



The Making of Scientist by Heather Blue

Grade Level: Grade 6

Subject Area: English Language Arts

Lesson Length: 2 hours

Lesson Keywords: Reading, writing, the making of scientist

Lesson Description: The goal of this lesson is to give students the opportunity to use the reading and writing habits they've been practicing on a regular basis to absorb deep lessons from Richard Feynman's recollections of interactions with his father. By reading and rereading the passage closely, and focusing their reading through a series of questions and discussion about the text, students will identify how and why Feynman started to look at the world through the eyes of a scientist. When combined with writing about the passage, students will discover how much they learn from memoir.

Common Core Standards Covered with This Lesson

CCSS.ELA-Literacy.RI.6.1: Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

CCSS.ELA-Literacy.RI.6.2: Determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments

CCSS.ELA-Literacy.RI.6.3: Analyze in detail how a key individual, event, or idea is introduced, illustrated, and elaborated in a text (e.g., through examples or anecdotes).

CCSS.ELA-Literacy.RI.6.6: Determine an author's point of view or purpose in a text and explain how it is conveyed in the text.

CCSS.ELA-Literacy.L.6.4: Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 6 reading and content, choosing flexibly from a range of strategies.

CCSS.ELA-Literacy.L.6.6: Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Lesson Content: Book/Story/Reading Passage

Instructions: Please read the following reading passage as many times as needed (aloud and silent) before starting to go through other lesson pages. Understanding the content of this passage is very important since the lesson activities will be all about this content. Feel free to print the passage if needed.

The Making of Scientist

by Richard Feynman

Content: Before I was born, my father told my mother, If its a boy, hes going to be a scientist. When I was just a little kid, very small in a highchair, my father brought home a lot of little bathroom tiles of different colors. We played with them, my father setting them up vertically on my highchair like dominoes, and I would push one end so they would all go down.

Then after a while, I'd help set them up. Pretty soon, we were setting them up in a more complicated way: two white tiles and a blue tile, two white tiles and a blue tile, and so on. When my mother saw that she said, Leave the poor child alone. If he wants to put a blue tile, let him put a blue tile.

But my father said, No, I want to show him what patterns are like and how interesting they are. Its a kind of elementary mathematics. So he started very early to tell me about the world and how interesting it is.

We had the Encyclopaedia Britannica at home. When I was a small boy he used to sit me on his lap and read to me from the Britannica. We would be reading, say, about dinosaurs. It would be talking about the Tyrannosaurus rex, and it would say something like, This dinosaur is twenty-five feet high and its head is six feet across.

My father would stop reading and say, Now, lets see what that means. That would mean that if he stood in our front yard, he would be tall enough to put his head through our window up here. (We were on the second floor.) But his head would be too wide to fit in the window. Everything he read to me he would translate as best he could into some reality.

It was very exciting and very, very interesting to think there were animals of such magnitude and that they all died out, and that nobody knew why. I wasn't frightened that there would be one coming in my window as a consequence of this. But I learned from my father to translate: everything I read I try to figure out what it really means, what its really saying.

We used to go to the Catskill Mountains, a place where people from New York City would go in the summer. The fathers would all return to New York to work during the week and come back only for the weekend. On weekends, my father would take me for walks in the woods and he'd tell me about interesting things that were going on in the woods. When the other mothers saw this, they thought it was wonderful and that the other fathers should take their sons for walks. They tried to work on them but they didn't get anywhere at first. They wanted my father to take all the kids, but he didn't want to because he had a special relationship with me. So it ended up that the other fathers had to take their children for walks the next weekend.

The next Monday, when the fathers were all back at work, we kids were playing in a field. One kid says to me, See that bird? What kind of bird is that?

I said, I haven't the slightest idea what kind of a bird it is.

He says, Its a brown-throated thrush. Your father doesn't teach you anything!

But it was the opposite. He had already taught me: See that bird? he says. Its a Spencers warbler. (I knew he didn't know the real name.) Well, in Italian, its a Chutto Lapittida. In Portuguese its a Bom da Peida. In Chinese, its a Chung-long-tah, and in Japanese, its a Katano Tekeda. You can know the name of the bird in all the languages of the world, but when youre finished, youll know absolutely nothing whatever about the bird. Youll only know about humans in different places, and what they call the bird. So lets look at the bird and see what its doing thats what counts. (I learned very early the difference between knowing the name of something and knowing something.)

He said, For example, look: the bird pecks at its feathers all the time. See it walking around, pecking at its feathers?

Yeah.

He says, Why do you think birds peck at their feathers?

I said, Well, maybe they mess up their feathers when they fly, so theyre pecking them in order to straighten them out.

All right, he says. If that were the case, then they would peck a lot just after theyve been flying. Then, after theyve been on the ground a while, they wouldnt peck so much anymore you know what I mean?

Yeah.

He says, Lets look and see if they peck more just after they land.

It wasnt hard to tell: there was not much difference between the birds that had been walking around a bit and those that had just landed. So I said, I give up. Why does a bird peck at its feathers?

Because there are lice bothering it, he says. The lice eat flakes of protein that come off its feathers.

He continued, Each louse has some waxy stuff on its legs, and little mites eat that. The mites dont digest it perfectly, so they emit from their rear ends a sugarlike material, in which bacteria grow.

Finally he says, So you see, everywhere theres a source of food, theres some form of life that finds it.

Now, I knew that it may not have been exactly a louse, that it might not be exactly true that the louses legs have mites. That story was probably incorrect in detail, but what he was telling me was right in principle.

Not having experience with many fathers, I didnt realize how remarkable he was. How did he learn the deep principles of science and the love of it, whats behind it, and why its worth doing? I never really asked him, because I just assumed that those were things that fathers knew.

My father taught me to notice things. One day, I was playing with an express wagon, a little wagon with a railing around it. It had a ball in it, and when I pulled the wagon, I noticed something about the way the ball moved. I went to my father and said, Say, Pop, I noticed something. When I pull the wagon, the ball rolls to the back of the wagon. And when Im pulling it along and I suddenly stop, the ball rolls to the front of the wagon. Why is that?

That, nobody knows, he said. The general principle is that things which are moving tend to keep on moving, and things which are standing still tend to stand still, unless you push them hard. This tendency is called inertia, but nobody knows why its true. Now, thats a deep understanding. He didnt just give me the name.

He went on to say, If you look from the side, youll see that its the back of the wagon that youre pulling against the ball, and the ball stands still. As a matter of fact, from the friction it starts to move forward a little bit in relation to the ground. It doesnt move back.

I ran back to the little wagon and set the ball up again and pulled the wagon. Looking sideways, I saw that indeed he was right. Relative to the sidewalk, it moved forward a little bit. Thats the way I was educated by my father, with those kinds of examples and discussions: no pressure just lovely, interesting discussions. It has motivated me for the rest of my life, and makes me interested in all the sciences. (It just happens I do physics better.)

Ive been caught, so to speak like someone who was given something wonderful when he was a child, and hes always looking for it again. Im always looking, like a child, for the wonders I know Im going to find maybe not every time, but every once in a while.

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Task 1: Vocabulary

Instructions: Please complete the following vocabulary activity by choosing the correct meaning of each word selected from the passage and use of each word correctly in a sentence.

Q: 1 WordPhrase: Principles **WordPhraseTier:** 2

Question: How did he learn the deep principles of science and the love of it, whats behind it... What does the word principles mean in this sentence?

- A: General law or larger truth
- B: school manager
- C: theories
- D: opinion

Question: Which one of the sentence below uses the word principles correctly?

- A: The school principle announced today that there will be no school tomorrow.
 - B: Principle is a theory that humans are still trying to figure out,
 - C: According to the Peter Principle, a worker will rise to his or her level of incompetence.
 - D: Ms. Benson said that boredom was her principal reason for retiring.
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Q: 2 WordPhrase: Tend to **WordPhraseTier:** 2

Question: The author in our story says The general principle is that things which are moving tend to keep on moving, and things which are standing still tend to stand still, unless you push them hard?

- A: decreasing
- B: feeling
- C: are likely to
- D: increasing

Question: Which one of the sentence below uses the word tend to correctly?

- A: I tended to attend to a conference in Washington.
 - B: Sam tends to say things like that when he is upset.
 - C: I have no time to tend to my diary.
 - D: Tend to unexpected circumstances, I delayed my travel.
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Q: 3 WordPhrase: Brown -throated thrush **WordPhraseTier:** 3

Question: The author in our story says Its a brown-throated thrush. Your father doesnt teach you anything!... What does the word brown-throated thrush mean in this sentence?

- A: A kind of snake
- B: A kind of spider
- C: A kind of bird
- D: A kind of butterfly

Question: Which one of the sentence below uses the word brown-throated thrush correctly?

- A: Some of the sea animals in America usually live in a Brown-throated thrush water.
 - B: I bought today a Brown-throated thrush from the department store.
 - C: Cleaning my room with a brown-throated thrush made the entire process very easy
 - D: I saw a brown-throated thrush in our backyard today.
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Q: 4 WordPhrase: Encyclopaedia Britannica **WordPhraseTier:** 3

Question: The author in our story says We had the Encyclopaedia Britannica at home. What does the word Encyclopaedia Britannica mean in this sentence?

- A: Kind of plant found near water
- B: A poem collection book
- C: A kind of sea animal
- D: Large set f books covering all sorts of knowledge

Question: Which one of the sentence below uses the word Encyclopaedia Britannica correctly?

A: Encyclopaedia Britannica usually fly very high during the winter season.

B: I found an Encyclopaedia Britannicanear the pond calling my name.

C: Encyclopaedia Britannica really helps you manage your daily schedule.

D: I used Encyclopaedia Britannica to look up information for my term paper.

Task 2: Forum Discussion

Instructions: This discussion forum will have questions for students to respond. Read the posted questions, and respond to each. Students are responsible for posting one initial and two peer responses for each topic.

1 - What was Feynman's father trying to teach?

What was Feynman's father trying to teach his son with the tiles? What sentence is the main point of this scene?

2 - How does the word "doing" connect to the lesson Feynman's father is trying to teach?

You'll only know about humans in different places, and what they call the bird. So let's take a look at the bird and see what it's doing - that's what counts. In this sentence from the text, Feynman used the word doing. Why is he using that word, and how does it connect to the lesson his father is trying to teach him in this example?

3 - Lice and Mites on Birds

Why does Feynman's father tell him about the lice and mites on birds?

4 - Everywhere there's source of food, there's some form of life that finds it.

Feynman's father says, *So you see, everywhere there's source of food, there's some form of life that finds it.* Explain what is meant by this sentence and why some is in italics.

5 - Was given something wonderful when he was a child.

In the final paragraph Feynman says he was given something wonderful when he was a child. Using two of the examples from the text, explain what he was given and how it influenced his life.

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Task 3: Writing Activity

Instructions: For your writing assignment, pick one of the examples that Feynman uses in his piece (the dinosaur, the birds, or the wagon) and in 2-3 paragraphs (minimum 250 words) explain both the example and the lesson Feynmans father was trying to teach him with it. Submit your assignment using the box below.

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