Teaching Scientific Literacy

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Developing students’ scientific literacy is a central goal for science teachers, but the term is broad and not precisely defined. The Next Generation Science Standards (NGSS) and the Framework for K–12 Science Education offer many useful ideas of what to teach to develop scientific literacy. However, the purpose of the NGSS is to define minimum performance standards; it is not a complete curriculum.

This leads to a vital question for teachers: What does “scientific literacy” mean to me and my students? Excellent teachers, and those who aspire to be excellent teachers, seldom teach simply “by the book.” They do not believe that state science education standards, high-stakes tests, or textbooks offer complete answers for teachers and students.

For example, can you imagine teaching biology during a pandemic without mentioning viruses, antibodies, vaccines, or immunizations? Indeed, knowing something about all of those aspects of science was important to Americans’ scientific literacy long before the COVID-19 pandemic, and will be important after the pandemic is gone.) Yet none of those biology topics is identified as a priority in the NGSS, nor are they likely to appear on a high-stakes test. Nonetheless, many biology teachers have understood that it is important to teach the science related to COVID-19, measles, and many other diseases in order to develop students’ scientific literacy.

We can think of the NGSS, the Framework, textbooks, and standardized tests as important parts of a science teacher’s toolbox. Yet excellent teachers also think outside the standard box, and that effort need not be difficult. Simply reading articles in The Science Teacher can stimulate thinking about what else is important to teach.

But how does one decide what to teach to promote scientific literacy? Are there themes beyond what is in the standard toolbox that can help? Here are five suggestions to consider.

Pay attention to the personal and societal contexts of science

Every student, including the millions who will not receive a college degree, will need to apply science to personal and societal issues and decisions. Why should anyone wear a mask? What is the role of governments, and political candidates running for office, in combating climate change? Should I believe this dubious claim in advertising, said to be based on scientific evidence? The National Science Teaching Association (NSTA) strongly supports building students’ scientific literacy by including personal and societal issues (NSTA 2016).

A particularly important example of societal context is the role of government scientific agencies. At a time when former directors of the Centers for Disease Control and Prevention and the Food and Drug Administration have issued public statements complaining of unprecedented politicization, it is vital that young people, who are future voters, learn about the role of such institutions, a little about how they operate, and about the importance of scientists’ independence from political interference to promote scientific integrity.

Relate scientific literacy to traditional forms of literacy

The Common Core State Standards call for students to read more nonfiction, including science. Science teachers can help English and Language Arts teachers—and students—by assigning science-related articles from newspapers and magazines, or even books, including high-quality fiction. A science classroom should have a library that includes both magazines and excellent science books—even including fiction or poetry to draw in humanities-oriented students. Scientific literacy will flourish in the United States only when people continue to read about science after they leave school. You might ask students to read and synthesize information from several sources about an important topic, like the safety of vaping, and then present their findings orally or in writing.

Teach about how to find reliable information about science and how to reject junk science

The volume of dangerous scientific misinformation has exploded in recent years, and spreads quickly via social media. Students should understand which sources of information are more trustworthy, and why. Media literacy is needed in every subject, science included. Schools need to teach students how to judge whether information they encounter, most often online—e.g., “drain toxins from your body with a foot detox, using our special solution”—is based on science or not (Zucker, Noyce, and McCullough 2020).

Include some important events in the history of science

Students will better understand the nature of science (NOS), and learn to view science in a societal context, if they know some history of science. The role of dogma in opposition to science provides one good example. When Galileo found evidence that heavenly bodies move
around one another, the church ignored the evidence he presented, called him a heretic, and placed him under house arrest. More recently, Trofim Lysenko, who rejected accepted theories of genetics but was supported by political leaders, set 20th-century Soviet agriculture and research in biology back by decades, and was responsible for thousands of unnecessary deaths.

Help females and minority students realize their potential in science

Scientific literacy is important to all and available to everyone, yet women and minorities are still underrepresented in STEM fields. Teachers can help. Besides using resources often included in textbooks, many articles, books and movies may be useful. As an example, the book *Hidden Figures* (Shetterly 2016), later made into an award-winning Hollywood movie, tells the story of Black female mathematicians at NASA who made vital contributions to the American space program despite being subject to bias based on race and gender. Teach students that science is for everyone.

**Conclusion**

Excellent teachers prioritize developing students’ scientific literacy, so that as adults they will apply science as knowledgeable decision-makers and become lifelong learners. The five themes discussed above are key aspects of scientific literacy that deserve attention and that can increase students’ interest in science.

**REFERENCES**


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