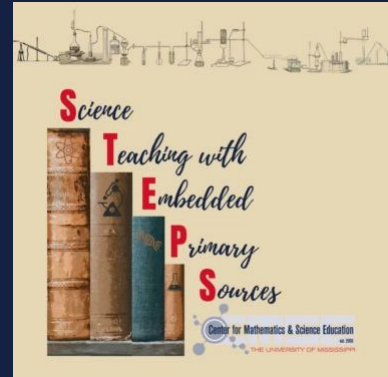


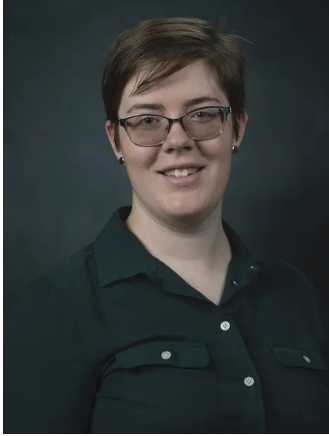


Using Primary Sources to Build Science Content Knowledge



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Background

- The Library of Congress Teaching with Primary Sources (TPS) program funds professional development sessions aimed at training teachers to use primary source materials from the Library in their classrooms; however, most TPS projects are aimed at teachers of history, social studies, English/language arts, or gifted students. Few projects provide support to science educators.
- Primary Sources refer to artifacts - manuscripts, objects, original documents, drawings, and more - that were created at the time under study. Primary sources provide a window to the past, allowing students to experience and interpret past events or ideas through the lens of someone who lived during the time under study.



The STEPS Project is sponsored in part by the Library of Congress Teaching with Primary Sources Midwest Region Program, located at Illinois State University. Content created and featured in partnership with the TPS Midwest Region does not indicate an endorsement by the Library of Congress.

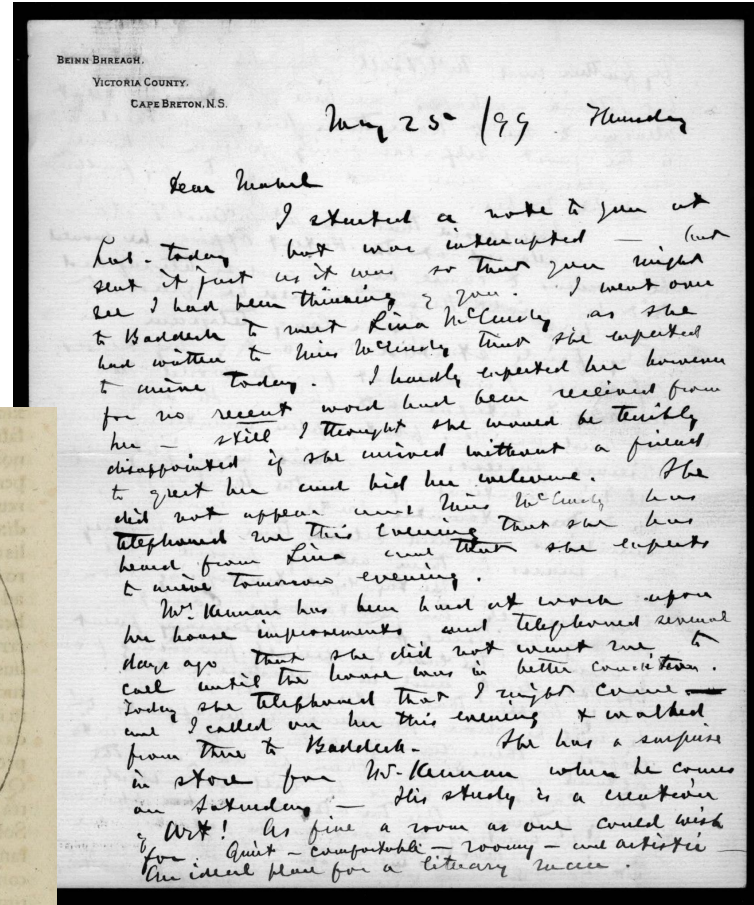
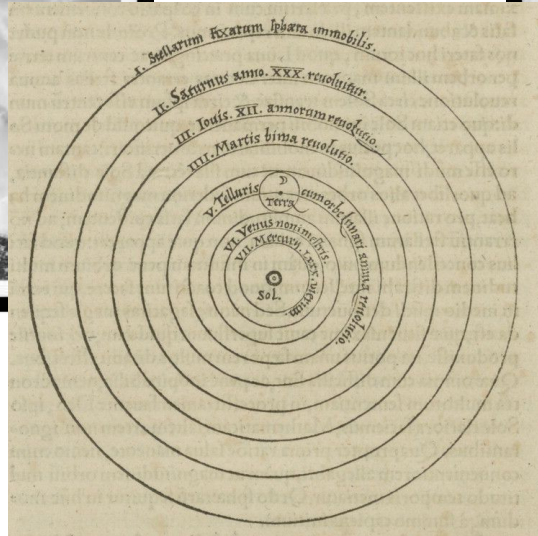
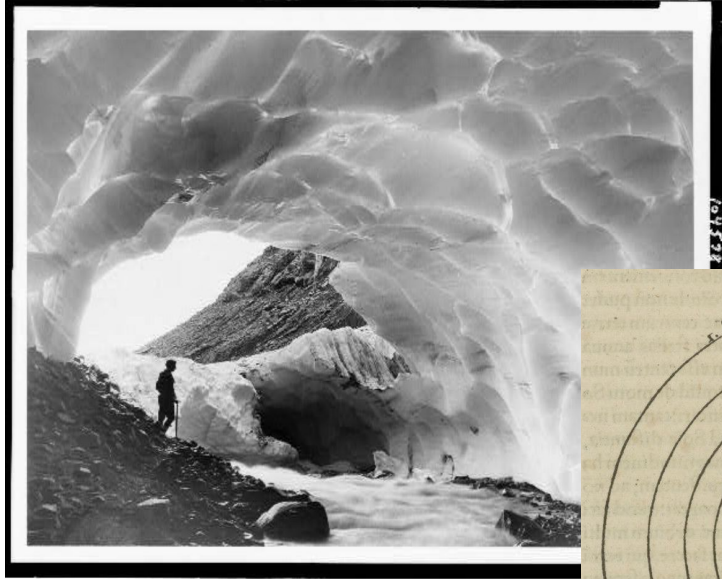
Background

“The history of scientific and engineering ideas, of individual practitioners’ contributions, and of the applications of these endeavors are important components of a science and engineering curriculum” (NRC 2012, p. 249)

- Research has shown that incorporating explicit instruction on the history of science within science instruction benefits students’ understanding of science content, the nature of science, and their attitudes towards science (Teixeira et al., 2009).
- Despite the benefits of including the history of science as a key component of science instruction, few teachers or curricula writers incorporate these concepts as part of their instruction (Höttecke and Silva, 2010).



Examples of Primary Sources



Goals

The overarching goal of this project is to support the professional growth of science teachers by facilitating curriculum development through collaboration with a focus on incorporating primary sources in the science classroom.



Development and Design

- While the primary goal of the workshop is to develop teachers' understanding and use of primary source materials, we also desire to help teachers understand how primary sources can be used in a science-specific context.
- Topics include how primary sources can support:
 - History of science
 - Nature of science
 - Structuring inquiry activities
 - Facilitating discussion among students
 - Socioscientific issues



Workshop

Day 1

- Learn about primary sources and their uses in classroom instruction.
- Develop an understanding of how the history and nature of science play roles in developing students' science content knowledge.
- Learn how to find primary sources related to science topics on the Library of Congress website (e.g. using primary source sets, web guides, and searching the online collections).
- Identify sources related to specific science topics for use in developing lesson plans on day 2.
- Evaluate primary sources using the Primary Source Analysis Tool.

Day 2

- Develop an understanding of how primary sources can be used to develop science content knowledge through the use of primary source modules, socioscientific issues, and inquiry-based activities.
- Develop a lesson plan or module around their chosen science standard and identified sources.
- Share, evaluate, and offer feedback on each other's module or lesson plan.



Workshop Details

Day 1

- Discover the roles that the history and nature of science play in developing students' science content knowledge.
- Identify primary sources and their uses in classroom instruction.
- Evaluate primary sources using the Primary Source Analysis Tool.
- Learn to find primary sources related to science on the Library of Congress website (e.g. using primary source sets, web guides, online collections).
- Locate primary sources related to a specific science topic.

Day 2

- Explore instructional strategies which incorporate primary sources to develop science content knowledge through the use of primary source modules, discussion, phenomena, socioscientific issues, and inquiry-based activities.
- Develop a lesson plan or module around a chosen science standard and identify sources relevant to this standard.
- Share, evaluate, and offer feedback on other participants' module or lesson plan.



Example Slide

11th/12th Environmental Science

These photos depict the use of bird feathers (and other body parts) for hat adornment during the late 1800's.

Bird of Paradise



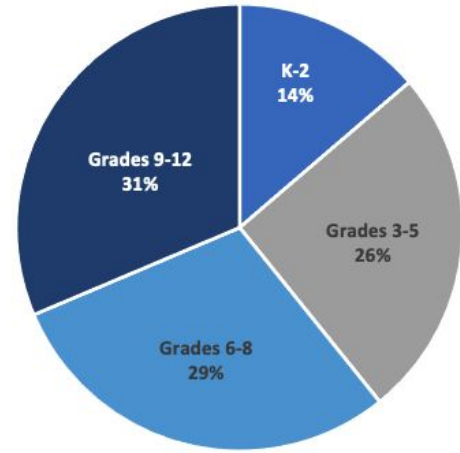
Tern Feathers



- Human impact on a species.
- Think about how animals have been used as in fashion throughout the years and how this could have lead to the creation of the Audubon Society.
- What organizations have been put into place as a result of these practices?
- A visual of how fashionable this was at the time to women socialites.
- This would lead to organizations for environmental protection.
- Next we would look at local legislation on environmental protection.

Participants

- 42 teachers have attended an in-person workshop
- 21 teachers currently participating in an asynchronous, online workshop
- 1-35 years of science teaching experience (M=9.4 years)
- Participants typically taught general science (K-8) or more than one discipline of high school-level science (e.g. biology, chemistry, physics, Earth and space science, etc.)



In-Person Workshop Grade Level Distribution



Preliminary Results

Survey Results – Pre/Post for In-person Cohorts 1 and 2

- 19 of 20 participants (95%) responded that they intend to incorporate primary sources in future science lessons.
- Respondents* reported significantly increased confidence in using primary sources to teach science across all measures, $p < .001$.
- Respondents* reported significantly improved attitudes towards HOS, NOS, and using primary sources, $p < .001$.

*Two respondents failed validation checks and were excluded from this analysis



Preliminary Results

Survey Results – Post/Delayed for Cohort 1

- 7 of 7 respondents* (100%) indicated that they had incorporated primary sources in their science lessons and planned to include them in future lessons.
- Gains from pre- to post-surveys were maintained in the delayed post-survey, with one area showing a statistically significant difference.
 - Teachers reported a shift in attitude related to the connection between primary sources and science standards from $M=4.9$ to $M=4.1$, $p=.025$.

*One respondent failed validation checks and was excluded from this analysis



Continuing the work

2STEPS - Additional Funding through the Library of Congress

- **Phase I** - Teachers participate in one of two in-person/online asynchronous workshops.
- **Phase II** - Teachers develop lessons incorporating primary sources and participate in a feedback loop to refine lessons before sharing them on the TPS Network.
- **Phase III** - Teachers participate in a three-day lesson planning institute to create and refine lessons before sharing them on the TPS Network. Videos of teachers using primary sources in their classrooms will be captured and shared through the TPS Network.



References

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- National Research Council. (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas*. National Academy Press.
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