

Case Study

By Gail Marlin

- Teacher's goal: to increase students' awareness of interactions between matter & energy & to introduce them to methods of observation, recording, analysis, and communication in science.
- Mr. Haddad wants students work in pairs, each of which will build a simple outdoor solar greenhouse.
- Students are to use thermometers to collect temperature data, analyze the data using spreadsheets, prepare a report, and present that report to the class.

Explain why the use of spreadsheet software proposed by the teacher would be appropriate and effective for enhancing this activity.

The use of a spreadsheet is an appropriate and effective tool for enhancing student learning and meeting Mr. Haddad's goal because students can compile and record observed temperatures in a spreadsheet, create a spreadsheet graph using this data, analyze the information provided by the graph, and communicate their findings by presenting an oral report to the class.

A spreadsheet is a table-like form made up of rows and columns. A cell is the intersection a row and a column and that is where the user enters data. Spreadsheet software has mathematical function or formula features that Mr. Haddad may want his students to use. For example, students could use different types of soil when potting their plants and list those soils as the column header at the top of each column of the spreadsheet. They could list each day (date) they record soil temperatures down the first cell of each row. In the body of the spreadsheet they would record observed temperatures and enter it in the appropriate cell. Using a spreadsheet is a great way to organize and manipulate data.

Another advantage of using a spreadsheet is that with a spreadsheet you can manipulate data by sorting and filtering it in different ways. Students could sort temperatures from lowest to highest or highest to lowest. They could filter out a specific day or a specific soil if they want. Students will also be able to find the mean (average), median, or mode of the green house temperatures that they collected using spreadsheet formulas.

Using the chart (graphing) function of a spreadsheet program will greatly enhance Mr. Haddad's lesson. Charts turn data into a meaningful, visual picture of information. Graphing data from the spreadsheet into a bar, line, or pie chart gives a visual representation of the data making trends and predictions easier to see. Creating a graph can be done by following the step-by-step instructions from the graphing wizard. The skills acquired by using the tools in spreadsheet software are practiced in the 'real world' so this lesson will benefit those students who participate.

Describe one additional technology available to the teacher and how that technology can be effectively integrated into the lesson. Explain why this technology would be appropriate and effective for enhancing this activity.

One additional technology available that would effectively enhance the lesson is to use the concept mapping software that is installed on Mr. Haddad's computers. Concept mapping software will assist students in developing their report. Student can collaborate and record ideas as they create their map. A concept map looks similar to a spider web. Students first enter the main idea of the report. Students then enter ideas for topics they want to include in their report, such as 'describe green house', 'explain process of collecting data', 'explain data', 'show graph', 'describe similarities and differences', 'interrupt the data', and 'state predictions'. These topics are shown inside individual balloons on the concept map. All the balloons are connected by lines to the main topic of the report. After they enter their main ideas they add supporting information under each main idea and this information appears under its topic. Students can move or reorganize their balloons on the map. Concept maps help students visually organize their thoughts; therefore it assists/aids visual learners, too. Concept mapping software can be used by most, if not all, 4th grade students. I have observed special, regular, and advanced education students and adults (diverse learners) use this software tool successfully.

Describe how to support and guide the teacher in planning, implementing, and evaluating the applications of technology ...

Planning: I will first schedule a meeting with Mr. Haddad to visit with him about his lesson plan ideas. I will assist him as a mentor by taking the role of support system and resource person. Developers of the Center for Cognitive Coaching state that 'the mission of cognitive coaching is to produce self-directed persons with cognitive capability for high performance both independently and as member of a community.' They state that trust is an important part of being a good mentor. To build trust I will be nonjudgmental, I will not criticize or make presupposition-type statements. As a MTT, I will listen intently to him, acknowledging, paraphrasing, and clarifying subject matter as we visit. At the meeting I will utilize other cognitive coaching techniques by asking probing questions about his goals, ideas, and concerns. My inquiring questions will be open-ended to allow for multiple responses and expand thinking and encourage thought. I will paraphrase his responses because in doing this it helps him to reflect, and it shows that I am trying to understand what he is saying. I will give him time to think and support his thinking by summarizing or organizing what he says. Since Mr. Haddad has taught this lesson in the past, I will ask him to reflect on what worked well and what areas he would like to strengthened in the lesson. We will clarify goals, specify success indicators, plan for collecting evidence, and establish a personal learning focus and processes for self-assessment. We will discuss and develop a timeline for the unit. We will also create a plan B for unforeseen problems, such as a downed network, computer(s) or other equipment not connecting or working, etc.

After visiting with Mr. Haddad, and if necessary, I will show him how to use the graphing and data analysis functions of the spreadsheet software. I will then help him decide how he wants to introduce those functions to his students. Does he want to demonstrate it to the entire class by using the school's projector? Does he want us to team teach it? Does he want to demonstrate it to a couple of students and then have those students peer teach, or does he want to demonstrate it in small groups? I will help him work through these type of concerns and we will come up with an acceptable solution that he feels comfortable with.

Implementing: Since there is no mention of the school having a computer lab or laptops, I will ask his thoughts about implementing the technology by letting 6 groups (2 students in each group as he requested) work at his 6 classroom computers. Students will use the spreadsheet and incorporate the graphing and data analysis functions, while the other half of the class gathers information on matter and energy from reference books and discussions amongst themselves. The class will then flip-flop and the students who were at the computers will do their research and the students who were researching will use the computers.

After the basic information has been entered into the spreadsheet and background information has been researched, each group will develop a concept map to aid them in the creation of their group report.

I will be available to Mr. Haddad in a way that he feels comfortable. For example, does he want me in the room where I can assist immediately, on campus where I can be there within minutes, at a phone or computer (via email) so he can contact me that way?

I will also help him test the equipment and software well before the date of the lesson. We will test the computers to make sure they run the software, update anything that might need to be updated, and walk through the lesson on the machine.

Evaluating: I will help Mr. Haddad develop a student evaluation for the lesson. We'll discuss what type of evaluation strategies he wants to use (rubric, checklist, teacher observation, discussions, etc). I'll inquire what aspects of the lesson he thinks is important to evaluate. We'll also discuss what data he wants me to collect for him, if any.

We'll meet again after the lesson to discuss the lesson. I'll ask him to reflect upon the lesson by asking him to summarize impressions and recall supporting information about the lesson. We will then analyze causal factors and brainstorm ways to improve the lesson for the next time he teaches it.

Describe how the technology you selected might be adapted for use in one other learning environment (ie: a different subject area, lesson, population, grade level.) A concept map assists users in organizing their thoughts whether the thoughts involve math, science, social studies, or any other subject area. It can be used by most any student or adult, and it aids visual learners.

Since a concept map is a visual (graphic) representation of the relationships between one or more concepts, it can be used in any learning environment. The map allows rapid inspection of relationships between concepts. It is a universal tool for most any learning environment.