**Objectives**

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 from the *Student Book*:
  - *Project Proposal Form*, page 4
  - *Peer Review Form*, page 5
  - *Story Evaluation Form*, page 6
- Samples of stories written by students from previous years, with the authors’ names removed (optional)

**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

**Getting Ready:**

Students can be encouraged to keep an “Energy Learning Log” to prepare for this writing activity (see Appendix).

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.

A possible action figure for an energy story: “Thermodym” upholds the laws of thermodynamics.
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.
Project Proposal Form

<table>
<thead>
<tr>
<th>Names</th>
<th>Responsibilities</th>
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*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.
Title of the Story

Author(s)

<table>
<thead>
<tr>
<th>The story emphasizes the importance of energy.</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Comments:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The story properly addresses the criteria.</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td>Comments:</td>
</tr>
<tr>
<td>The story is original, interesting, and creative.</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td>Comments:</td>
</tr>
<tr>
<td>The story is well organized.</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td>Comments:</td>
</tr>
<tr>
<td>The story has been turned in on time.</td>
<td>Yes</td>
<td>No</td>
<td>Comments:</td>
<td></td>
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<tr>
<td>The story is the correct length.</td>
<td>Yes</td>
<td>No</td>
<td>Comments:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The story deserves a passing grade.</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td></td>
</tr>
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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.