and appreciation.

1.3 Students select and apply strategies to facilitate word recognition and develop vocabulary in order to comprehend text.

1.4 Students communicate with others to create interpretations of written, oral and visual texts.

Classroom Activities

Lesson 1

Objective

The students will be introduced to the format of a non-fiction book and share prior knowledge with this genre.

Materials

Big book for shared reading - Think About the Weather

Chart paper

Vocabulary words on index cards - weather, storm, cloud, wind, rain, hurricane, tornado

Procedure

1. Begin by telling the students that they will be learning about a type of book called non-fiction, a book about facts and real things.

2. Explain that before reading a nonfiction book, good readers get their minds ready to understand the information they will read about.

3. Preview the book's title and look at the front and back covers for the children to begin to formulate thoughts and predictions about the content and what new things they will learn on the topic of weather.

4. Introduce vocabulary cards to start embedded so knowledge. Ask the students to discuss the words and what they already know or have experienced.

5. Do a picture walk through the book pointing out strong text features to non-fiction, such as labels, captions, diagrams, maps, photographs, charts which support and extend the text.

6. Read the book with the students, having them join in as they are able.

7. Conclude by discussing learned facts from their nonfiction reading.

Lesson 2

Objective

The students will begin a writer's workshop file to collect writings illustrations from experiments and experiences during the unit of study.

Materials

1 two-pocket folder for each student

Writing paper with area for illustration

Chart paper

Procedure

Have the children gather together on a rug area or somehow near each other to begin to discuss writer's workshop.

To introduce the method, explain that they will be writing about what they know, as that is what good writers do. Model this by writing on chart paper something you remember from the Think About the Weather book. Illustrate and write facts to demonstrate.

Have the students turn to a partner on the rug and have them brainstorm about what they would like to write about.

After two to three minutes, regain their attention and have a few share with the group their plans on what to write.

Distribute folders and have the students begin to write and illustrate as you move around and mini-conference to help them along.

Lesson 3

Objective

The students will gain a simple understanding of the different movement of the plates. Through this lesson the theory of plate tectonics will be demonstrated.

Materials

Miscellaneous puzzle pieces - some that fit and some that do not

Flour and water mixture - 2:1 ratio

Food coloring

Small zipper top bags - one per student

Procedure

1. Begin by posing the questions: *Do you like to put puzzles together? How do you know when the puzzle is done? What happens if you push the pieces together when they don't fit well?* The students should begin to recognize that force or energy would cause the pieces to become damaged and folded or buckled.

2. Introduce the vocabulary words converge, diverge, and transform, demonstrating with hand movements.

3. Tell the class they are going to move as the different types of plate boundaries.

4. Divide the class into two groups and have them stand shoulder to shoulder in two lines facing each other.

5. Instruct the two lines to move toward each other to illustrate a converging plate boundary. The lines would then move backward or away to illustrate a diverging plate boundary. And finally, one line takes a step to the

right, the other, a step to the left to illustrate a transform plate boundary.

6. Distribute zipper plastic bags containing a portion of dough mixture. For younger students this hands-on activity will help demonstrate how plate movements form features - mountains at converging plate boundaries and valleys where plates move apart.

7. Ask the students: *What happens when you push the dough together? Can you make mountains and valleys?* Have the students using their own bags stress the bag by pushing together, pulling apart and pushing in opposing directions.

Lesson 4

Objective

The students will become aware of the facts of the 1943 eruption of Paricutin and create a volcanic eruption in the classroom.

Materials

Hill of Fire by Thomas P. Lewis

Writer's workshop folder

Small drink bottle

60 ml water

1 tablespoon baking soda

1/4 cup vinegar

Orange food coloring

Few drops of dishwashing detergent

Small square of tissue

Tray

Play dough

Procedure

1. Read Hill of Fire by Thomas P. Lewis, to the class. This story revolves around the eruption of Paricutin, a real volcano in Mexico, and a little boy's experiences.

2. Construct the volcano by placing the drink bottle on the tray and encasing it in playdough to create a mountain.

3. Place the water, soap, food coloring and vinegar in the drink bottle.

4. Wrap the baking soda in the tissue and drop into the bottle. The volcano will then erupt.

5. This can be repeated for emphasis and excitement. Be sure to have the "recipe" or list of procedures drawn and written on the board or chart paper for the students to use for reference.

6. Have the children write about their experiment in their folders, reminding them to list the steps that caused the volcano to erupt and to describe what happens.

Lesson 5

Objective

The class will make a model tornado and observe and record what happens.

Materials

2 clean two-liter bottles

Duct tape

Water

Glitter

Writer's workshop folder

Procedure

1. Fill one of the bottles three quarters (3/4) the way with water. Add some glitter to help enhance the effect.

2. Place the two bottles mouth to mouth and tape them securely together. Check for leaks.

3. To create the effect, turn the bottles upside down so the water will be flowing through the opening into the bottom, empty bottle.

4. Swirl slowly to help create the funnel.

5. Have the children write about their experiment in their folders, reminding them to list the steps to create a volcano and to describe what happens.

Lesson 6

Objective

The students will simulate an earthquake and record their experiment.

Materials

2 pieces foam board 22" x 28" from art supply store

Deck of cards

Several small houses, cars, trees, buildings from games, legos, train sets

Writer's workshop folder

Procedure

1. Cut one piece of foam board in two, creating two pieces 14" x 22".

2. On a desk top, place two cut pieces back together as though still one large piece. Use a desk that allows the foam board to hang beyond edges. Place full foam board sheet on top, perpendicular to cut pieces.

3. Build a house of cards, or several on the top board.

4. Move the two bottom foam board pieces by pushing them together, sliding them apart, or sliding them beside each other. This will simulate how plate tectonics affect fault lines. Repeat several times.

5. Using the model-sized pieces, create a town on the top form board. Again, create an earthquake by sliding the two foam board pieces on the bottom.

6. Have the children write about their experiment in their folders illustrating their findings and describing what they saw.

Lesson 7

Objective

The students will learn about the conditions that create a hurricane and simulate a hurricane in a bowl.

Materials

Large globe

Large round clear bowl or tub of water

Spoon

Food coloring with a dropper top

Printed photos of hurricanes from Google Images

Procedure

1. Discuss background conditions that can create a hurricane: winds blowing across the ocean in different directions begin to push of warm, moist air toward each other. Explain the air rises up and makes clouds that start to spin because of the Earth's rotation. Use the globe to show how the Earth rotates and where the tropical oceans are.

2. Tell the students you will be using the bowl as the ocean, the spoon to show how the winds move the water.

3. Moving the spoon in a circular motion around the side of a bowl, stir the water.

4. When the water is moving fast, stop stirring and immediately put several drops of food coloring into the center of the swirling water. The color will move out from the center forming bands--much as clouds in a hurricane do.

5. Show the students the photos from Google. Have them compare the printed photos to the hurricane in the bowl.

6. Have the children write about their experiment in their folders illustrating their findings and describing what they saw.

Lesson 8

Objective

The students will compile their writings into a published non-fiction text.

Materials

Writer's workshop folders

Colored paper for book covers

Markers, crayons, colored pencils

Three -hole punch

Brass fasteners

Procedure

1. Students will title their books and complete the front and back book covers. Encourage them to use information from their research.

2. Guide the students as they complete a table of contents based on experiments and information included in their research. Encourage them to include non-fiction text features such as labels in illustrations, charts, lists, directions, maps.

3. Have the students make sure their pages are in order and that their writings and illustrations are complete.

4. Put completed writings into book form. Bind the books with brass fasteners.

When students have all finished their books, host a publishing party where they present and read their books to other students, parents, classmates and teachers.

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