

ITEEA *STEL* LESSON PLAN

Lesson Title: Lesson 3: Home Water Usage

STEL: *Standards for Technological and Engineering Literacy: The Role of Technology and Engineering in STEM Education*

KSB: Knowledge and Skill Builder

Author: EbD™

STEL Context(s): The Built Environment

Name of Course: *TEEMS Nxt Gen Grade 5*

Intended for In-School or At-Home: In-School

Grade Level: 5

Lesson Overview/Big Idea: Collection of real-world water usage information by students in their homes provides a source of data to use for analysis and graphing. Students collect data and create bar graphs to visually represent their family's information. This lesson also compels students to consider what they would do if they did not have access to clean, safe water for a day.

Purpose of Lesson: Water is used in a variety of ways including but not limited to personal usage, generating power, and irrigating crops. Americans use over 400 trillion gallons of water a day. Almost 80% of this water comes from surface water sources such as rivers and lakes. The other 20% comes from underground aquifers. California, Texas, Idaho, and Florida use almost one-fourth of the total water (both fresh and salt) withdrawn in the United States for use by humans. However, these states use water for different things. For example, California uses more than half of its water to irrigate crops and about 30% to generate power. In Texas, over 40% is used to generate power and about 30% for watering fields. Crop irrigation accounts for about 85% of all the water used in Idaho, and power generation accounts for over 65% of the water used in Florida. Water usage not only varies from one state to another in the United

States but also from one home to another. Families use water for personal hygiene, washing dishes and clothing, flushing the toilet, drinking, and for recreation, among other things. This lesson will give students an in-depth look at how water is used in the United States.

Instructional Time: Required – 45 minutes Optional – 15 minutes Total – 60 minutes

STANDARDS/BENCHMARKS

<i>Standards for Technological and Engineering Literacy (STEL)</i>			
STEL-4I.	Explain why responsible use of technology requires sustainable management of resources.		
	Cognitive	Affective	Psychomotor
	Understand		
STEL-5D.	Determine factors that influence changes in a society’s technological systems or infrastructure.		
	Cognitive	Affective	Psychomotor
	Analyze		
STEL-8F.	Identify why a product or system is not working properly.		
	Cognitive	Affective	Psychomotor
	Analyze		
STEL-8G.	Examine information to assess the trade-offs of using a product or system.		
	Cognitive	Affective	Psychomotor
	Analyze	Responding	

Next Generation Science Standards (NGSS) Benchmarks

5-ESS3-1	Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment.
3-5-ETS1-1.	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
3-5-ETS1-2.	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
5-ESS2-1.	Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
5-ESS2-2.	Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

Common Core Mathematics Standards (CCSS Math) Benchmarks

MP.2	Reason abstractly and quantitatively.
MP.4	Model with mathematics.
MP.5	Use appropriate tools strategically.
3- 5.OA	Operations and Algebraic Thinking

Common Core English Language Arts Standards (CCSS-ELA) Benchmarks

CCSS.ELA-Literacy.RI.5.7	Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.
CCSS.ELA-Literacy.W.5.7	Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.
CCSS.ELA-Literacy.W.5.8	Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.
CCSS.ELA-Literacy.W.5.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.
RI.5.9	Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

Applicable STEL Practices: Making and Doing, Critical Thinking, Attention to Ethics

Learning Objectives:

In this lesson, students will:

- State a conclusion consistent with information, observations, or data.
- Draw a scaled bar graph to represent data with several categories.

6E MODEL LEARNING HIGHLIGHTS

EXPLORE: (predict, experiment, observe, discover, record, retest, discuss)

Students will survey and chart how much water their household uses each day and discuss ways in which their water usage is a necessity or luxury and how to determine between the two.

Teacher Preparation: Provide students with a copy of the Water Usage Survey (File 3.1)

Explain the purpose (tracking their family's water usage for an entire day) of the survey to students and how to complete it. Note: In order for students to be able to keep track of water usage for an entire day, it is best to hand out the survey on a Friday.

After students complete the Water Usage Survey and return them to school, have students take out their surveys. Provide each student with a piece of graph paper and colored pencils.

As a class, discuss students' survey responses and ask students if anyone is familiar with a bar graph. Have students record the term bar graph in the glossary of their STEM notebooks.

Demonstrate to students how to create a bar graph on the graph paper to visually represent their family's water usage. The categories that students should use for bars are:

- Shower (survey item #1)
- Bath (survey item #2)
- Brush Teeth (survey item #4)
- Wash Hands (survey item #5b)
- Flush Toilet (survey item #6b)
- Drink (survey item #7b)

Instruct students to create a scale for the bar graph that is great enough to accommodate the data that each one collected. Have students label the x-axis "Types of Water Uses," and the y-axis "Total Water Use."

Remind students to give the bar graph a title.

Direct students to color each bar a different color to make the graph visually appealing. Place students in groups of 3-4 to share their graphs with one another.

As a class, discuss the graphs. Ask students what was different about the graphs and what was similar. Also, discuss students' responses to items #8 and #9.

TEACHER RESOURCES

Required Tools/Materials/Equipment:

- Water Usage Survey (File 3.1)
- Graph paper
- Colored pencils
- STEM Notebook
- Pencil

Lab/Classroom Safety and Conduct:

- Students should use all tools and equipment safely while maintaining appropriate levels of activity for themselves and others.
- Students should demonstrate respect and courtesy for the ideas expressed by others in the class.
- Students should show respect and appreciation for the efforts of others in the class.

Student Resources:

- Water Usage Survey (File 3.1)
- STEM Notebook and Rubric
- Quick Write Sheet and Rubric

Assessments: The teacher will use rubrics and observation throughout the lesson to gauge student learning:

- File 0.4 Quick Write Rubric
- Check for Understanding STEM Notebook
- Survey

Graphs/charts

Supporting Files:

Include attachments as both Word and PDF files.

Include a Design Brief