

The Missing Link: Using Engineering Design and Thinking Skills to Connect Literature, Science, and Math Grade 4-5

Name: School: Blanchard Memorial School

| Outline | Description |
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| Introduction | BLIZZARD! By Jim Murphy is part of our fifth grade Houghton Mifflin Series. The first theme our students tackle in language arts is “Nature’s Fury”. Since I teach science, my first unit is “Climate and Weather”. My activities have been a wonderful scaffold for the students work in language arts and the stories they read get the students very excited about the weather and we love that the students can make great connections to text, to themselves and to the world. |
| Story title and description | BLIZZARD! By Jim Murphy – Historical Fiction The passage we will read is a chapter from the book about the people of New York City trying to get back to work after one of the most destructive blizzards in history that struck the eastern United States from Virginia to Maine on March 12, 1888. The chapter focuses on how a few ambitious people get folks to cross the frozen East River and make money while doing it. It is also quite descriptive as to what people witness as the tide of New York Harbor starts to shift and what happens when disaster strikes. |
| Learning Goals / Outcomes | <ul style="list-style-type: none"> • Students will be able to identify the problems of getting across the river in the story. • Students will identify the use of design elements in the story. (what was already in place) • Students will design/build a prototype for an apparatus for people to cross the river. • Students will be able to identify how the storm impacted changes in weather instruments and reporting the weather over the years. |
| Prior Knowledge | <ul style="list-style-type: none"> • Living in the northeast, students come to class with a great deal of background knowledge of snowstorms. Students will have the opportunity to share their memories. • Students will have set up their science notebooks. • Students will have studied the difference between weather and climate, weather instruments and the evolution of meteorology by the time we read this story. • They will have already made wind vanes, learn how to read a thermometer, collect daily temperature data, and collect weekly rain gauge data. • They will have been introduced to our school weather station which is part of the WBZ weather net. |
| Teachers Strategy | <ul style="list-style-type: none"> • Review information regarding weather and climate, types of precipitation, and the science of meteorology. |

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| | <ul style="list-style-type: none"> As they read, they should generate questions they have about the time period on post-its to guide their research. They will be reminded to use the picture clues to help them as well. Emphasis will be placed on the date and reminders that it was 123 years ago. When all questions, ideas and challenges have been presented, students will be given their design challenge. | | |
| Vocabulary | <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><u>Story Vocabulary</u></p> <p>blizzard ice-crossers ice floes entrepreneurs</p> </td> <td style="width: 50%; vertical-align: top;"> <p><u>Design Vocabulary</u></p> <p>needs weight problem framing brain writing requirements modeling/building presentation</p> </td> </tr> </table> | <p><u>Story Vocabulary</u></p> <p>blizzard ice-crossers ice floes entrepreneurs</p> | <p><u>Design Vocabulary</u></p> <p>needs weight problem framing brain writing requirements modeling/building presentation</p> |
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| Design Challenges | <ul style="list-style-type: none"> The challenges will focus on how people get around. What equipment was available? How were people dressed? How did they get their information? Did they know the storm was coming? How did people usually get to work? | | |
| Requirements | <ul style="list-style-type: none"> Identify the typical climate for March 12th. Identify the simple machines used in the story. Locate the East River on a map. Data collection | | |
| Selected design challenge to solve | <ul style="list-style-type: none"> The design challenge will be set: Students will design any type of apparatus to get people across the East River quickly and safely; keeping in mind they can make money. | | |
| Procedure: Lessons (Week long lesson) | <ul style="list-style-type: none"> Read story – partner read Working with their partner and using a computer students will research the year 1888 to find out what forms of communication were used and what was happening during that time to draw conclusions about how people lived. Have groups share what they found and compare it to current day, 123 years later. Working in table groups (four students) students will identify problems the people of New York City faced in getting back to work. Students will be given the design challenge. As a group of four, students will brainstorm ideas about what they will design then sketch a design that they believe people will pay money to use to get them across the river, like the entrepreneurs in the story. | | |

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| | <ul style="list-style-type: none"> • Bring materials from home to design a prototype. • Spend a class period building • Convince their classmates that their design would get them across the river safely and quickly. • Self and teacher assessment |
| Extensions | <ul style="list-style-type: none"> • Students will write a weather report about a fictional blizzard. They will include details about what will happen (using meteorological terms) and how people can stay safe. • Students can then choose a way to present it, orally, put on a skit or video tape and view their forecast. • Since we take in our rain gauge when it drops below 32°, have students design an instrument to measure snow in inches and centimeters. Once class agrees on a design they will need to make it and mount it outside. They will then collect data similar to how they did weekly monitoring of the rain gauge. |
| Framework Standards | <p>Earth and Space Science Grades 3-5</p> <ul style="list-style-type: none"> • Differentiate between weather and climate • Explain how air temperature, moisture, wind speed and direction, and precipitation make up the weather in a particular place and time. <p>Technology/Engineering Grades 3-5</p> <ul style="list-style-type: none"> • Identify a problem that reflects the need for shelter, storage or convenience. • Describe different ways in which a problem can be represented, e.g; sketches, diagrams, graphic organizers, and lists. • Identify relevant design features (e.g; size, shape, weight) for building a prototype of a solution of a given problem. |
| Thinking Skills | <p>Students will show:</p> <ul style="list-style-type: none"> • Questioning • Critical thinking (analysis of the past) • Creative thinking • Reflection |
| Safety | <p>Students will follow classroom rules regarding emotional, physical and environmental safety that have been pre-</p> |

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| | established. |
| Materials | Teacher will provided an array of classroom supplies. Once students have been given their design challenge they will have the opportunity to gather supplies from home, keeping in mind our classroom credo about reduce, reuse, recycle. |
| Assessment method | A rubric that students can follow throughout the design process will be available for the group to follow. After presentations students will self-assess as well as the teacher. |