

Five Things I Learned from Richard Feynman About Science Education

Kathy Ceceri

Although I briefly flirted with the idea of going into science (before wisely coming to accept my inner English major), I never planned to become a science teacher. But I enjoyed reading about science in books written for popular audiences. And, without realizing it, I was picking up attitudes about science education that have shaped how I do science with my own kids.

One of my first literary science mentors was the late Nobel Prize-winning physicist Richard Feynman. Feynman had worked on the Manhattan Project, but became famous as a member of the committee which reported to Congress after the Space Shuttle Challenger disaster. It was Feynman who dipped a rubber O-ring into a glass of ice water to show how it became brittle – a simple but devastating demonstration. His lectures at Caltech, which are still studied today in book form, are considered classics. Recently, I happened to pick up his 1985 memoir *Surely You're Joking, Mr. Feynman* for the first time in many years. And I was surprised to see how many of the beliefs I hold today came directly from this book. Here are five of them:

1. Science is Something Anyone Can Do

Feynman credited his father with encouraging his interest in science by constantly asking him questions designed to make him think about how the world worked. (His mother, he complained, was constantly kicking him out of the house to play.) When he was 12, Feynman built an electrical “lab” in his room, with fuses made of tin foil and bells and lights that he could wire together in different configurations. He also became a whiz at fixing busted radios and soon had a thriving sideline as a neighborhood repairman.

2. Science Can be Playful

Even when he was working on the Manhattan Project, Feynman liked to tinker and play around with science and math. He and his wife (who was hospitalized with TB) would devise codes just to drive the censors who opened all their mail crazy. He studied safecracking and began breaking into the facility’s file cabinets – which, of course, contained the secrets of the atomic bomb. (Instead of making the file cabinets more secure, bumbling officials simply banned

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Feynman from their offices.) After the war at Caltech, Feynman continued to indulge what he called his “puzzle drive” by becoming an expert on Mayan hieroglyphics.

3. Scientific Curiosity Can be Applied to Other Areas

Feynman liked to challenge himself in areas besides math and science as well. He learned to play Latin drums well enough to perform with a ballet company. Although he didn't consider himself artistic, he learned how to draw well enough to sell several works and had a one man show at a campus gallery.

4. Science Education Should be More than Memorizing Definitions

When Feynman was a graduate student at Princeton, he was allowed to sit in a biology course if he agreed to do the assignments. One involved giving a report on research that had been done on cats. He was unfamiliar with the names of the muscles mentioned, so he went down to the library to get “a map of the cat”. Then he gave his report, beginning with an explanation of the cat's anatomy. The biology students immediately stopped him, saying they already knew all that. “Oh,” he replied, “you do? Then no wonder I can catch up with you so fast after you've had four years of biology”. As he wrote, “They had spent all their time memorizing stuff like that, when it could be looked up in fifteen minutes”.

5. Science Textbooks Stink

Asked to evaluate math and science textbooks for the California Board of Education, Feynman's temper exploded over books that were “universally lousy”. One tried to apply math to science with a problem that involved adding up the temperatures of red stars, yellow stars, green stars, and violet stars – even though there are no green or violet stars, and there's no purpose in adding their temperatures. “All it was was a game to get you to add, and they didn't understand what they were talking about.” Talking about a science textbook which stated that a wind-up toy moved because “energy makes it go,” he pointed out that “you could say ‘energy makes it stop’ just as well”.

I've now passed Feynman's book on to my older son, with the hope that he'll enjoy it as much as I have. (Parental alert: The book contains a few sections on Feynman's retro interest in strip clubs.) But even if he's not ready – it may be a book that needs a little distance from childhood to appreciate – it's been nice to have my ideas about science education reaffirmed.

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