

Teacher Quest Action Plan

Topic: Alternative Energy

Name: Dr. Bruce Sabin

Employer: Progress Energy Florida, Inc.

Position: Energy Analyst

Describe your job responsibilities, duties and the skills you have learned that will be transferred to the classroom.

During the summer of 2008 I was able to work with the Alternative Energy Strategy office at Progress Energy of Florida. I was given the chance to work on several projects, including a grant to study the potential for wind power in Florida, a business plan to increase the use of solar hot water heaters, and strategies for developing infrastructure needed for large-scale use of Plug-in Hybrid Electric Vehicles (PHEVs).

During my first days I was given tasks and trusted to complete the work, and my work was used in corporate decision-making. In this role I learned more about the legal, political and social influences on the alternative energy technologies. I also learned a tremendous amount about the current state of technologies and how Progress Energy is planning for the future.

My experience will help me considerably as I teach my students about energy use, production and conservation, as well as the environmental impacts of human activity on the environment. Because the projects I worked on are ongoing projects, I hope to keep in contact with my Progress Energy team and bring current issues into my classroom. I have developed several lesson plans based on my summer experience.

Lesson plan/unit of study objective:

During this lesson students will:

1. Use scientific inquiry to investigate wind patterns.
2. Discuss sources of funding for alternative energy research.
3. Determine the amount of renewable energy that may be captured through wind power.

Sunshine State Standards:

SC.H.1.4.1 - The student knows that investigations are conducted to explore new phenomena, to check on previous results, to test how well a theory predicts, and to compare different theories.

SC.H.2.4.2 - The student knows that scientists control conditions in order to obtain evidence, but when that is not possible for practical or ethical reasons, they try to observe a wide range of natural occurrences to discern patterns.

SC.H.3.4.4 - The student knows that funds for science research come from federal government agencies, industry, and private foundations and that this funding often influences the areas of discovery.

SC.H.3.4.6 - The student knows that scientific knowledge is used by those who engage in design and technology to solve practical problems, taking human values and limitations into account.

Materials:

1. Anemometer (device for measuring wind speed - If an anemometer is not available, this lesson plan could be modified to use data from a weather station (e.g., www.wunderground.com or www.weather.com).
2. Scale map of campus
3. Rain gauge
4. Internet access (<http://www.bergey.com/>; <http://www.abundantre.com/>; <http://www.avinc.com/wind/>)
5. Wind resource map (http://www.eere.energy.gov/windandhydro/windpoweringamerica/wind_maps.asp)

Instructional Procedures:

Part 1

1. Teach students how to use the anemometer.
2. Take the class outside and measure the wind speed and direction. Record the information in a logbook.
3. Place the rain gauge outside; show students the location of the rain gauge and how to use the gauge.
4. Have one group of two students go outside and take anemometer readings each period of the day for each of the next 10 school days. Students will record their data in the logbook. Larger classes may have three students per group or may extend the number of days so that all groups have a chance to participate in data collection.
5. Also record whenever it rains and how much rain fell during each rain shower.
6. At the end of the 10 school days, make enough copies of the logbook data for each group of two students. Have students analyze the data by:
 - a) determining average wind speed over the 10 days
 - b) determining average wind speed for each hour of the day and each day of the investigation
 - c) creating line graphs for wind speed averages
 - d) comparing wind speed patterns to rainfall patterns
 - e) observing any other patterns that may appear in the measurements

7. Each group will then develop a model to describe wind speed and direction over the two-week period. The model will then be used to predict wind patterns over the next two weeks.
8. Repeat steps 1-5.
9. Make enough copies of the entire dataset for each group. Students will analyze the 20 days worth of data and test their models against the data.
10. Students will write brief reports describing their original hypotheses and whether those hypotheses were rejected or accepted based on further testing.

Part 2

1. Students will read a newspaper article about Florida state funding for wind power research.
2. Students will use internet access to research three wind turbine manufacturers and the wind resource requirements and electrical generation of various equipment.
3. Students will discuss whether the campus seems to have sufficient wind resources for wind power to be an effective alternative energy. Students will also discuss the role of government in funding and promoting specific areas of scientific research.

Part 3

1. Provide each group a copy of the national wind resource map, or allow them to view wind resource maps online.
2. Based on the wind resource maps and technical information for wind turbines, have students describe which areas of the United States are most conducive to wind power. Students may create a scale showing which areas are highly favorable to wind power, which areas are moderately favorable, and which areas are unfavorable.

Integration of summer work experience / follow-up activities:

Progress Energy and I will keep in contact. Progress Energy representatives will visit my classes to discuss current work. As the Progress Energy research on wind power continues, new information will be integrated into class activities. When Progress Energy develops a wind map of Florida, their results can be compared with the maps developed by students.

Teacher Quest Action Plan

Topic: Robotics

Name: Allan Dyer

Employer: Florida Advanced Technological Education (FLATE) Center

Position: Robotics Instructor

Describe your job responsibilities, duties and the skills you have learned that will be transferred to the classroom.

I was the instructor of a robotics camp for middle school students. The program included the use of the Lego Mindstorms NXT robots and software. I had little knowledge of the Lego robotics products prior to accepting the position, and after working with the product throughout the planning portion of the camp, I began to see the potential for its use in teaching math, science, and technology. I was responsible for designing the curriculum for the week-long robotics camp, and although there existed a wealth of material for me to pull from, I had to get creative in order to make the camp challenging and exciting for the middle school child. I was able to organize challenges for the student teams to complete after each programming lesson, and these challenges gave the students the opportunity to compete. Needless to say, the atmosphere became very intense during the challenges as students worked to adjust programming variables in order to "out compete" the other teams.

This work experience has given me the opportunity to challenge myself as a teacher with respect to developing large units of study. While writing the lessons to be used in the robotics camp, I began to see the usefulness of teaching a unit like robotics. Not only are the students motivated to learn, but they are also covering many of the important standards that they are required to know for FCAT. Most importantly, I walk away with the knowledge that incorporating technology in the classroom is not only exciting and motivational, but it provides the students with much needed hands-on technology experience that will help them become more marketable in the future as they enter an increasingly high-tech work force.

As I look forward to the next school year, I'm beginning to see areas in my curriculum where I can apply the knowledge gained from this work experience. I feel more confident that I will be able to create challenging and exciting units that still cover the required standards. It is possible to give the kids the knowledge and skills that they need without relying so heavily on a text book. It may require more work up front, but in the end the students are much more motivated and therefore more likely to meet the desired objectives.

Lesson plan/unit of study objective:Renewable Energy Unit / Solar Car Project

Students will understand that fossil fuels are a limited, nonrenewable energy source whose use comes with an environmental cost.

Students will be able to compare and contrast renewable and nonrenewable energy.

Students will know examples of renewable and nonrenewable energy and how they differ.

Students will be able to explain the pros and cons of several renewable energy types.

Students will understand the potential of solar energy.

Students will understand that solar energy can be converted into electrical and mechanical energy.

Students will design and build a model solar car that utilizes the energy of the sun.

Students will understand the forces that work against the forward motion of their solar cars and that these forces must be taken into consideration when designing and building their cars.

Sunshine State Standards:

Energy: SC.B.1.3. The student recognizes that energy may be changed in form with varying efficiency.

Force and Motion: SC.C.1.3. The student understands that types of motion may be described, measured, and predicted.

Processes that shape the Earth: SC.D.2.3. The student understands the need for protection of the natural systems on Earth.

Earth and Space: SC.E.1.3. The student understands the interaction and organization in the solar system and the universe and how this affects life on Earth.

How Living Things Interact with Their Environment: SC.G.2.3. The student understands the consequences of using limited natural resources.

The Nature of Science: SC.H.1.3. The student uses the scientific processes and habits of mind to solve problems. SC.H.3.3. The student understands that science, technology and society are interwoven and interdependent.

Materials:

PowerPoint presentations for each lesson; 2 small photovoltaic cells per team; 1 solar motor per team; 1 set of axle/wheel systems per team; electrical wiring; chassis material (foam board balsa wood, etc.)

Instructional Procedures:

In keeping with our school's environmental studies and technology magnet theme, this three-week unit will focus on addressing the current fuel crisis facing our society:

Students will investigate the environmental and social costs of using fossil fuels and closely examine possible renewable energy alternatives.

Students will complete lessons that cover examples of renewable and nonrenewable energy sources and the pros and cons of each. A careful examination of the potential of solar energy will follow.

Students will consider the amount of untapped energy that the Earth receives from the sun.

Students will then learn the science behind photovoltaic cells and other methods used to harness the sun's energy (e.g. solar cookers).

Students will design, construct, and use a solar cooker.

Students will then design and construct solar powered model cars that utilize photovoltaic technology to convert light energy into electrical energy.

The final day of the unit will consist of a solar car race that puts each student team's design to the test.

Integration of summer work experience/follow-up activities:

My summer work experience is the motivation for the renewable energy unit. After realizing the importance of providing our students with access to hands-on technology driven projects like the robotics camp, I was thinking of a way to bring this out in my current curriculum. Since our school has an environmental studies and technology magnet program, having our students working with the current technology of photovoltaics seems fitting.

While I have used solar cars in the past, I did so as a standalone project as opposed to a project within a large unit of study. I believe that by approaching the solar car project as part of a comprehensive unit of study related to a specific social issue (the fuel crisis), I will be able to better motivate the students while at the same time helping them to see that technology (in this case photovoltaic technology) can provide at least a partial solution to some of our problems. My experience this summer has taught me ways in which we can dig deeper into the use of technology and help students understand the direct connection to their futures.

Comments:

Excellent professional development experience!

Teacher Quest Action Plan

Topic: Chemical Reactions

Name: Georgiana Graves

Employer: Museum of Science and History

Position: Summer Camp Instructor (K-1)

School: Central Riverside Elementary

Describe your job responsibilities, duties and the skills you have learned that will be transferred to the classroom.

My experience at MOSH (Museum of Science and History) has been personally and professionally rewarding. The children were engaged and excited to learn the various science themes each week. We had daily lessons that produced hand-made artifacts. It was a constant reminder that when a child is able to create an object they are more involved and the lesson becomes relevant and hopefully more information is retained.

The learning styles of all students were addressed, and hopefully they will take what they learned in camp back to their own classrooms during the school year. The children were bright and provided amazing background knowledge and insight daily. I created a standard for excellence and high expectations, and students were lively and involved in lessons I presented. They were encouraged to ask questions, participate in discussions, and understand the relevance of the week's topic to their daily lives.

We used museum exhibit time to explore all that the museum had to offer and to continue their education. I was able to continue to implement and teach behavior management; the class ran smoothly and the children worked well together. I was responsible for the safety of approximately 20 children each week. I worked with 6 and 7 year olds, so organization and well developed plans were required to have productive and manageable days. I was able to incorporate activities and techniques I know from teaching to keep all students engaged.

When I go back to my classroom I am bringing with me many various crafts and activities for different science themes. I want to create artifacts in my classroom like I did this summer. The children enjoy it, and they are also able to take them home and hopefully, parents will ask questions and they become more involved with their child's education.

Lesson plan/unit of study objective:

Students will learn about three different chemical reactions. They will participate in the scientific processes, use scientific reasoning and thinking, and record their findings and share as a group.

Sunshine State Standards:

SC.1.N.1.1: Raise questions about the natural world, investigate them in teams through free exploration, and generate appropriate explanations based on those explorations

SC.1.N.1: Using the five senses as tools, make careful observations, describe objects in terms of number, shape, texture, size, weight, color, and motion, and compare their observations with others.

SC.1.N.1.3 Keep records as appropriate - such as pictorial and written records - of investigations conducted.

SC.1.N.1.4 Ask "How do you know?" in appropriate situations.

Materials:

- Bag of diapers
- Small paper cups
- Black construction paper
- Borax (found in the laundry section of the store)
- Cornstarch (found in the baking section of the store)
- White glue (e.g., Elmer's glue - look for it in the school supplies section)
- Warm water
- Measuring spoons
- Spoon or craft stick to stir the mixture
- 2 small plastic cups or other containers for mixing
- Marking pen
- Watch with a second hand
- Metric ruler
- Zip-lock plastic baggie
- 1 part citric acid
- 2 parts baking soda
- Witch hazel
- Coloring of your choice
- Fragrance oil of your choice
- Mold
- Science journals

Instructional Procedures:

Discuss chemical reactions. Ask the children what they think they are. Chemical reactions are when a substance changes.

Experiment #1: Baby Diaper Magic

Super absorbent baby diapers have a chemical called Sodium Polyacrylic embedded in the padding. If removed, it can make an interesting experiment.

- Take one super absorbent baby diaper (Unused!)
- Remove its inner lining to expose the cotton like pad.
 - Note: Use of bag is to prevent fibers and chemical from drifting into the air. Though non-toxic it can be an irritant to eyes and nose if breathed.
- Pull apart the inner lining and you will feel a "sand-like" substance.
- Rub the liner and pull apart the pads to remove as much of this as possible within the bag.
- When the pad is in small pieces shake it to get most of the rest out over black piece of paper.
- Remove any remaining "fluff" from the sand like substance and put substance in small cup.
- Slowly add distilled water (or tap water) to the glass. The substance will expand to 400 times its original size. (Salts or minerals in tap water will cause it to absorb less liquid)
- You will find that it will absorb many ounces and still remain a solid gel.
- Once you have a cup of gel, pour it onto a plate as a mound.
- If you shake salt on this, the chemical will release its water (very quickly).
- Do not pour the residue down the drain unless you have salted it first (it can plug pipes).

Experiment 2: Make Bouncy Balls

- Label one cup 'Borax Solution' and the other cup 'Ball Mixture'.
- Pour 2 tablespoons warm water and 1/2 teaspoon borax powder into the cup labeled 'Borax Solution'. Stir the mixture to dissolve the borax.
- Pour 1 tablespoon of glue into the cup labeled 'Ball Mixture'. Add 1/2 teaspoon of the borax solution you just made and 1 tablespoon of cornstarch. **Do not stir.** Allow the ingredients to interact on their own for 10-15 seconds and then stir them together to fully mix. Once the mixture becomes impossible to stir, take it out of the cup and start molding the ball with your hands.
- The ball will start out sticky and messy, but will solidify as you knead it.
- Once the ball is less sticky, go ahead and bounce it!
- You can store your plastic ball in a sealed ziploc bag when you are finished playing with it.
- Don't eat the materials used to make the ball or the ball itself. Wash your work area, utensils, and hands when you have completed this activity.

Experiment 3: Make Bath Fizzies

- BLEND-BLEND-BLEND-BLEND the citric acid and baking soda – this step is super important – if you don't blend well, you end up with a grainy bomb. We actually use a mixer on our larger batches.
- Once you've blended really well, add your colorant.
- Add fragrance oils to your personal nose preference.
- Now, this is the difficult part. Spritz (with a squirt bottle) the witch hazel onto your batch while stirring with the other hand. When your batch sticks together when squished, you need to start putting it in molds – time is of the essence. If you wait too long, the mixture will get hard. If you spritz too much, the mixture will be too wet and “grow” (start the fizzing reaction) on you.
- Put the bombs in molds – wait a few minutes and tap them out. Let them air dry for 3 or 4 hours and voila! Wonderful, hard bath bombs. The harder you pack the bath bombs, the more dense, heavy, and durable a bomb you will get.

Integration of summer work experience/follow-up activities:

These were three experiments we did one day while studying chemical reactions. The students loved all three, and they were able to use all senses except taste to try and guess what the substances were. They each had a journal to record the steps for each experiment and draw a picture. We then gathered, shared our observations, and I revealed what each experiment was and the chemical reactions that occurred.

I think doing this early in the year with my class is an excellent introduction to the fun and wonder of science. The children are able to create bouncy balls and bath fizzies (which they love and can take home) and the diaper is a great laugh with the little ones. They are excited about science and these experiments require them to be involved, versus just watching me do an experiment.

Teacher Quest Action Plan

Topic: Water Conservation

Name: Stan Kosmoski

Employer: The Florida Aquarium

Position: Art-O-Fishal Fun Camp Coordinator

Describe your job responsibilities, duties and the skills you have learned that will be transferred to the classroom.

As a camp coordinator at the Florida Aquarium, I taught a summer camp program called "Art-O-Fishal Fun" for underserved youth in Hillsborough County. Students learned about their local watershed using a blend of art and science.

Working in an arts magnet school, I have tried to integrate the school theme into the regular science classroom. In the past I have successfully carried the drama portion of our curriculum into my lessons, but have neglected the art end. Incorporating the interactive notebook, originally designed by "History Alive!" into my classes this fall, I needed ideas for the students to incorporate the content into their schema through the use of art. Working with Aaron, my art teacher at the Florida Aquarium, has given me a multitude of ideas for doing just that.

Lesson plan/unit of study objective:

Students will demonstrate knowledge of water conservation issues through the creation of a campaign platform (using a RAFT strategy) for a third party candidate to run for President in November 2008.

Sunshine State Standards:

SC.7.E.6.6 - Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, and changing the flow of water.

SC.7.L.17.3 - Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.

SC.7.N.1.1 - Define a problem from the seventh grade curriculum; use appropriate reference materials to support scientific understanding; plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data; interpret data in charts, tables and graphics; analyze information; make predictions, and defend conclusions.

Materials:

Poster board; markers; pencils; rulers

Instructional Procedures:

At the conclusion of the units covering Florida water resources, students will watch a DVD entitled "Water's Journey - The Hidden Rivers of Florida".

1. Students will be placed in teams of 2-3.
2. Based on the unit study and DVD students will brainstorm a list of 5 problems facing water supply in Florida (must be specific problems).
3. Students will adopt both a positive and a negative approach to informing the public about these 5 problems (Positive = action steps; Negative = resulting ecological damage).
4. Teams will choose 1 message pair and create a 'candidate' (either a wetlands/water related animal or component) to deliver the message on a presidential ticket.
5. Teams will draft 2 campaign posters with a slogan and candidate in appropriate setting.
6. One of the drafts will then be used to complete a poster board size campaign poster in full color.

Integration of summer work experience / follow-up activities:

I will develop this work (the art portion of which we did on a much smaller scale this summer) into a cross-curricular vehicle involving social studies and language arts. Both teachers have agreed to work in the development of the project. The time constraints of the summer camp limited the depth we could provide to our campers' experience. This added time and depth of three subject area focus can make this a significant learning opportunity using art for my students in my classroom.

Comments:

WOW! What a dynamic idea for an election year! I would never have stumbled on the poster aspect of it without the ideas and direction of the summer camp. I will use this unit of study as a cross-curricular vehicle with two other teachers at my school to make this a significant learning opportunity for my students. I may even try to go further and have a 7th grade election based on the two candidates receiving the most votes.