Unit 3/Week 5

Title: Snowflake Bentley

Suggested Time: 5 days (45 minutes per day)

Common Core ELA Standards: RI.4.1, RI.4.2, RI.4.3, RI.4.7; W.4.2, W.4.4, W.4.9; SL.4.1, SL.4.2; L.4.1, L.4.2, L.4.5

Teacher Instructions

*Refer to the Introduction for further details.*

**Before Teaching**

1. Read the Big Ideas and Key Understandings and the Synopsis. Please do **not** read this to the students. This is a description for teachers, about the big ideas and key understanding that students should take away **after** completing this task.

Big Ideas and Key Understandings

Having the perseverance to pursue your dreams, no matter the hardships or what others may think, can lead to the discovery of unique ideas that can be appreciated by others.

Synopsis

Snowflake Bentley is a biography about the life of Wilson Bentley, a self-taught scientist who photographed thousands of individual snowflakes in order to study their unique formations. From the time he was a small boy, Wilson Bentley saw snowflakes as small miracles. And he determined that one day his camera would capture for others the wonder of the tiny crystal. Bentley's enthusiasm for photographing snowflakes was often misunderstood in his time, but his patience and determination revealed two important truths: no two snowflakes are alike; and each one is startlingly beautiful. He demonstrated his scientist's vision and perseverance through lectures and a book about snow crystals. Because of his wonderful work with snow crystals, he became affectionately known as "Snowflake" Bentley.

1. Read entire main selection text, keeping in mind the Big Ideas and Key Understandings.
2. Re-read the main selection text while noting the stopping points for the Text Dependent Questions and teaching Vocabulary.

**During Teaching**

1. Students read the entire main selection text independently.
2. Teacher reads the main selection text aloud with students following along. (Depending on how complex the text is and the amount of support needed by students, the teacher may choose to reverse the order of steps 1 and 2.)
3. Students and teacher re-read the text while stopping to respond to and discuss the questions and returning to the text. A variety of methods can be used to structure the reading and discussion (i.e.: whole class discussion, think-pair-share, independent written response, group work, etc.)

Text Dependent Questions

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| **Text Dependent Questions** | **Evidence-based Answers** |
| Snowflake Bentley is a biography, the story of a person’s life, with additional sidebar information scattered throughout the selection. The sidebar information on page 381 says that Wilson Bentley was born on February 9, 1865 in Jericho, Vermont in the heart of the “snowbelt.” Why is Jericho described as the “heart of the snowbelt?” (Pg. 380) | Jericho, Vermont is described as the “heart of the snowbelt” because there is so much snow. The annual snowfall in about 120 inches. |
| Reread page 380. A **simile** compares two unlike things using the words "like" or "as". (The child’s hands were as cold as ice.) The author uses a simile to describe how Willie felt about snow. Identify the simile and explain what two things are compared. | The simile is: Snow was as beautiful as butterflies or apple blossoms. The snow is being compared to butterflies and apple blossoms. |
| Reread page 382. When Willie was a boy, how were his daily activities different from the other children? | While the other children built forts and pelted snowballs at roosting crows, Willie used an old microscope his mother gave him to look at things like flowers, raindrops, blades of grass, and snow. He also caught snowflakes and studied the icy crystals and all forms of moisture. He kept a record of the weather and did many experiments with the raindrops. |
| Look at the sidebar text on page 383. Intricate means complicated or complex. By using the old microscope his mother gave him, Willie discovered certain intricate characteristics of snowflakes. List three intricate characteristics that Willie discovered. | Willie discovered that most ice crystals have six branches, all six branches are alike, and no two snowflake designs are the same. |
| Willie spent three winters trying to draw the complicated patterns he saw when he looked at snowflakes through the microscope, but the snow crystals always melted before he could finish. Explain what Willie meant when he said, “When a snowflake melted…just that much beauty was gone, without leaving any record behind.” (Pg. 383) | Willie said snowflake designs were masterpieces of design and no one snowflake design was ever repeated. When a snowflake melted, there would never be a repeat of that snowflake and its beauty would be gone forever. |
| Describe how the camera with the microscope allowed Willie to share the snowflakes others. (Pg. 384) | The camera with its own microscope made images on large glass negatives. Its microscope could magnify a tiny crystal from 64 to 3,600 times its actual size. This made it possible for Willie to photograph the snowflakes and capture the image forever. Willie can finally share the beauty of snowflakes with others. |
| After Willie’s parents spent their savings to buy him the camera with its own microscope, Willie faced even more setbacks. Describe the problem that Willie faces on page 386. How did he respond to the problem? | Willie’s first pictures were failures. The pictures looked like shadows. Mistake by mistake, snowflake by snowflake, Willie worked through every snow storm. Even though Willie did not give up, winter ended and he had no good pictures of snowflakes. |
| Reread page 387. The second winter, Willie tried a new experiment and it worked. How did the neighbors react to the idea of Willie photographing snowflakes? | Willie’s neighbors thought it was silly to photograph snowflakes. They laughed at his idea of photographing snowflakes. Because snow was so common in Vermont, the neighbors felt like they didn’t need his pictures. The neighbors said, “Snow is as common as dirt. We don’t need pictures.” |
| While other farmers kept warm by a fire or rode to town with horses and sleigh, Willie stood outside in the cold waiting hours for just the right crystal to photograph. Describe the obstacles Willie faced in trying to capture that just right snowflake. (Pg. 389-390) | Willie stood at the shed door and caught snowflakes on a black tray. Sometimes the snowflakes were jumbled and broken and he had to wait for hours before finding a snowflake that was just right. If the shed was warm, the snow would melt. If he twitched a muscle, the snowflake would break. He used a wooden pick to slide the snowflake in place on the microscope. He had to be careful and work fast or the snowflake would evaporate. |
| Reread page 397. To inspire means to urge or encourage someone to do something. Willie’s work was greatly respected near the end of his life and inspired others. Provide four details from the text to support this statement. | Willie’s work was greatly respected near the end of his life. The details that support this statement include: (1) Scholars came from far and near to hear him speak about snow crystals. (2) A professor said he was doing great work. (3) He came to be known as the world’s expert on snow. (4) Other scientists raised money to help him publish his book. |
| What information does the author provide on pages 397 to support the idea that Willie remained unusually dedicated to his work even to the end of his life? | At the age of 66, Willie walked six miles in a blizzard to make more pictures. As a result, he became ill with pneumonia and died two weeks later. |
| Wilson Bentley spent fifty years developing his technique or method of photography in Jericho, Vermont. After his death, describe how the people of Jericho honored him. (Pg. 398) | The people of Jericho built a monument for Willie Bentley in the middle of town. Forty years after his death the children of his village worked to set up a museum in honor of the farmer-scientist. |

Vocabulary

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|  | **KEY WORDS ESSENTIAL TO UNDERSTANDING** | **WORDS WORTH KNOWING**  General teaching suggestions are provided in the Introduction |
| **TEACHER PROVIDES DEFINITION**  not enough contextual clues provided in the text | Page 383 - intricate  Page 385 - inspire  Page 388 - technique | Page 383 - masterpieces  Page 384 - foolishness, negatives  Page 390 - molecules |
| **STUDENTS FIGURE OUT THE MEANING**  sufficient context clues are provided in the text | Page 380 - annual  Page 398 - grandeur  Page 390 - evaporate | Page 382 - moisture |

Culminating Task

* Re-Read, Think, Discuss, Write
* *Wilson Bentley’s passion to photograph snowflakes caused him to become known as “the Snowflake Man.” Write a paragraph that gives examples of his love for snowflakes from childhood to adulthood and how this passion caused him to become known as “the Snowflake Man.” Use evidence from the text to support your answer.*

Answer:As a child, Wilson Bentley was curious about nature and loved to learn. While other children built forts and pelted snowballs, Willie used an old microscope to look at things like flowers, raindrops, blades of grass, and snow. Willie said that snow was as beautiful as butterflies or apple blossoms. He became very interested in snowflakes and wanted to find a way to share them with others. When he saw how beautiful snowflakes were under a microscope, he dedicated his life to sharing that beauty with the world, no matter what others thought. With a special camera, Willie spent many years improving the quality of his photographs. He gave speeches about snow crystals. He became known as an expert on snow and had a book published with his best snowflake pictures. He was called “the Snowflake Man” because he spent his life sharing the beauty of snow crystals with other people.

Additional Tasks

* Choose one of the articles on www.snowflakebentley.com to have students read in conjunction with this story.

Note to Teacher

* This story lends itself to connections to Science, with a focus on precipitation, for instance.

Supports for English Language Learners (ELLs)

to use with Basal Alignment Project Lessons

When teaching any lesson, it is important to make sure you are including supports to help all students. We have prepared some examples of different types of supports that you can use in conjunction with our Basal Alignment Project Lessons to help support your ELLs. They are grouped by when they would best fit in a lesson. While these supports reflect research in how to support ELLs, these activities can help ALL students engage more deeply with these lessons. Note that some strategies should be used at multiple points within a lesson; we’ll point these out. It is also important to understand that these scaffolds represent options for teachers to select based on students’ needs; it is not the intention that teachers should do *all* of these things at every lesson.

**Before the reading:**

* Read passages, sing songs, watch videos, view photographs, discuss topics (e.g., using the [four corners strategy](http://www.theteachertoolkit.com/index.php/tool/four-corners)), or research topics that help provide context for what your students will be reading. This is especially true if the setting (e.g., 18th Century England) or topic (e.g., boats) is one that is unfamiliar to the students.
* Provide instruction, using multiple modalities, on selected vocabulary words that are *central to understanding the text*. When looking at the lesson plan, you should note the Tier 2 words, particularly those words with high conceptual complexity (i.e., they are difficult to visualize, learn from context clues, or are abstract), and consider introducing them ahead of reading. For more information on selecting such words, go [here](https://achievethecore.org/page/3167/selecting-and-using-academic-vocabulary-in-instruction). **You should plan to continue to reinforce these words, and additional vocabulary, in the context of reading and working with the text. (See additional activities in the During Reading and After Reading sections.)**

**Examples of Activities:**

* Provide students with the definition of the words and then have students work together to create [Frayer models](http://www.theteachertoolkit.com/index.php/tool/frayer-model) or other kinds of word maps for the words.
* When a word contains a prefix or suffix that has been introduced before, highlight how the word part can be used to help determine word meaning.
* Keep a word wall or word bank where these new words can be added and that students can access later.
* Have students create visual glossaries for whenever they encounter new words. Then have your students add these words to their visual glossaries.
* Create pictures using the word. These can even be added to your word wall!
* Create lists of synonyms and antonyms for the word.
* Have students practice using the words in conversation. For newcomers, consider providing them with [sentence frames](https://achievethecore.org/page/3159/ell-supports-for-writing-and-discussion) to ensure they can participate in the conversation.
  + Practice spelling the words using different spelling practice strategies and decoding strategies. Students could take turns spelling with a partner.
* Use graphic organizers to help introduce content.

**Examples of Activities:**

* Have students fill in a [KWL chart](http://www.nea.org/tools/k-w-l-know-want-to-know-learned.html) about what they will be reading about.
* Have students research setting or topic using a pre-approved website and fill in a chart about it. You could even have students work in groups where each group is assigned part of the topic.
* Have students fill in a bubble map where they write down anything that they find interesting about the topic while watching a video or reading a short passage about the topic. Then students can discuss why they picked the information.

**During reading:**

* Read the text aloud first so that ELLs can hear the passage read by a fluent reader before working with the text themselves.
* Allow ELLs to collaborate in their home languages to process content before participating in whole class discussions in English. Consider giving them the discussion questions to look over in advance (perhaps during the first read) and having them work with a partner to prepare.
* Encourage students to create sketch-notes or to storyboard the passage when they are reading it individually or with a partner. This will help show if they understand what they are reading as they are reading it.
* Ask questions related to the who, what, when, why, and how of the passage. For students that may need a little more help, provide them with [sentence stems](https://achievethecore.org/page/3159/ell-supports-for-writing-and-discussion).
* Continue to draw attention to and discuss the words that you introduced before the reading.

**Examples of Activities:**

* Have students include the example from the text in their glossary that they created.
* Create or find pictures that represent how the word was used in the passage.
* Practice creating sentences using the word in the way it was using in the passage.
* Have students discuss the author’s word choice.
* Use graphic organizers to help organize content and thinking.

**Examples of Activities:**

* Have students fill in a chart to keep track of their 5ws while they read to help them summarize later and figure out the central idea of a passage.
* It may again be beneficial to have somewhere for students to store new words that they encounter while reading the text. Students could use a chart to keep track of these new words and their meanings as they read.
* If you had students fill in a KWL, have them fill in the “L” section as they read the passage.
* Utilize any illustrations or text features that come with the story or passage to better understand the reading.
* Compare/contrast the passage with what the illustrations convey about the passage. Have students consider if the illustrations look the way they visualized the passage in their own minds or if the passage matches their predictions based on the illustrations.
* Identify any text features such as captions and discuss how they contribute to meaning.

**After reading:**

* Present directions for any post-reading assignments orally and visually; repeat often; and ask English Language Learners to rephrase.
* Allow ELLs to use English language that is still under development. Students should not be scored lower because of incorrect spelling or grammar (unless the goal of the assignment is to assess spelling or grammar skills specifically). When grading, be sure to focus on scoring your students only for the objective(s) that were shared with students.
* Scaffold questions for discussions so that questioning sequences include a mix of factual and inferential questions and a mix of shorter and more extended responses. Questions should build on each other and toward inferential and higher-order-thinking questions. There are not many factual questions already listed in the lesson instructions, so you will need to build some in as you see fit. More information on this strategy can be found [here](https://achievethecore.org/aligned/creating-sequencing-text-dependent-questions-support-english-language-learners/).
* Reinforce new vocabulary using multiple modalities

**Examples of activities:**

* Using the words that you had students work with before reading, have students write sentences in reference to the passage that you just finished reading.
* Require students to include the words introduced before reading in the culminating writing task.
* For newcomers, print out pictures that represent the words that you focused on and have students match the words to the pictures.
* Based on different features of the words, have the students sort them into different categories and explain their choices. For example, the students could sort the words by prefixes, suffixes, connotation, etc.
* After reading the passage, continue to examine important sentences (1–2) in the text that contribute to the overall meaning of the text. Guide students to break apart these sentences, analyze different elements, and determine meaning. More information on how to do this, including models of sentence deconstruction, can be found [here](https://achievethecore.org/page/3160/juicy-sentence-protocol).
* Provide differentiated scaffolds for writing assignments based on students’ English language proficiency levels.

**Examples of Activities:**

* For all students, go over the prompt in detail, making sure to break down what the prompt means before having the students get to work. Then have the students explain the directions back to you.
* Have students create an evidence tracking chart during reading, then direct them to look back over their evidence chart and work with a group to see if their evidence matches what the rest of the class wrote down. If some of the chart does not match, students should have a discussion about why.
* For students who need more support, model the proper writing format for your students and provide them with a properly formatted example for reference.
* For newcomers, you may consider creating sentence or paragraph frames to help them to write out their ideas.
* To further discussion about the passage, have students create their own who, what, when, where, why, and how questions related to the passage to ask each other and have students pair up and practice asking each other the questions. If available, pair students of the same home language to support the use of language still under development.