Profile Sheet

Teacher: Angela Feliciano
Primary Subject Area: Language Arts
Outside Subject Area: Science
Grade Level: 3rd
PBL Title: Investigators Respond to Heat Wave in the Computer Lab

Description of Student Roles and Problem Situation:
Students will act as investigators and heating and cooling experts to determine the cause and possible solutions to extremely high temperatures in the school computer lab. Students will report their findings and possible solutions to the principal of the school.

Adaptations for a student from a non-Western culture:
I will discuss the problem situation with the student and question how a situation like this would have been handled in their country, if this type of situation would even be relevant to them and then help them to understand why it is important in our culture using a one-on-one approach. I would check his/her progress daily to make sure each task is being met properly. If I saw a need for additional help, I would assign an accelerated student to be a peer helper.

Adaptations for an ESOL student:
I will provide translations of meet the problem documents to help the student better grasp the subject area from the start of the problem. Because Language Arts is the primary subject being assessed, I will allow the student to do all of his/her writing on a computer using word processing software to help them make corrections using spell check and grammar check.
Title, Learner Characteristics, and Sunshine State Standards
And
Learning Outcomes, Student Role & Problem Situation, Meet the Problem Method

PBL Lesson Plan for Diverse Learners

Teacher: Angela Feliciano
Title: Investigators Respond to Heat Wave in the Computer Lab
Primary Subject Area: Language Arts
Outside Subject Area: Science
Grade Level: 3rd

Primary Sunshine State Standards:
LA.3.3.1.1: The student will prewrite by generating ideas from multiple sources (e.g., text, brainstorming, graphic organizer, drawing, writer's notebook, group discussion, printed material)
LA.3.3.1.2: The student will prewrite by determining the purpose (e.g., to entertain, to inform, to communicate, to persuade) and the intended audience of a writing piece; and
LA.3.3.2.1: The student will draft writing by using a prewriting plan to develop the main idea with supporting details that describe or provide facts and/or opinions; and
LO #1: Given prewriting assignments and a rubric, students will compose a draft of their findings and suggestions scoring at the satisfactory level or above on the rubric. (Synthesis)
LA.3.3.3.4: The student will revise by applying appropriate tools or strategies to refine the draft (e.g., peer review, checklists, rubrics).
LA.3.3.5.3: The student will share the writing with the intended audience.
LO #2: Given their compositions, in groups, students will accurately present their findings and solutions to the principal. (Evaluation)

Outside Subject Area Sunshine State Standards from Science:
SC.3.P.11.1: Investigate, observe, and explain that things that give off light often also give off heat.
LO #3: Given a sheet of paper, students will accurately list 5 things in the classroom that can transmit heat and write a sentence analyzing why they believe it produces heat. (Analysis)
SC.3.P.11.2: Investigate, observe, and explain that heat is produced when one object rubs against another, such as rubbing one's hands together.

Learner Characteristics of Primary Grade Students:
Physical: Children tend to be extreme in their physical activities. The accident rate is at a peak in third grade.
Justification: Because our problem is located in the computer lab, it will be necessary to stress the importance of being calm around the computers and possibly choosing a
computer lab time that is after recess or gym so the students will not have as much energy.

Social: Children become somewhat more selective in their choice of friends and are likely to have a more or less permanent best friend.
Justification: Our activity will have a lot of small group interaction and feedback from peers, so it will be important not to allow cliques to form groups so that students do not feel excluded or inferior.

Emotional: Primary grade students are sensitive to criticism and ridicule and may have difficulty adjusting to failure.
Justification: This characteristic will be extremely important, because students will be proofing one another’s drafts for errors. Students may mistake comments for criticism or have a heightened sensitivity during this activity.

Emotional: Most primary grade children are eager to please the teacher.
Justification: It may be important to assign roles for the students within their small groups to ensure they stay on task to please the teacher.

Cognitive: Primary grade children understand that there are different ways to know things and that some ways are better than others.
Justification: This characteristic will help students to draw better conclusions from their research and determine what will best solve the problem.

Description of Student Roles and Problem Situation:
Students will act as investigators and heating and cooling experts to determine the cause and possible solutions to extremely high temperatures in the school computer lab.
Students will report their findings and possible solutions to the principal of the school.

Meet the Problem Documents:
Students will receive a memo from the principal of their school as well as a document on how to set up a computer lab.
Memorandum

To: Feliciano's Heating & Cooling Solutions

From: Mrs. Chimene Johnson, Principal, ABC School

Re: Computer Lab Temperatures

Date: March 7, 2011

We have been experiencing extremely hot temperatures in our computer labs at the ABC School lately. Teachers are refusing to take their students to the labs because of the heat. We use a computer program that helps to prepare our students for their FCAT exams. There are not enough computers in the classrooms for students to get adequate access to this program. With FCAT exams coming up in one month, we need to find the reason behind the heat and a fast solution to the heat problem.

We will need investigators to look for possible causes and your heating and cooling experts to find possible solutions. It is imperative that you help to discover the reason for this problem and present me with possible solutions by Friday, March 18th, 2011 at 1:00. Our budget for this problem is $2,000.00. I will expect a full presentation so that I am fully aware of my options and why you think they will work.
Guidelines to Set up a Computer Lab

By Arnold Anderson, eHow Contributor
updated: April 20, 2010

Don't forget the basics when setting up your computer lab.

When you are setting up a computer lab there are several things to keep in mind. Issues of security, ergonomics and safety should all be taken into account when designing the lab. It is best to plan out your computer lab completely before you begin remodeling a room or purchasing equipment. A computer lab can get expensive, and if you do not plan properly you may wind up over budget and without all of the features you need.

Air Circulation

A computer lab needs to have good air circulation for two reasons. The first reason is to keep the electronic components in the computers from overheating. If the air is not flowing properly throughout the room, then your computer components will get hot and damage your computers. The other reason for good air circulation is the comfort of the lab users. Several computers in the same room all operating at the same time can generate heat. Without good air flow it may be difficult for anyone to use the lab for extended periods of time. According to PC Guide, a good room temperature to use ranges from 60 to 75 degrees Fahrenheit.

Physical Security

When you set up your computer lab you need to attend to network security and protection from viruses. Do not forget to secure the actual machines and their components as well. You can employ a system that locks the computers and components to the desks, or you can have a detection system at the lab doors that is triggered when someone tries to remove something.

Anti-Static

People coming into your computer lab from the outside have the potential to store static electricity and bring it into the lab. According to PC Computer Notes it is important to protect computers when they are being worked on by sitting them on an anti-static mats. Static electricity can damage equipment and cause injury, so take the steps to prevent it in your computer lab when any case is opened.

Access

Access to computer lab equipment should be monitored. There are two ways to make sure that only authorized personnel have access to the computer. The first is a badge system that requires a special card to be swiped into the door lock to open the lab door. The cards can only be issued by the lab administrator, they must be signed for and they must be returned within a pre-determined time period. The other way to monitor the computer lab is to only have it open specific hours during the day, and have an administrator in the lab to monitor activity at all times.

Read more: Guidelines to Set Up a Computer Lab | eHow.com
Problem Statement, Know/Need to Know Boards, Possible Resources

Problem Statement:
How can we, as investigators and heating and cooling experts, solve the temperature crisis in the ABC School computer lab in such a way that:
1. We discover the cause of the heat in the computer lab.
2. We determine possible solutions to overcome the heat.
3. We stay at or under the $2,000.00 budget.
4. We present solution options to Principal Johnson on March 18th, 2011

Know/Need to Know Board:

Know:
1. The temperature in the computer lab is too hot for the students and teachers to be in it.
2. We have a budget of $2,000.00
3. We need to make a presentation to Principal Johnson on March 18th, 2011
4. If air is not flowing properly throughout the computer lab, then your computer components will get hot and damage your computers.
5. Several computers in the same room all operating at the same time can generate heat.
6. Without good air flow it may be difficult for anyone to use the computer lab for extended periods of time.
7. A good computer lab temperature ranges from 60 to 75 degrees Fahrenheit.

Need to Know:
1. What causes the computers to put out heat?
2. How is the temperature in the computer lab controlled?
3. Is the thermostat hooked up to more than one room?
4. What is the best way to cool the computer lab down?
5. What is the most cost effective way to cool the computer lab down?
6. What is the thermostat in the computer lab set on?
7. How many computers are in the computer lab?
8. How big is the computer lab?
9. How much does it cost to set the computer lab up on its own thermostat?
10. Is there a way to control the amount of heat put off by the computers?

Resources:
Websites (4):
http://pcsupport.about.com/od/maintenance/tp/pc_cooling.htm
http://www.openxtra.co.uk/articles/recommended-server-room-temperature
http://www.heatsink-guide.com/
http://static.highspeedbackbone.net/html/guide_Basic_PC_Cooling.html

Books (1):
Human Resources (2):
LaMae Creamer, ABC School Head Janitor, (850) 555-1234, 98 12th Street, Apalachicola, Florida 32320
Chimene Johnson, ABC School Principal, (850) 653-1212, 98 12th Street, Apalachicola, Florida 32320
Capstone Performance

The capstone performance for the problem will include an individual written report and a group oral presentation. Students will be assessed primarily on the written report and will receive a group grade for completing their part in the group oral presentation. In the written report, students will take on the roll of the investigator and heating and cooling expert and come up with a reason for the problem, at least two possible solutions, and four justifications for each solution. The groups (3-4 students) will come together and discuss each others solutions. They will then decide which solutions they believe will work the best within the budget. Each student in the group will present one solution and 4 justifications for the solution.

The school principal will come to hear the presentations along with the media specialist and the school custodian. They will sit in front row of seats and the presenting students will stand at the front of the classroom, behind a podium, facing the desks (see room arrangement below). Autonomy is reached through the individual report students do and meta-cognition will be incorporated in a reflection paragraph that students will write to say which overall solution they thought was best and which they thought was worst, giving at least one justification for why.

Room Arrangement

<table>
<thead>
<tr>
<th>Chalkboard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigators</td>
</tr>
<tr>
<td>Podium</td>
</tr>
<tr>
<td>Principal, Media Specialist, School Custodian</td>
</tr>
<tr>
<td>Students Desks</td>
</tr>
</tbody>
</table>
Rubric for Assessing the Capstone Performance

Rubric for Capstone Performance Written Report

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Excellent</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Problem Statement is Addressed</strong></td>
<td>10 Points</td>
<td>8 Points</td>
<td>4 Points</td>
</tr>
<tr>
<td>Student accurately addresses and answers each of the 4 conditions in the problem statement. Student lists 5 items that give off heat.</td>
<td>Student accurately addresses and answers 3 of the conditions in the problem statement. Student lists 3-4 items that give off heat.</td>
<td>Student accurately addresses and answers 2 of the conditions in the problem statement. Student lists 2 or less items that give off heat.</td>
<td></td>
</tr>
<tr>
<td><strong>Source of Problem is Identified</strong></td>
<td>10 Points</td>
<td>5 Points</td>
<td>0 Points</td>
</tr>
<tr>
<td>Student states what he/she believes is the source of the problem and gives and explanation why.</td>
<td>Student states what he/she believes the source of the problem is, but does not give an explanation why.</td>
<td>Student does not identify what he/she believes is the source of the problem.</td>
<td></td>
</tr>
<tr>
<td><strong>Solutions and Reasons are Given</strong></td>
<td>20 Points</td>
<td>12 Points</td>
<td>8 Points</td>
</tr>
<tr>
<td>Student accurately lists 2 possible solutions and 4 reasons for each of the solutions. Each solution and reason is worth 2 points.</td>
<td>Student accurately lists less than 2 possible solutions and/or list less than 4 reasons for each of the solutions</td>
<td>Student accurately lists only 1 possible solution and only 3 reasons for that solution.</td>
<td></td>
</tr>
<tr>
<td><strong>Mechanics</strong></td>
<td>5 points</td>
<td>3 points</td>
<td>1 points</td>
</tr>
</tbody>
</table>

Scoring Guide:

A = 40-45  
B = 34-39  
C = 28-33  
D = 22-27  
F = Less than 22
Two Alternative Solutions and “Best” Solution Analysis

**Solution One:**
The heat is caused by poor air circulation, number of computers in the room, and lack of air conditioning. Since the air conditioning for each room in the school is connected to the adjoining room, it is impossible to adjust the temperature in the computer lab without overcooling the adjoining classroom. In addition to making sure computers are set up in a way that allows proper ventilation for the computer to properly cool itself, I suggest we put an additional air conditioner in each room to help compensate for the heat of the computers.

<table>
<thead>
<tr>
<th>Pro</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Janitors could install air conditioners</td>
<td>Air conditioners are subject to repairs when they break</td>
</tr>
<tr>
<td>Air conditioners are relatively inexpensive ($250-$1000).</td>
<td>Air conditioners sometimes leak</td>
</tr>
<tr>
<td>Cooling the air will help students concentration while in the lab</td>
<td>Air conditioners can be noisy.</td>
</tr>
<tr>
<td>Adjoining classrooms will not have to compensate for the heat, because of the additional cooling system.</td>
<td>Air conditioners can over cool a room making it uncomfortable to be in them.</td>
</tr>
</tbody>
</table>

Consequences:
Air conditioning units can make rooms too cool, causing teachers and students to not want to go because it is uncomfortable for them when they are underdressed.

Air conditioners require maintenance and a faulty air conditioner could cause teachers to keep students out of the lab due to inconsistency.

**Solution Two:**
The heat is caused by poor air circulation, number of computers in the room, and lack of air conditioning. Since the air conditioning for each room in the school is connected to the adjoining room, it is impossible to adjust the temperature in the computer lab without overcooling the adjoining classroom. In addition to making sure computers are set up in a way that allows proper ventilation for the computer to properly cool itself, I suggest we put a wall mounted exhaust vent in each room with a fan attached to draw heat out of the room.

<table>
<thead>
<tr>
<th>Pro</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventilation is relatively inexpensive to purchase ($100-$350).</td>
<td>Installation may be costly. The school is a brick building.</td>
</tr>
<tr>
<td>Air circulation is really important for computers and an additional vent will allow for better air circulation</td>
<td>Fans can be noisy</td>
</tr>
</tbody>
</table>
Exhaust fans can help to eliminate humidity in the air. During hot months there may be some back draft heat that enters the lab.

Exhaust fans can help circulate the air in the room, making dust less likely to settle in computers. When you open the classroom to the outside ventilation, you may incorporate problems such as leaks, etc.

Consequences:
Fan installation may backfire and cause the heat to get worse instead of better.

Leaks can occur whenever you install something in an outside wall.

**Justification:**
Best Solution: Solution One. Air conditioning units are relatively inexpensive and easy to install. No building permit would be required, because there would be nothing done to the building itself. The adjoining room would not have to compensate for the heat in the computer lab, allowing students to be comfortable (not overly cool) in their classroom. According to the meet the problem document, *Guidelines to Set up a Computer Lab*, a good room temperature to use ranges from 60 to 75 degrees Fahrenheit. The additional air conditioning unit would allow the desired temperature to be maintained. Computer labs need proper air circulation. Adding an air conditioning unit will help cool air to circulate and help to keep the computers from overheating. Although air conditioning units sometimes require a lot of maintenance, the school could buy a back up unit in case of issues with one of the units.
Debriefing Plan and Coaching Questions

Each group of students will present their findings to the School Principal, Media Specialist, and School Custodian as well as their fellow students. Each student in each group should present one solution along with four justifications for using that solution. Students should take notes during the presentations so that they can write a reflection paragraph on which solution was the best and which solution was the worst with one justification for why they picked each. There will then be a class discussion where students talk about the solution they thought was best and why.

Five Essential Concepts:
1) Students will need to understand how things that give off light produce heat. Students will do an activity where they pinpoint items that produce heat.
2) Students will need to understand that things that rub together produce heat. Students will do an activity where students must identify things that give off heat from rubbing together.
3) Student will understand how to organize their ideas into a paper. Students will do accomplish this by taking notes during their investigation and research and use those notes to help them write their first draft.
4) Students will need to know how to edit their first draft to make a final draft. Students will use peer review to help this process.
5) Students will need to be able to present what they have written to a given audience. Students final presentation will help provide the stage for this.

Coaching Questions:

<table>
<thead>
<tr>
<th>Type of Question</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meet the Problem</strong></td>
<td></td>
</tr>
<tr>
<td>Cognitive</td>
<td>Can you summarize the information you’ve received?</td>
</tr>
<tr>
<td>Meta-cognitive</td>
<td>Are there any unfamiliar term?</td>
</tr>
<tr>
<td>Epistemic</td>
<td>Will this problem be easy or hard to solve? Why?</td>
</tr>
<tr>
<td>Know/Need to Know Board</td>
<td>Where could you go to find that out?</td>
</tr>
<tr>
<td>Cognitive</td>
<td>How do you know that?</td>
</tr>
<tr>
<td>Meta-cognitive</td>
<td>What’s the most important? The least important?</td>
</tr>
<tr>
<td>Epistemic</td>
<td>What is your role in the problem?</td>
</tr>
<tr>
<td>Problem Statement</td>
<td>What do you think the problem is?</td>
</tr>
<tr>
<td>Cognitive</td>
<td>What factors do you need to think about to reach a solution?</td>
</tr>
<tr>
<td>Meta-cognitive</td>
<td>How might you find out that information?</td>
</tr>
<tr>
<td>Epistemic</td>
<td>What does that mean?</td>
</tr>
<tr>
<td>Generating Possible Solutions</td>
<td>Why is that important?</td>
</tr>
<tr>
<td>Cognitive</td>
<td>What is the next step?</td>
</tr>
<tr>
<td>-----------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Meta-cognitive</td>
<td>How did you arrive at this solution?</td>
</tr>
<tr>
<td>Epistemic</td>
<td>Will this solution help to solve all issues? If not, what issues have not been solved?</td>
</tr>
</tbody>
</table>