Career Academy Teacher Externship Program

Power Outage Activity

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Overview:

This lesson plan is for a cross-curricular project that helps students investigate their electricity use and devise a plan for how they could maintain their normal activities for two days without using power (such as during a power outage). The idea came from the need many companies have for a back-up plan when they lose power during a storm but still need to maintain their operations.

Featured Externship Business:

Oconto Electric Cooperative

Subject:

Science, Math, Language Arts, Technology, Planning, Real Life Problems

Grade Level:

Middle School (6-8)

Learning objectives:

After doing this activity, students should be able to:

- Explain and calculate their typical daily electricity use
- Understand which appliances take power and how long they last without being plugged in/charged
- Understand and explain how to acquire and use water safely without electricity
- Understand and explain how to acquire and prepare food safely without electricity
- Understand and explain safe methods to see in the dark without electric light
- Discuss other challenges and provide solutions for households and companies/businesses running without power
- Explain and discuss solutions to minimize electricity usage

Workplace Readiness Skill:

x Social Skills	x Communication
x Teamwork	x Critical Thinking
x Attitude and Initiative	x Planning and Organization
☐ Professionalism	☐ Media Etiquette

Type of Activity:

x Individual
x Small group
☐ Whole class

Wisconsin Academic Standards for School Counseling:

Academic Development Domain:
Content Standard A: Students will acquire the attitudes, knowledge, and skills that contribute to successful learning in school and across the lifespan.

Content Standard C: Students will understand the relationship of academics to the world of work, and to life at home and in the community.

Personal/Social Development Domain:
Content Standard E: Students will make decisions, set goals, and take necessary action to achieve goals.

Wisconsin State Standards for Mathematical Practice:
Solve real-world problems by utilizing the following Mathematical Practice Standards:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.

Wisconsin's Model Academic Standards for Science:
Content C Science Inquiry: Students in Wisconsin will investigate questions using scientific methods and tools, revise their personal understanding to accommodate knowledge, and communicate these understandings to others.

Content G Science Applications: Students in Wisconsin will demonstrate an understanding of the relationship between science and technology and the ways in which that relationship influences human activities.

Wisconsin's Model Academic Standards for Social Studies - Content Standard D: Economics: Students in Wisconsin will learn about production, distribution, exchange, and consumption so that they can make informed economic decisions.

Common Core State Standards in English Language Arts
Standards and practices will vary based on teacher discretion regarding how much research, evidence citing, writing, and presentation format requirements and options for students

Time:

On-going over several weeks, both in class and outside of class work

Materials:

- Electricity use journals and logs for students
- Computers/devices and Internet access for research
- Project presentation options for students

Directions:

1) **Introduce the project and problem to students:**

   This can be done in a variety of ways. For example, in social studies, the class could study the Industrial Revolution and advances in different ages of technology. In science, this could coincide with an electricity or renewable energy unit. Perhaps there was a series of storms recently in your area that left several households without power, and you can use that event as a discussion point. (As an aside, this last example is what triggered this unit and project idea while the teacher was completing a CATE externship at Oconto Electric Co-op.)

2) **Have students investigate and record how much they rely on electricity and power on a daily basis:**

   First, have students brainstorm and name all of the appliances and devices that they immediately realize that they use daily. Then have students log and keep a journal of their electricity use for one entire week so that they can see how much and how often they are using power. This should be very detailed to help them proceed with the next step of the project. *This should include activities of when they wake up to when they go to sleep AND if anything is in use overnight. They should pay attention to details, such as ALL electronics that are plugged in all of the time (even if not in use), when they turn things on and off, when they plug something in to charge, how long it takes to charge it, and when they unplug it. This will also help them track how long some of the batteries on their devices last*

with normal use. See at end of document: Electricity Use Log document for example and directions- multiple copies can be made for each student OR this can be done electronically

3) Explain to the students that the unthinkable has now happened:

A huge storm in the state came through and knocked out power for the entire state!!!!! Life is going to continue (as usual- as much as possible!), but they no longer have electricity and can expect it to be out for AT LEAST TWO DAYS!!! They now need to come up with a plan of how they will maintain their daily activities (go to school, do homework, eat, use the restroom, etc.). This will involve research and creativity. They may want to log and map out two days worth of normal activities WITH electricity to help them see what they will need to manage without electricity. Although students may work together and share ideas (this is encouraged!), each student lives in a different household and needs to devise and create their own plan. The students will be responsible for choosing their own format to present their project and solution ideas. Provide students with a grading rubric and expectations.

<u>Some items that may come up and ground rules to be addressed (as needed):</u>

A. Unless their household already owns something, they may NOT go out and purchase something new (exceptions like bottled water can be negotiated and agreed upon--as teacher sees fit). The purpose here is that each household is NOT going out to buy themselves a generator. However, if a household currently owns one, it is up to the teacher whether the student is allowed to incorporate that into their project solution or not.
B. Food storage and preparation and water access will need to be discussed and researched: how many times can one open the refrigerator before food won't be safe? Does the student have a gas or electric oven or a gas or charcoal grill? What can they eat without "cooking"? Does the student have a well or city water? Will the students have access to a grocery store that is still open and not closed because of the outage?
C. Bathroom use/hygiene: the teacher should decide how best to address this for middle-school appropriateness. Will they investigate alternative ways to flush the toilet? Or will the teacher just going to omit this piece of the project?
D. How long will their cell phone last? Their computer? Will they have wifi or data? Do they have alternative ways to charge these things or ideas to conserve their charge?
E. How are they going to see at night? Are batteries in flashlights working and available?

F. Will they be able to wake up for school on time?!....

Wrap-Up:

1) Have students share their projects (however teacher sees most appropriate).
2) Class discussion and follow-up:
    a) What are some of the common problems everyone had to solve?
    b) What were the common solutions?
    c) Are the ideas presented feasible and realistic? Are any not feasible and why?
    d) This project might not seem realistic/probable, but what kinds of things COULD take out everyone's power? Are there certain areas where this is more likely? Why?
    e) What about other countries? What do they do?
    f) Will this affect anything you do differently on a daily basis regarding electricity and electronics?
    g) Do you feel better prepared for the next time the power goes out?

Extension Activity:

There are lots of ways the above wrap-up questions and project could be taken even further:

a) Have students respond and summarize the overall project in essay form
b) Have students calculate their average kilowatt hours they consume
c) Have students research the power systems in other countries
d) Have students track their energy usage and utility bills on a more long-term basis- can they lower their utility costs and energy use? Can they go "off the grid?"

*References for kilowatt hours for most appliances and cost to use can be found online

Electricity Use Log

Name:

First, brainstorm and name all of the appliances and devices that you know you use daily. Keep a journal to log all of the items that you use in a week that use electricity. This should be very detailed to help you proceed with the next step of the project. (*This should include activities of when you wake up to when you go to sleep AND if anything is in use overnight. You need to pay attention to details, such as ALL electronics that are plugged in all of the time (even if not in use), when you turn things on and off, when you plug something in to charge, how long it takes to charge it, and when you unplug it. This will also help you track how long some of the batteries on your devices last and how often you charge them with normal use.)*

All Electric Appliances and Devices in My Household:

Devices Always Plugged In:	When they are used:

Electricity Use Log (Daily)

Date:

Device used:	Time:	For How Long:	For What Purpose:

Electricity Use Log (Daily)

Date:

Device plugged in/charging: Start: End: Total Time: