LESSON 7:
Ingenious: Franklin Assembles a Scientific Community

OVERVIEW
There are many memorable images associated with scientific progress, such as Isaac Newton sitting under an apple tree or Franklin flying a kite in a thunderstorm. These images lead us to believe that many, if not most, of our scientific accomplishments can be attributed to the efforts of a few lone geniuses working in isolation. However, scientists have long realized the value of sharing their knowledge through research, publication, and teaching. In early modern Europe, learned societies such as the Royal Society in London met to discuss the research and observation of its members. New discoveries were changing the way people thought about the world. Isaac Newton’s work on gravity and Benjamin Franklin’s on electricity were among the exciting scientific discoveries of the 17th and 18th centuries, but they were just two participants in a larger network of change and progress.

Aware of the growing body of scientific knowledge and curious to learn it all, Benjamin Franklin organized the American Philosophical Society to establish a scientific community in America. It was modeled after London’s Royal Society and Dublin’s Philosophical Society, and its six founding members included botanist John Bartram and lawyer-scientist Thomas Hopkinson. Fifty years later, the Society included a host of prominent Philadelphia intellectuals: founding fathers George Washington, Thomas Jefferson, and John Adams, and such international figures as the Marquis de Lafayette. The Society provided a forum for exchanging ideas and pooling skills and knowledge, and its members particularly strove to promote American science and invention.

OBJECTIVES
Students will:
• Be introduced to the scientific community that developed in colonial America under the stewardship of Benjamin Franklin and the American Philosophical Society.
• Learn about the American Philosophical Society’s early members and their accomplishments and contributions to the Western scientific revolution of the 17th and 18th centuries.
• Examine 17th- and 18th-century scientific achievements of individuals excluded from membership in the more established learned societies of that time period.

TIME
This lesson and activity require two class periods.

MATERIALS
• Library or Internet resources

McREL STANDARDS
History/World History
Standard 27. Understands major global trends from 1450 to 1770
LESSON AND ACTIVITY
1. Homework
Prior to beginning discussion, assign students “A Proposal for Promoting Useful Knowledge Among the British Plantations in America.”

2. Inquiry/Discussion
Begin lesson by posing the following questions: If you were a scientist with an important new discovery, whom would you tell about it? How would you publicize your discovery? Answers will probably include the Internet, journals, newspapers, magazines, and other media. Friends and colleagues may also be mentioned.

Ask the students whether or not they believe that the comments of other scientists would be valuable, and if so, why? Lead the discussion to the value of having peers in the scientific community examine, evaluate, further test, and otherwise validate (or challenge) new scientific observations and theories.

3. Information
Ask students to talk about Franklin’s proposal to establish the American Philosophical Society. Students should address Franklin’s vision of forging a scientific community in the colonies. You may want to remind students that in an era before widespread public education, private discussion groups and learned societies were vital to a nation’s cultural and intellectual growth. You may also want to provide students with additional context for the discussion by noting the establishment of other learned societies in Europe and America in the late 1600s and early 1700s. (See www.royalsoc.ac.uk for information on the Royal Society in Britain and www.amphilsoc.org/ for information on the American Philosophical Society.)

4. Investigation 1
Divide the class into groups and assign each group the task of preparing a brief presentation describing the individual scientific accomplishments of the below individuals who were early members of the American Philosophical Society. Students can refer to the Internet or their school library to conduct their research.

- Benjamin Franklin
- Thomas Jefferson
- David Rittenhouse
- John Bartram
- Francis Hopkinson

When individual students have completed their research, each group will develop a response to the question of whether or not the above individuals constituted a community and if so, what value this community added to 18th-century society. Class will meet as a whole and share their ideas and conclusions.
5. Investigation 2
The group repeats the same exercise as above, but this time researches the accomplishments of the 18th-century women and people of color in science including:

- Maria Gaetana Agnesi
- Emilie de Breteuil, Nichole-Reine Lepaute, Sybilla Master
- Maria-Sophie Germain
- Maria Sibylla Merian, Elizabeth Luca Pinckney
- Benjamin Banneker

6. Inquiry/Discussion
Again, the class as a whole will discuss the respective accomplishments of the above scientists and address whether or not this group of scientists was part of an “established” scientific community. You may point out to students that although many people contributed to the expanding body of scientific knowledge in the 18th century, some of those individuals were excluded from membership in the more established scientific societies because of race or gender or simply because they were deemed amateurs, lacking proper formal training. Ask students how science is best served?

7. Writing
Students will write an article for an 18th-century national science newsletter. The articles may address any theme reflective of this lesson plan, including (but certainly not limited to) a profile of an 18th-century scientist, a summary of 17th- and 18th-century scientific discoveries, or a study of an 18th-century collaborative project or debate between two scientists (e.g., between Franklin and L’abbé Jean-Antoine).

ASSESSMENT
Students are graded on the quality of their class participation, investigative group work, and newspaper article.

EXTENSION ACTIVITIES

- Build a Web site that gives a more complete picture of the scientific community of the 18th century.
- Form a Science Society in your class, grade, or school in which students share their recent reading, observations, experiments, and findings.

FURTHER RESOURCES

- www.des.emory.edu/mfp/Kuhn.html
- www.royalsoc.ac.uk/
- www.amphilsoc.org/
- www.enetis.net/~surveyor/nshof/rittenhouse.html
- www.dep.state.pa.us/dep/PA_Env-Her/john_bartram.htm
- www.colonialhall.com/hopkinson/hopkinson.php
Useful Knowledge

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- www.geocities.com/bioelectrochemistry/franklin.htm
- www.astr.ua.edu/4000WS