

Teacher Quest Tampa Bay Pilot Program

2009 Action Plan

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Lesson Title: Growing Mold on Purpose

Grade Level: 7

Subject Area: Math

Date: 7/8/09

Summer Work Experience:

Company: HSA Engineers & Scientists

Position: Building Scientist

While working at HSA Engineers & Scientists, I learned how to create scale models of floor plans using Excel. The floor plan is used to graphically display the field measurements regarding air quality, microbial growth, moisture, temperature, and humidity within residential homes. This data is placed into various tables and charts to help create a Cause and Origin Report for the insurance company to determine the validity of the homeowner's claim.

I also tracked the data for an experiment regarding microbial growth and the percentage of moisture over time for various cabinet materials. I was able to present the first month's worth of data to the entire Air Quality Department at the yearly meeting.

I am now more aware that science and math cannot be separated. Technology is the essential tool used in the world to gather information whether through a computer, camera or instrument. In order for students to become more interested in STEM-related careers, I need to bring hands-on projects to them to experience firsthand. It is critical that they make a connection to how many careers rely on technical vocabulary, specific math skills and computer skills.

Lesson plan/unit of study:

Objectives(s): Students will perform real world experiments to collect data. The data will be analyzed graphically. Predictions will be made from these results.

Sunshine State Standards:

MA.7.A.1.6 – Apply proportionality to measurement in multiple contexts, including scale drawings and constant speed.

MA.7.S.6.1 – Evaluate the reasonableness of a sample to determine the appropriateness of generalizations made about the population.

MA.7.P.7.2 – Determine, compare and make predictions based on experimental or theoretical probability of independent or dependent events.

MA.8.A.6.1 – Use exponents and scientific notation to write large and small numbers and vice versa and to solve problems.

MA.6.A.5.1 – Use equivalent forms of fractions, decimals and percents to solve problems.

MA.912.S.3.1 – Read and interpret data presented in various formats.

Materials:

Newsprint, poster board, markers, colored pencils, photographs from magazines or the Internet, scissors, print resources, Internet access, clear tape, microscope, digital projector, digital camera, eye droppers, small cups, re-sealable sandwich bags, masking tape, bread, sugar, lemon juice, water, sonic tape measure, moisture meter, graph paper, plastic container

Instructional procedures:

Background knowledge concerning mold and bacteria

1. Students will discuss what previous knowledge they have concerning these materials on chart paper. I will explain to the students they will be learning about the characteristics, helpfulness and harmfulness related to these materials. Students will work in groups of up to 3 persons using the Internet to answer discussion questions.
 - a. What is the difference between mold and bacteria?
 - b. Draw a graphical representation of each.
 - c. What types of mold and bacteria are harmful and helpful?
2. Students will share their findings with the class. The class information will be recorded on chart paper. In order to prepare the class for the upcoming Bread Box experiment, we will discuss the concept of percent. Students will practice with estimating percent and changing from percent to decimal to fraction.
3. Bread Box Experiment – Water, sugar water and lemon juice will be applied to white bread and placed in individual labeled sealed bags. One piece of dry white bread will be placed in a labeled bag. Another type of bread will be placed under the same circumstances as the white bread. All 8 bags will be placed in a dark, warm place (about 86 degrees Fahrenheit). Each group will observe the bags daily for two weeks and record the results on a table showing percent of microbial growth. Digital pictures will be taken to track the experiment. Groups may also draw pictures to show observations. Finally, the groups will place the data into a graph and compare the various bread samples. The following discussion questions will be answered by the groups:

- a. From this activity can you tell what helps mold to grow best?
 - b. Does it matter what kind of bread you use?
 - c. What causes the different colors you see?
 - d. What would happen if you left the bags in a well-lit place instead of a dark place?
 - e. What would happen if you changed the temperature?
4. Tape samples will be lifted to view mold under the microscope. Internet samples will be compared to see if we can find any similar pictures. Groups will draw what they see from the microscope slide. The size of mold will be discussed. Students will practice changing standard notation into scientific notation.
 5. Groups will be assessed from the final project. They may choose various methods to present: PowerPoint, poster board, story book, pod cast, graphic organizers.
 6. Learn 360 streaming media will be used to show "The Day the Big Easy Drowned." It shows the Hurricane Katrina disaster and the major problem it caused afterwards, namely mold. A class discussion will be held on what type of environment is needed to enhance microbial growth.
 7. Groups will create a floor plan of the classroom using the sonic tape measure. The floorplan will need to be drawn to a specified scale. Scale factor will be practiced. The floor plan will be used to determine perimeter and area. The temperature and relative humidity will be checked each class period and recorded over a 2-week period. The data will be graphed. Students will make predictions from the data regarding the potential for microbial growth and what factors could be altered to either enhance or reduce the chance for microbial growth.
 8. Groups will be assessed on the floor plan, data table and predictions made from the data. Again, the final product can be turned in on a PowerPoint slide, poster, spreadsheet, or podcast.

Integration of summer work experience/follow-up activities:

I will share digital photos and completed projects that I worked on this summer. I will also try to invite a guest speaker to further discuss the Hurricane Disaster Teams. The guest speaker will also share career information with the students and the importance of studying math, science and technology in school.

Assessment Instruments:

I will use the presentations listed above in a variety of formats. There will also be individual written assessments related to the various mathematical concepts that we covered.

Example of a Moisture Measurement Data Chart

Location	Height	North	East	South	West
Kitchen	Ceiling				
	7 ft	Cab	Cab	N	D
	4 ft	N/A	N/A	N/A	N/A
	1 ft	Cab	Cab	N	D
	Baseboard	Cab	Cab	N	D
Floor Perm			17.4	19.5	25.1 23.0
Living Room	Ceiling			14.9	
	7 ft	N/A	N	N	D
	4 ft	N/A	N	N	N
	1 ft	N/A	N	N	N
	Baseboard	N/A	N	N	N
Floor Perm				13.8	
Bathroom	Ceiling				
	7 ft	Tub	D	N	M
	4 ft	Tub	D	N	M
	1 ft	Tub	D	N	V
	Baseboard	Tub	D	N	V
Floor Perm	21.1	32.7			
Bedroom 2	Ceiling				
	7 ft	W	N	N	N
	4 ft	W	N	N	N
	1 ft	N/A	N	N	N
	Baseboard	N/A	N	N	N
Floor Perm	19.4	18.5	18.6	18.7	19.3
Bedroom 1 - Closet ok	Ceiling	11.7			
	7 ft	N	W	N	N
	4 ft	N	W	N	N
	1 ft	N	N	N	N
	Baseboard	N	N	N	N
Floor Perm	16.9	16.9	15.6	18.0	
Bedroom 2 CL	Ceiling				
	7 ft				
	4 ft				
	1 ft				
	Baseboard				
Floor Perm				17.2	22.2

Methodology Used - Invasive Non-Invasive

INTRUSIVE KEY		Legend	NON-INTRUSIVE KEY	
N	6.0 - 14.0%	CL = Closet	N	0-30
N	14.1 - 16.5%	V = Vanity	N	31-70
N	16.6 - 20.0%	D = Door	N	71-100
N	>20.0%	M = Mirror		
		T = Tile		
		N/A = Not Applicable		

Graphic representation of a floor plan drawn to scale indicating microbial and water damage.

