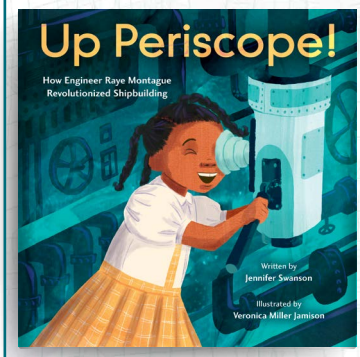

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Up Periscope!

How Engineer Raye Montague Revolutionized Shipbuilding

By Jennifer Swanson,
Illustrated by Veronica Miller Jamison

TEACHING TIPS

Up Periscope! How Engineer Raye Montague Revolutionized Shipbuilding is a compelling nonfiction picture book recounting the barriers and the breakthroughs of Raye Montague, the first person to create a comprehensive computer program. As you explore the book with your students, the following are some possible engagements for interacting with the text and the topics it introduces for young readers.

Three Things

Raye Montague's mother always told her three things: "1) She could learn anything. 2) She could do anything. 3) She could be anything." Throughout the text, lists of three items are featured–including the types of ships Raye dreams of building. After reading the story, encourage students to provide three examples of various aspects of the text. Examples might include: three obstacles Raye overcame, three accomplishments Raye made, three words to describe Raye's determination, or three things students learned about the historical timeframe of the picture book, etc.

Illustration Investigation

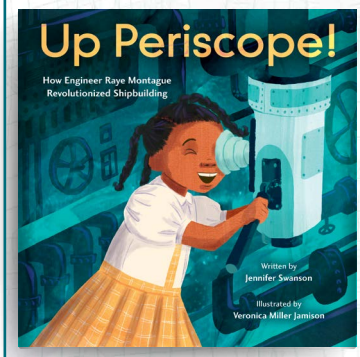
Throughout the book, Veronica Miller Jamison's illustrations provide a sense of time passing and give insights into the important tools available to engineers of the era. Engage in a "historical picture walk" with your students through the illustrations, noting the details that students notice or wonder about, particularly related to technology. For example, on page 21, we can notice that Raye's desk calendar indicates the year is 1971. Students may wonder what interacting with computers looked like in 1971 verses today? An extension activity would be to create a list of all of the students' questions for further online research and exploration.

Then and Now

After reading *Up Periscope!*, many students will have questions and comments about the systemic inequities Raye Montague faced in her pursuit of an engineering career. Using chart paper or a whiteboard, create a T-chart, labeling one side "then" and one side "now." After a first read of the story, reread the book aloud with students and fill in some of the major events of the story in the "then" column. For example, in the "then" column, list "girls were not allowed to take shop class." In the "now" column, you might ask students, are certain classes in school closed to any genders and record their answers. An extension might be to learn what year laws and policies changed on topics related to educational integration. (A good start might be discussing the 1972 Title IX legislation). Note, although much progress has been made in educational and professional settings, it is important to not gloss over inequities that still exist when discussing issues with students.

Positive/Negative Timeline

Have students create a timeline of the events of Raye Montague's life featured in the book; rather than a linear timeline that simply summarizes the chronology of the story, a positive/negative timeline also involves analysis skills where students decide if events of a story were a positive or negative event in the protagonist's life. Events such as the discrimination Raye faced would be documented below the number line and



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positive events such as exploring the submarine with her grandfather or designing a Navy submarine would be placed above the number line as positive events. As the events of the story are connected, the timeline will have peaks and valleys rather than one horizontal line. Creating a positive/negative timeline involves the synthesis and sequencing skills of timelining but also brings in a critical thinking and judgment element for class discussions.

Dreaming Big

Although Raye Montague knew that many barriers existed that might keep her from achieving her dreams of becoming an engineer, she held tight to the early words her mother shared that she could learn anything, do anything, and be anything. Your students also have big dreams to accomplish many things in life. For a shared writing exercise, create the following sentence frame: "I want to learn _____, so I can _____, and be _____." Model with your own example for your students, such as, "I want to learn to **speak another language**, so I can **communicate with more families**, and be **bilingual like many of my students**!" Have students pair/share and later journal the steps they will need to take to accomplish the goal they have set for themselves.

P Is for Periscope

Students may be unfamiliar with a periscope and its purpose of allowing an observer to view objects above the surface of the water while submerged in a submarine. Show students online images and short videos of how a periscope works. Extend this activity to explore various facets of the engineering of submarines; include examples of the early submarines that inspired Raye Montague and the USS *Oliver Hazard Perry*, the design created by Montague's computer program. (The contrasting styles of submarines are featured in sketches on the book's endpapers.)

Make Your Own Periscope

With minimal supplies such as cardboard and small craft mirrors, students can create their own periscope and explore the science of light, one aspect of submarine design. A great lesson with follow up critical thinking questions can be found at: https://learning.sciencemuseumgroup.org.uk/resources/periscope/.

Firsts in STEM: Author's Note and Further Reading

Montague emphasized how she was the first person to create a comprehensive computer program to build a US Navy ship. Swanson also shares her own firsts as a woman in STEM in the book's author note. Create a text set of other picture book biographies of firsts in STEM for students to explore—ideally stories that feature those historically marginalized in STEM fields, including women and scientists of color. Extension ideas could include independent reading choices, research presentations, or small group literature circle discussions based on the books in the text set.

Teaching Tips created by Marie A. LeJeune