

SEVERE WEATHER AND LOW PRESSURE SYSTEM

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The high and low pressure in the atmosphere can be easily understood by the hand twisting motion, but the turmoil that a low pressure can bring can be hazardous. The weather hazards can bring extremely strong winds and storms that can lead to severe weather such as thunderstorms, lightning, heavy rain, strong winds, blizzards, tornadoes and hurricanes.

There are number of ways to enhance the Education of Science. Severe weather usually is of interest to people who live in Florida. They experience "Hurricane Season" every year. Severe weather normally is associated with the change in air and water pressure. They normally are associated with low pressure systems. The American Meteorological Society Pressure blocks, can help students understand how pressure in the atmosphere and ocean affects the atmospheric and oceanic systems. It also helps them to understand what pressure is, how pressure changes with height, horizontal pressure variations, pressure changes with altitude, horizontal forces as a result of temperature change, and sea surface currents based on temperature and density change.

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Introduction:

The educators have to be more innovative, creative to make the learning experience more interesting for students. Hands-on activities allow students to take the ownership of their

learning and apply it to real life situations. In 2002 fall semester a web enhanced hybrid course was developed to help non-science major students to partially fulfill their general education science requirement. A few selected chapters from online weather studies course were included with web enhanced Physical Science Course. The topics ranged from Newton's laws of Motion to Atmosphere and weather. All units and other course material were posted on the WebCT course management tool. The students were asked to read the units and complete the assignment. The assignment consists of short question answer and covered all topics of the unit. The discussion then continued in the class room with hands-on activities. Number of hands-on activities provided by American Meteorology Society is used for better understanding of the basic concepts. Use of teaching resources and hands-on activities has proved to be an excellent way to improve students learning. It uses scientifically accurate strategies for teaching and learning. The AMS pressure blocks just looks like toys but can be used as teachers aid at any grade level for better understanding of low, high pressure and change in pressure and meeting of two fronts that can be the onset to severe weather.

The students found the hand twisting activity for high and low pressure, AMS pressure blocks and cardboard activity for Coriolis effect very interesting. The assessment results show the increased level of cognitive achievement. The activities provided more inviting environment for inquiry and offered a greater flexible and relax able environment. The severe weather is the most popular topic. Some of the students work is shown below.

1. Thunder storms as a result of weather fronts: Thunderstorms are violent disturbances

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in the atmosphere that involve rapid changes in air pressure. They often form in low pressure areas where there is a large amount of rising air. As the rising air cools, clouds will begin to form to produce rain showers. When a cold front meets a warm front, storm clouds may form to produce thunderstorms. Thunderstorms are violent disturbances in the atmosphere that involve rapid changes in air pressure. It can develop into heavy rain or hailstorm with thunder and lightning. These storms can be very violent. It can lead to lightning. Areas of positive and negative electrical charges can develop with clouds. Lightning discharge can take place between the clouds or clouds and the ground. The dreaded low pressure system, depressions or cyclones can also result in developing storms spawned Tornadoes. Thunderstorms can spin up the fastest winds inside tornadoes.

2. **Tornadoes:** A tornado is a violent, whirling, funnel-shaped wind that moves in a narrow path over land. A tornado consists of a spout of black cloud spreading out to an umbrella shape above. More tornadoes occur in the U.S. than anywhere else in the world.

An average tornado is only 0.4 km in diameter and lasts only an average of fifteen minutes. The length of its path is generally only about 6km. The wind speeds in the funnel can reach over 350 km/hour. It can destroy the strong buildings, uproot trees and lift heavy objects such as houses, cars and even railroad cars. Generally the atmospheric pressure is very low. Hence the expansion of air within a house will be enough to blow the walls of the house outward

3. The surface wind speed decreases due to the friction from obstacles such as trees, mountains, buildings etc. This decrease in wind speed causes the Coriolis force to weaken. Hence the pressure gradient is the dominant force on the wind and the wind will flow across isobars toward lower pressure. The greater the degree of friction at the surface, the more the

Coriolis force is weakened and causes greater deflection toward low pressure.

4. **Hurricanes:** Hurricanes are large tropical storms with heavy winds. They contain winds in excess of 74 miles per hour (119 km per hour) and heavy rainfall leading to flooding. The strong winds also produce abnormal rises in sea levels. The hurricane season starts June 1 and ends November 30 of each year.

Hurricanes are the most violent and destructive type of storm. Hurricane storms are classified by wind speed, barometric pressure, and size of storm surge. The hurricane categories are

Category One: Minimal storm
Wind Speed: 74-95 mph
Barometric Pressure: 29.94 inches
Storm Surge Size: 4-5 feet
Effects: Winds can uproot trees.

Category Two: Moderate storm
Wind Speed: 96-110 mph
Barometric Pressure: 28.50-29.93 inches
Storm Surge Size: 6-8 feet
Effects: Moderate damage to homes windows, roofs, mobile homes could be destroyed.

Category Three: Extensive storm
Wind Speed: 111-130 mph
Barometric Pressure: 27.91-28.49 inches
Storm Surge Size: 9-12 feet
Effects: Extensive structural damage to homes from wind and flooding

Category Four: Extreme storm
Wind Speed: 131-155 mph
Barometric Pressure: 27.17-27.90 inches
Storm Surge Size: 13-18 feet
Effects: Wind and flooding extreme damage

Category Five: Catastrophic storm
Wind Speed: 156mph and higher
Barometric Pressure: Below 27.27 inches
Storm Surge Size: Above 18 feet
Effects: Catastrophic damage to property

Hurricane Preparedness: Prior to hurricane season and during based on actual threat to the location.

Conclusion: Students were more enthusiastic towards learning science. They related their learning to real life experiences. More class time is used for discussions. Students became more active learners; they seemed to be more responsible towards their learning. The student-student and student-teacher interaction and participation also increased.

References:

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