

Teaching Elementary Science Using History as a Guide

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Qualifications

- ☞ University Professor From 1990 - 1995
- ☞ Helped Develop Indiana's Only Residential High School for Gifted and Talented Students
- ☞ NSF-Sponsored Scientist with More Than \$200,000 In Research Grants
- ☞ Became Interested in Homeschooling Because of Excellent University Students Who Were Homeschooled
- ☞ Currently writes homeschooling and Christian apologetics materials.
- ☞ Author at Berean Builders Publishing

Two Traditional Approaches to Teaching Science

The Spiral Approach:

Students are taught a little bit about a wide variety of subjects each year. As time goes on, subjects are revisited in a more detailed fashion.

The Immersion Approach:

Students are taught a single subject for a semester or more, allowing them to get a detailed picture. As time goes on, many subjects are covered.

A "New" Approach

1. Give students (and their parents) a very basic foundation in scientific thinking and some basic scientific facts.
2. Start with the ancient Greeks and move forward in history, discussing the science as it was learned.

Why Teach Science This Way?

1. It has many of the benefits of the spiral approach, but it isn't as boring. You revisit topics, but in the context of new people and new ideas.
2. It fits well into some of the popular homeschool curriculum programs.
3. It helps to destroy the notion that people from the past were not as smart as we are today.
 - a. Democritus theorized about atoms in the 4th Century BC.
 - b. Galen used the pulse rate as a diagnostic tool in the 2nd century AD.
 - c. Leonardo da Vinci made plastic in the early 16th century.

4. It helps to debunk some very popular myths.
 - a. Students are often taught that ancient people thought the earth was flat.
 - i. That is simply a lie. In the 2nd century BC, Eratosthenes determined the distance around the earth to within 1% of the correct value.
 - b. Students are often taught that the church forbade dissections, holding back the advancement of medicine.
 - i. It was actually Galen who could not dissect people to learn human anatomy, because of a Roman Law. This led him to make many mistakes.
 - ii. There is no record of the church forbidding dissection. In fact, 14th-century physician Guy de Chauliac was able to correct Galen by observing human dissections.

5. It shows that even when they are wrong, scientists can still advance our understanding.
 - a. Aristotle demonstrated the importance of observation in science and argued against Plato, who said the natural world is not worth understanding. His thinking shaped natural philosophy for almost 2,000 years. Nearly everything he wrote about science is incorrect.

6. It shows how science really works.
 - a. Science is not a linear process. Often, when a scientist makes an advance in one aspect of science, he or she makes a mistake in another. Vesalius, for example, corrected Galen on many things in human anatomy, but he also got the number of lobes in the lung wrong, while Galen had it right!
 - b. Most Scientific Advances Required the Work of Many People over Many Years
 - i. Aristotle said air is an element and has no weight.
 - ii. Da Vinci showed air cannot be an element.
 - iii. Jean Rey heated lead and tin in the presence of air and saw that their weights increased, leading him to speculate that air is not weightless.
 - iv. Galileo compared air to water and decided that air must have weight
 - v. Evangelista Torricelli invented the barometer, which changed height based on the weather.
 - vi. Blaise Pascal got his brother-in-law to carry a barometer up a mountain.
 - vii. The process of understanding that air has weight took about 1,900 years and required the work of at least six different natural philosophers!
 - viii. Of course, the Bible knew this all along:

**“When He imparted weight to the wind
And meted out the waters by
measure,”
-Job 28:25**

7. It shows just how much of a debt science owes to Christianity.
 - a. The modern methodology of science can be traced to:
Robert Grossteste (Bishop of Lincoln) and Roger Bacon (Franciscan friar)
 - b. Christianity Gave Science A Reason to Look for Laws that Governed Nature.
“In one of those strange permutations of which history yields occasional rare

examples, it is the Christian world which finally gave birth in a clear, articulate fashion to the experimental method of science itself.”

-Dr. Loren Eiseley, Benjamin Franklin Professor of Anthropology and the History of Science at the University of Pennsylvania

- c. Many Scientific Breakthroughs Occurred Because of Scientists’ Christian Faith
 - i. Nicolaus Copernicus put the sun at the center of the universe specifically because the geocentric model was too messy, and he said that this went against the nature of God, who is the

“the Best and Most Orderly Workman”

- ii. Sir Isaac Newton went against the scientific consensus of his day by believing that the same laws which operate on earth operate in the heaven. Why? Dr. Morris Kline says it was because Newton believed:

“God had designed the universe, and it was to be expected that all phenomena of nature would follow one master plan.”

- iii. Gottfried Wilhelm Leibniz developed binary logic and the binary number system (which is the basis of modern computers) to be able to more effectively communicate Christianity to the pagans.

In a letter to Duke Rudolph of Brunswick, he wrote:

“After all, one of the high points of the Christian faith, which agrees least with the philosophers and is not easy to impart to pagans, is the creation ex nihilo through God’s almighty power. Now one can say that nothing in the world can better present and demonstrate this power than the origin of numbers, as is represented here through the simple and unadorned presentation of One and Zero or nothing.”

How it Works in My Curriculum

Science in the Beginning gives the foundational material.

- Creation is the beginning of history
- 15 lessons for each day of creation. (3 are optional.)
- Hands-on activity for each lesson
- Three levels of review so all elementary students can do the course together.

Science in the Ancient World, *Science in the Scientific Revolution*, and *Science in the Age of Reason* are available now. They use the historical approach. The final book in the series, *Science in the Industrial Age*, should be out by the summer of 2017.

- Same basic structure as the first, but now the lessons are ordered chronologically.
- Students are taught mostly what the natural philosophers got right, but sometimes what they got wrong.
- Parent needs to do the books in order, not the student.