



Comprehensive Theme Activity: Energy Story

Students develop a story that creatively and accurately incorporates essential energy concepts. This story can be used as the performance standard for the theme “We Need Energy.”

Grade Level: 5–8 (9–12)

Subject Areas: English
Language Arts, Science, Social
Studies

Setting: Classroom and library

Time: The time frame depends on when and how this project is implemented. The following is a possible timeline for the project.

Week One

Introduce assignment and have students plan their story (**Orientation** and **Steps 1–4**).

Weeks Two and Three

Students conduct research (in and outside of class), participate in class activities related to basic energy concepts, and write and review first draft (**Steps 5–6**).

Week Four

Students revise and edit final draft and submit completed story (**Steps 7–8** and **Closure**).

Getting Ready:

Students can be encouraged to keep an **Energy Learning Log** to prepare for this writing activity. This activity can be presented at the beginning, middle, or end of an energy unit. Or this activity can be the energy unit, because researching and writing the story will help the students learn and understand basic energy concepts. Students can be given class time to conduct research or be expected to do this on their own. In addition, students can gain knowledge and skills about effects of energy use and development through participating in other class activities such as those found in the *KEEP Energy Education Activity Guide*.

Objective

Students will be able to:

- define energy;
- describe how energy is used to maintain, organize, and change systems
- identify sources of energy;
- describe forms of energy; and
- explain how the first and second laws of thermodynamics apply to energy use.

Rationale

Writing projects provide students with unique opportunities to express their knowledge about energy—what it is, where it comes from, what forms it takes, and what properties it has.

Materials

- Copies of the following pages:
 - **Project Proposal Form**
 - **Peer Review Form**
 - **Story Evaluation Form**
- Samples of stories written by students from previous years, with the authors’ names removed (optional)
- Find additional resources related to this activity on keepprogram.org > Curriculum & Resources

Background

The primary message of the theme We Need Energy is that everything depends on energy. Thoroughly understanding this message involves answering some basic questions. These questions include “What is energy?” and “What does energy do?” To demonstrate that they have mastered the concepts in this theme, students should be able to describe accurately how they, their environment, and their community depend on energy. This description should include the definition of energy and how it behaves.

There are a variety of ways a teacher can determine if students understand basic and essential energy concepts. One approach is for students to put their thoughts in writing. This assessment strategy, also called Writing-as-Learning, helps students monitor and enhance their learning.

Writing-as-Learning does not consist of students sitting at their desks and writing a two-page essay that the teacher has to spend the weekend grading. Instead it is an ongoing, progressive process, where the evaluation is formative rather than summative. That is, teachers facilitate the development of students' written material, assess students' word choices and organizational skills, and note their progress. The key to success of the Writing-As-Learning approach is that students must be actively involved in the process. Students should view writing as a creative avenue to explore and express their comprehension rather than a chore. A benefit of using writing as an assessment tool is that students become better writers. The challenge of using the correct wording to relate new experiences to prior knowledge can enhance students' communication skills and vocabulary.

Writing is an engaging process where students are compelled to think on paper. Students need to analyze, interpret, and work to make words and sentences correctly express what they understand. By reading students' creative writing projects, teachers gain insight into students' thought processes about essential energy concepts. Students should keep these stories and use them to refresh their memories about energy.

Procedure

Orientation

Invite students to author a potential best-selling story about energy. This story might be presented in written form or as a play, video, or comic strip.

Review the role energy plays in our lives and how it is often overlooked and unappreciated. Explain that energy is a challenging topic because it is so abstract. Tell students that their mission, as good authors, is to take this complex, important topic and write a story that is meaningful to the average reader. Warn students that this is a challenging project, but their reward will be a unique understanding of energy that should be shared with the general public.



Steps

1. Introduce students to the *Project Proposal Form*. Share the evaluation criteria listed on the *Story Evaluation Form*:

- Discuss the evaluation criteria and tell students that the main objective is accurate representation of important energy concepts. If possible, have samples that do and do not meet the criteria available for student reference.

2. As a class, identify important energy concepts that should be included:

- Begin with a writing activity where students identify major concepts in energy that they know or would like to know (use the project criteria as a reference). It may help to relate activities and lessons in which they have participated that addressed energy concepts. Students can use a graphic organizer such as a concept map to arrange the concepts.

3. **Divide the class into cooperative working groups of two or three students:**

- Discuss responsibilities associated with developing stories, such as designing, researching, drafting, reviewing, revising, and presenting. Students may want to assign certain responsibilities to different group members.

NOTE: This can also be a project where the whole class works together to create one story (for example, each cooperative learning group can develop a chapter). Another approach is to have students work individually.

4. **Ask groups to decide on a story line and distribute the *Project Proposal Form*:** Invite the groups to brainstorm fun ways to tell the story. They should decide on their audience, the setting, a plot, and how their main message (the importance of energy) will be delivered. Following are several creative approaches to presenting the story:

- Adventures of energy as it flows through human and/or natural ecosystems (could be presented as a cartoon strip)
- A “whodunit” mystery where the reader must “track” or locate evidence of energy
- A script for a play or a video
- An interview where people share their experiences with and insights into energy
- A story of energy in one day of your life (perhaps a birthday or a community event)
- An illustrated storybook for younger children

Tell students to identify the pros and cons of each format. Help students to select the approach that is most feasible, yet provides a creative challenge. After students have a general idea of how they want to write the story and what energy information to include, have them complete their *Project Proposal Form*. Meet with the groups to discuss the form and to help them clarify their questions concerning the information they need to write the story.

5. **Researching and writing the first draft:** Help students identify strategies to answer the questions related to their story. Encourage students to develop a system, such as an “Energy Learning Log,” for recording and organizing their research. As much as possible, allow students class time to complete the project. This time can be used to monitor student progress, answer questions, and provide editorial suggestions. This also gives you the opportunity to observe group dynamics, and make sure each student is doing his or her fair share.

6. **Reviewing the first draft:** The purpose of the review is to identify where text can be added, deleted, or streamlined to strengthen the accuracy and presentation of energy concepts in the story. Help students to understand that if stories are carefully reviewed, revised, and edited, the results of the final evaluation should not be surprising.

Stories can be reviewed by students as well as by you. A *Peer Review Form* has been provided to guide students’ reviews of each others’ stories. Encourage the reviewers to point out the strengths of the story first, and then provide suggestions to improve the story. Visit each group to monitor their discussions.

7. **Revising the story based on the review:** When the groups receive their reviews, they should brainstorm how they’ll address the comments. Things to consider include “What additional research is needed?” “Which ideas should we accept or reject and why?” and “How should we incorporate suggestions?”

During the revision process students should pay attention to their writing skills, taking care to use proper spelling, grammar, and punctuation. When they have completed the final draft, another student (a fresh pair of eyes) needs to read and edit it, because authors often miss or overlook their own errors.

8. **Editing the final draft:** Editing can also be conducted by peers. Remind students that they are to focus only on spelling and grammatical errors, and not rearrange or critique the content, as this should have been addressed in the review. Rather than expecting every mistake to be identified, encourage the editors to concentrate on two or three types/kinds of recurring errors. Be available to answer questions and check students’ work to make sure their editorial comments are correct and to make sure nothing important has been overlooked.

Closure

Have the groups read or present their completed stories to each other. Students may be motivated to take extra care in developing their stories if they know they will be read or seen by an audience outside the classroom. Discuss creative ways to display or present the stories. The local library or businesses may be interested in exhibiting copies of students’ work. If the stories are entertaining and educational, they can be published and sold as a fund-raiser or donated to another class or school.

Assessment

Formative

- Did students work together cooperatively in groups?
- Did they ask pertinent and insightful questions?
- Did they conduct reviews seriously, providing useful comments?
- How did they respond to and address the reviews of their project?

Summative

The **Story Evaluation Form** provides an agree/disagree scale to evaluate papers. Passing grades should receive “Strongly Agree” and “Agree.” Modify or adapt this form as needed.

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The Wisconsin K-12 Energy Education Program is supported through funding from



Wisconsin K-12 Energy Education Program (KEEP)
College of Natural Resources
University of Wisconsin - Stevens Point



Energy Learning Log

Energy Learning Logs are similar to portfolios and are used for projects within the performance standard activities. Use an Energy Learning Log throughout the entire developmental process of students' learning about energy. An Energy Learning Log can be of any type, such as an accordion folder, a spiral or loose-leaf notebook, etc. Invite students to personalize the outside of their logs with drawn or cut-and-pasted illustrations relating to energy.

Energy Learning Logs Can Be Used...

...as a Vehicle for Pre-assessment

Prior to any instruction on energy, invite students to write about energy for 15 minutes or so. Emphasize that this is not a formal writing task. They should write down anything that comes to mind, keeping their pen or pencil to the paper at all times. If their mind is blank, suggest they write the word energy over and over again until they think of something related to energy, or they can write about why they can't think of anything related to energy. After students are done writing, ask them to summarize what they wrote by writing down three statements that they think they know about energy, and three questions that they have about energy. These questions can be discussed as a class, shared with the teacher on an individual basis, or kept private. At the end of the energy unit, have students revisit these questions and statements and answer or rewrite them as needed.

...to Help Organize and Plan a Project

After students have been introduced to the purpose of a project, encourage them to use the Energy Learning Log as a planning and organizing tool. They can outline their objectives and identify what they need to acquire. The log can be used to collect background information and reference materials such as journal articles and interview results. This is one reason why a large three-ring binder or accordion folder serves as a good log.

The system students use to organize the information they collect provides insights into their thought processes. Have students construct outlines or concept maps that diagram their arrangements. This allows you a good opportunity to evaluate their work in progress. Assist them by identifying new categories or suggesting ways they can narrow their scope.

...as a Reflective Tool and to Monitor Progress

Use the Energy Learning Log to link different energy concepts students have learned. When students are learning new concepts, encourage them to refer to previous information.

Allow time at the end of each energy education activity for students to summarize and interpret what they experienced. They should view these writing opportunities as a means to express their personal insights. They are striving to make the energy activity meaningful and to apply it to their own lives. By relating what they have observed in their own words, students will discover gaps that need to be filled, make connections among existing thoughts, and raise questions that require further exploration.

Students may wish to use parts of the log as a diary. They can record their personal reflections, wishes, and frustrations in a special section of the log, in code, or in a separate journal. In some

Energy Learning Log

cases, this section will be designated as writing not to be viewed by the teacher.

...to Report and Evaluate Results

An Energy Learning Log can be used to document the results of a project or activity, or it can be the project. Actual samples of student work can be part of the log. Samples include artwork, videos, poetry, draft writings, calculations, and test results. One strategy involves having students use the log to show what they think is their best work. Reflective questions should accompany this presentation. For example, students can be asked to explain why they think this is their best work, what they did to make the project successful, what they would do differently, and how this applies to their overall development as a current and future energy consumer.

If the log itself is graded, one or more of the following criteria can be used: accuracy of content, creativity, originality, evidence of increased knowledge about energy, thorough expression of attitudes toward energy, completeness, etc. It is best to present these criteria to students before they initiate their log work; then they will know what they should achieve. These criteria can be adapted into a rubric evaluation form.

Resources

Barrow, Lloyd. "A Portfolio of Learning." *Science and Children* 31, no. 3 (1993):38-39.

Belanoff, Pat, and Marcia Dickson, editors. *Portfolios: Process and Product*. Portsmouth, N.H.: Boynton/Cook Publishers, Inc., 1991.

Benjamin, Carol Lea. *Writing for Kids*. New York: T. Y. Crowell, 1985.

Cole, Donna J., Charles W. Ryan, and Fran Kick. *Portfolios across the Curriculum and Beyond*. Thousand Oaks, Calif.: Corwin Press, Inc., 1995.

The Watercourse and Western Regional Environmental Education Council. "Water Log" pp. 19–22 in *Project WET Curriculum and Activity Guide*. Bozeman, Mont.: The Watercourse and the Western Regional Environmental Education Council (WREEC), 1995.

Project Proposal Form

| Names | Responsibilities* |
|-------|-------------------|
| | |
| | |
| | |
| | |

*If this is a group project, write down each person's primary responsibility.

Purpose of Project

To develop a story that emphasizes the importance of energy in our lives.

Date Story Is Due _____

Suggested Length _____

Summary of Proposed Story Line (include audience, setting, and general plot description)

Criteria

The purpose of the project must be emphasized within the story.

The story must address the following questions:

- What is energy?
- What evidence is there that energy is being or has been used?
- Where does the energy come from? (Identify sources.)
- In what forms does energy exist?
- What happens to energy as it is being used? (Relate to energy transfer and conversion; also tie in the first law of thermodynamics.)
- What are the limitations of energy use? (Relate to the second law of thermodynamics.)

The story must be edited and checked to make sure grammar, punctuation, spelling, etc. are correct.

Include other criteria or considerations.

Generate a list of additional questions about energy you'll need to know to write this story.

Peer Review Form

Title of the Story _____

Author(s) _____

Reviewer(s) _____

Answer each of the following questions carefully, highlighting strengths and providing suggestions whenever possible.

Does this story address the purpose of this project? Why or why not?

What do you like best about this story?

What did you find confusing or difficult to understand in the story?

How effectively does the story meet each of the criteria for this project?

What suggestions do you have for improving the story? (Focus on suggestions for addressing the purpose of the project and meeting criteria.)

On the back or on another piece of paper, write any other comments you have. (You may refer to **Supplemental Review Questions.**)

Supplemental Review Questions

Instructions

Add these questions to the *Peer Review Form* as needed.

How would you summarize the story line? (Include audience, setting, and general plot description.)

What made it easy or difficult to summarize the story?

Is the story original?

What made the story interesting? What made it dull?

Was the story easy to understand? (Consider organization, sense of purpose, and plot development.)

To what extent did mechanical errors (spelling, grammar, punctuation, etc.) make reading difficult?

How thoroughly and accurately are each of the following incorporated into the story?

- Energy defined
- Evidence that energy was or is being used
- Sources of energy identified
- Different forms of energy described
- Descriptions of what happens to energy as it is being used
- Limitations of energy use

Who is the intended audience for this story?

Do you think the audience will clearly understand and appreciate how the author(s) think and feel about energy? Will they gain insight into important energy concepts?

Include other considerations.

Story Evaluation Form

Title of the Story _____

Author(s) _____

The story emphasizes the importance of energy.

Strongly Agree

Agree

Disagree

Strongly Disagree

Comments:

The story properly addresses the criteria.

Strongly Agree

Agree

Disagree

Strongly Disagree

Comments:

The story is original, interesting, and creative.

Strongly Agree

Agree

Disagree

Strongly Disagree

Comments:

The story is well organized.

Strongly Agree

Agree

Disagree

Strongly Disagree

Comments:

The story has been turned in on time.

Yes

No

Comments

The story is the correct length.

Yes

No

The story deserves a passing grade.

Strongly Agree

Agree

Disagree

Strongly Disagree

What I liked best about the story:

Suggestions I have for improving the story (see above for comments):

The above comments and suggestions could be made; consider them for your next project.

The above comments and suggestions should be made to improve the grade of this project.

The above comments and suggestions must be made to receive a passing grade.