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Title: The role Pittsburgh played in the Industrial Revolution and Westward Expansion

Subject: 5th grade Social Studies, ELA and Science

State: New York

Abstract:

The fifth grade social studies and science curriculums in New York State encourage teachers to allow students to explore the “why”. Why were cities located along waterways in the nineteenth century in the United States? The role that the steel industry played in the Industrial Revolution and the growth of cities in the United States cannot be overestimated.

Since students are expected to consider both natural resource availability and geographic advantages, Pittsburgh is an ideal location to consider. The Industrial Revolution is truly the beginning of humans impacting the natural world. Students are also expected to understand how matter can change over time. In order to create steel, a number of natural resources must be manipulated in just the right manner. This process provides both an opportunity to analyze an innovation and a hands-on exploration of the raw materials needed and the resulting by products. The subject of science does not exist in a vacuum and by allowing students to examine coke and pig iron, they will gain a deeper understanding of the transformation accomplished.

1. Introduction and rationale-

In fifth grade the science and social studies topics and texts are often integrated into a class’s ELA work. The topic of steel production in the United States lends itself to address both the social studies standards regarding geographic advantages and economic forces. The process of separating minerals to create steel addresses the use of natural resources and changes in matter. Westward Expansion is a focus in fifth grade, but we often do not address how the discovery of iron ore and innovations in the production of steel made trains, ships and bridges more durable and replicable on a much larger scale.

At this point in the school year, students have learned about the Louisiana Purchase, Lewis and Clark and the Civil War. Students have a basic understanding of the geography of the United States, natural resources and modes of transportation.

2. Unit Goals-

The goal of this unit is for students to discover what characteristics led to Pittsburgh, Pennsylvania becoming the American headquarters of steel production. The enormity of the steel industry furthered Westward Expansion and urbanization of much of the United States. Students will consider how the United States grew and that there were consequences of that tremendous growth. Although the Industrial Revolution created new job opportunities and greater mobility, it also brought with it tremendous increases in pollution.

Essential Questions:

- How does an interdependent region meet the challenges of modern living?
- How do geographic features effect development?
- What innovations made Westward Expansion possible?
- How were the lifestyles of most Americans changed by industrialization?
- Why was Pittsburgh the ideal geographic location for the steel industry of the United States?

3. State Standards addressed

New York State Next Gen 5th Grade Standards:

Reading:

5R1: Locate and refer to relevant details and evidence when explaining what a text says explicitly/implicitly and make logical inferences.

5R4: Determine the meaning of words, phrases, figurative language, academic, and content-specific words and analyze their effect on meaning, tone, or mood.

5R7: Analyze how visual and multimedia elements contribute to meaning of literary and informational texts.

5R8: Explain how claims in a text are supported by relevant reasons and evidence, identifying which reasons and evidence support which claims.

5R9: Use established criteria to categorize texts and make informed judgments about quality; make connections to other texts, ideas, cultural perspectives, eras and personal experiences.

Writing:

5W1: Write an argument to support claims with clear reasons and relevant evidence.

5W2: Write informative/explanatory texts to explore a topic and convey ideas and information relevant to the subject.

5W5: Draw evidence from literary or informational texts to respond and support analysis, reflection, and research by applying the Grade 5 Reading Standards.

Research to Build and Present Knowledge:

5W6: Conduct research to answer questions, including self-generated questions, and to build knowledge through investigation of multiple aspects of a topic using multiple sources.

5W7: Recall relevant information from experiences or gather relevant information from multiple sources; summarize or paraphrase; avoid plagiarism and provide a list of sources.

5SL1: Engage effectively in a range of collaborative discussions with diverse partners; express ideas clearly and persuasively, and build on those of others.

5SL2: Summarize information presented in diverse formats (e.g., including visual, quantitative, and oral).

5SL4: Report on a topic or text, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support central ideas or themes; speak clearly at an understandable pace and volume appropriate for audience.

5SL5: Include digital media and/or visual displays in presentations to emphasize and enhance central ideas or themes.

Social Studies Standards:

A. Gathering, Interpreting, and Using Evidence

1. Develop questions to help identify evidence about topics related to the historical events occurring in the Western Hemisphere that can be answered by gathering, interpreting, and using evidence.
2. Recognize and effectively select different forms of evidence used to make meaning in social studies (including primary and secondary sources such as art and photographs, artifacts, oral histories, maps, and graphs).
3. Identify evidence and explain content, authorship, purpose, and format; identify bias; explain the role of bias and potential audience, with teacher support.
4. Identify arguments of others.
5. Identify implicit ideas to draw inference, with support.
6. Recognize arguments on specific social studies topics and identify evidence supporting the argument.

B. Chronological Reasoning and Causation

1. Explain how events are related chronologically to one another in time.
2. Employ mathematical skills to measure time in years and centuries. Understand the difference between BCE and CE. Identify the chronological significance of data presented in timelines.
3. Identify causes and effects using examples from current events or grade-level content and historical events.
4. Identify and classify the relationship between multiple causes and multiple effects.
5. Distinguish between long-term and immediate causes and effects of an event from current events or history.
6. Recognize the dynamics of historical continuity and change over periods of time. Identify important turning points in history.
7. Use periods of time such as decades and centuries to organize a historical narrative; compare histories in different places in the Western Hemisphere utilizing timelines.
8. Recognize and identify patterns of continuity and change in history.
9. Understand the role of periodization as a practice in history and social studies.

Science Standards:

4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

4-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth's features. [Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]

4. Description of activities by day:

The teacher will lead the class discussions with questions. Answers will be recorded on the board. The class will watch short videos together, explore documents in pairs and examine mineral samples in small groups. Each student will complete the two day investigation with a culminating writing piece, entries into their vocabulary notebook. If time permits, the students will present their writing to the class.

Day 1:

Essential Question: What natural resources made a location ideal for industrialization in the 19th century?

The class will discuss their thoughts on what makes a region ideal for industrialization. Connecting with their previous study of the Louisiana Purchase and Lewis and Clark, the class will revisit Lewis and Clark's path to the Pacific Ocean.

Looking at a map of Pittsburgh, why do you suppose Lewis and Clark began their famous journey to the West coast from there?

<https://www.nps.gov/lecl/planyourvisit/maps.htm>

What makes Pittsburgh attractive for manufacturing and trade in the 19th century?

Students will work in pairs to examine the map and legend.

<https://digital.library.pitt.edu/islandora/object/pitt%3ADARMAP0822/viewer>

What was and is still today coal used for?

Students will work in pairs examining the two websites describing the enormity of the Pittsburgh Coal Seam. They will write notes in their notebooks.

https://sites.pitt.edu/~harbert/penna_geology/coal.html

<https://visitgreene.org/2021/04/pittsburgh-coal-seam/#:~:text=Mining%20in%20Pittsburgh&text=The%20coal%20was%20extracted%20from, mines%2C%20burning%20for%20several%20years.>

Students will write their thoughts on why Pittsburgh was ideally situated and rich with natural resources for industrialization.

Day 2:

Essential Question: Why is steel so important in the Industrial Revolution?

What do you need to make steel? Students will brainstorm with a partner.

With partners, students will explore the website created by the steel industry to identify ten things that use steel. <https://worldsteel.org/about-steel/steel-facts/>

The class will view a very short video describing how steel is made
<https://www.britannica.com/technology/steel/images-videos#Videos>

Each group of students will be given samples of coal, coke, iron ore, pig iron, slag and limestone. Using the steelmaking diagrams provided, students will theorize the identity of each sample. The class will gather to reveal accurate identification.

The class will watch a video that summarizes the history of Pittsburgh.
A Short History of Pittsburgh, created by Carnegie Mellon University
(https://youtu.be/tgKg_PIN4qs)

Students will write a concluding statement and express their opinion of why Pittsburgh became the center of steel production in the United States, what did the availability of steel aid in the development of and was the steel industry a positive force in our country?

At the conclusion, all vocabulary words will have been defined and added to the class word wall.

5. Formal and Informal assessments:

- a. Opening discussion participation
- b. Partner work identifying products using steel.
- c. Group work identifying raw materials, by products and finished products in steel making process.
- d. Define all related vocabulary in notebook.
- e. Write concluding statement restating facts learned and the student's opinion of the Pittsburgh steel industry.

6. Technological needs-

Students will use Google Classroom on their laptops to view documents and post their findings. The class will use the Smartboard to view the videos.

7. Materials

- a. Map of Lewis and Clark's journey
(<https://www.nps.gov/lecl/planyourvisit/maps.htm>)
- b. Map of Pittsburgh
<https://digital.library.pitt.edu/islandora/object/pitt%3ADARMAP0822/viewer>
- c. Articles about the Pittsburgh Coal Seam
https://sites.pitt.edu/~harbert/penna_geology/coal.html

<https://visitgreene.org/2021/04/pittsburgh-coal-seam/#:~:text=Mining%20in%20Pittsburgh&text=The%20coal%20was%20extracted%20from,mine%20C%20burning%20for%20several%20years.>

- d. Sample limestone, iron ore, slag, coal and coke provided by the River of Steel Heritage site.
- e. Infographics describing the making of steel provided by the River of Steel Heritage site.(see below)
- f. Website describing steel from the steel industry
<https://worldsteel.org/about-steel/steel-facts/>
- g. Video demonstrating how steel is made
<https://www.britannica.com/technology/steel/images-videos#Videos>
- h. Video describing why steel is superior to iron:
<https://www.britannica.com/technology/steel/images-videos#/media/1/564627/158923>
- i. Video entitled A Short History of Pittsburgh, created by Carnegie Mellon University
(https://youtu.be/tgKg_PIN4qs)
- j. Vocabulary:
 - 1. Industrialization
 - 2. Iron ore
 - 3. Pig iron
 - 4. Coke
 - 5. Slag
 - 6. Limestone
 - 7. By product
 - 8. Union
 - 9. Bessemer steel
 - 10. Fusion
 - 11. Absorption
 - 12. Molten
 - 13. Confluence

8. Other sources to consider

- a. U.S. Census Data
- b. Pollution in Pittsburgh in the latter half of the nineteenth century vs pollution today.

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Diagrams provided by the Rivers of Steel (2022) Homestead, Pa.



