

# Science Lesson #11

## *How to Make Your Own “Fables & Science” Lesson*

(Carbon Dioxide 5 Ways)

[www.bickart.org](http://www.bickart.org)



### Introduction to Fables and Science

#### Today's Lesson

I'm sure that you are already making your own science lessons that are like what I'm about to articulate. But you came here, so I assume you would like to organize your thoughts and get some *food* for further thought. So, all I have to do is outline, ***“What is Heart Thought?”*** because that is what Fables & Science lesson are made of.

To make a lesson that is full of heart, you can think of it as if you and your students are breathing in and out. If you first breath in an observation, then breath out an analysis. If you look at specific detailed information, then step back from the trees to the forest. If you spend some time in your head, then step back and ask your heart what it needs. Usually, your heart needs to feel what this lesson has to do with building character.

## Heart Thought

(also see the [Heart Thought Exercises](http://bickart.org) on bickart.org)

- **Use Critical Thinking (Head):** see Lesson #10 *Did that Iron Just Say Something?* ... where we embraced Galileo's offerings solely on the basis of reasoning.
- **Build Character (Heart):** see Lesson #2 *Becoming a Great Observer* and Lesson #3 *Interrogation and Observation* ... where we stressed observation as the key method to overcome the modern tendency to jump to conclusions and analysis.
- **Be Provocative (Head + Heart):** see Lesson #1 *Could Aristotle's Four Elements Be Alive?* ... where I challenged students to consider that inorganic elements may have a form of life that we have not learned how to detect.

Some Ways to Lead with Your <i>Heart</i> ...	Some Ways to Lead Your <i>Head</i> ...
---	---

intuiting, observing, connecting, feeling, pausing, centering, touching, empathizing, eye contact, slow to respond, keep it light, playful, humorous, “let’s go another way”, “I see what you’re feeling”, “do you think that will work?”	analyzing, articulating, solving, being logistical, planning, being right, quick to respond, intensity, heaviness, seriousness, “stop that or else”, “you’re wrong”, “don’t even tell me your way”, “because I said so!”
---	--

### Characteristics of

- see the forest, then the trees and back - keep referring to the whole picture
- teachers (YOU) are life blood: teach what you love
- show how to learn - inspiration, then information
- transformation: character building
- qualities in addition to or instead of quantities
- see the universal: see the Lesson #12 ***Lions and Tigers and Bears - Oh My!*** ... where I show how one bread ‘morphs’ into another, so you can see the whole as all connected
- the two kinds of **Wonder**: left brain (why, how, measurement), right brain (awe, beauty, wonderful)

## ***How to Make Your Own “Fables & Science” Lesson***

Add plenty of ***Heart Thought!***

***Breathe in ...***

An Observation

Big Picture (forest)

Heart Wonder

***Breathe out ...***

An Analysis

Detail (trees)

Head Wonder

## ***How to Make Your Own “Fables & Science” Lesson***

Three Keys ...

- 1. Use Critical Thinking (Head)***
- 2. Build Character (Heart)***
- 3. Be Provocative (Head + Heart)***

## How to Make Your Own “Fables & Science” Lesson

Some Ways to Lead with Your Heart ...	Some Ways to Lead Your Head ...
intuiting, observing, connecting, feeling, pausing, centering, touching, empathizing, eye contact, slow to respond, keep it light, playful, humorous,  “let’s go another way”, “I see what you’re feeling”, “do you think that will work?”	analyzing, articulating, solving, being logistical, planning, being right, quick to respond, intensity, heaviness, seriousness,  “stop that or else”, “you’re wrong”, “don’t even tell me your way”, “because I said so!”

### Demonstration of Carbon Dioxide 5 Ways

Much of these are taken from Michael Faraday’s excellent set of lectures called, *The Chemical History of a Candle* (Faraday, 1860/2012)

### Demonstration

The 5 ways we will show carbon dioxide is:

1. CO<sub>2</sub> in a Pure State: heavier than air

## Carbon Dioxide 5 Ways

**1.** CO<sub>2</sub> in a Pure State:  
*heavier than air*



2. CO<sub>2</sub> in a Fire Extinguisher: as dry ice (see Lesson #5)

## Carbon Dioxide 5 Ways

**2.** CO<sub>2</sub> in a Fire  
Extinguisher:  
*as dry ice (see Lesson #5)*



3. CO<sub>2</sub> in a Chemical Reaction: vinegar + baking soda

### Carbon Dioxide 5 Ways

**3.** CO<sub>2</sub> in a  
Chemical Reaction:  
*vinegar + baking soda*



4. CO<sub>2</sub> in a Candle:  $C + O \longrightarrow CO_2$

### Carbon Dioxide 5 Ways

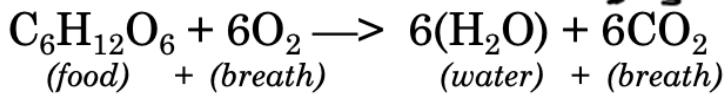
**4.** CO<sub>2</sub> in a  
Candle:  
 $C + O \longrightarrow CO_2$



5. CO<sub>2</sub> in Breath:  $C_6H_{12}O_6 + 6O_2 \longrightarrow 6(H_2O) + 6CO_2$

## Carbon Dioxide 5 Ways

### 5. CO<sub>2</sub> in Breath:



[\[Play video here to see live demonstration.\]](#)

\*\*\*\*\*

### Here's a provocative thought...

As you saw in the video, like fire, we breathe in oxygen and breathe out carbon dioxide. And like fire, the oxygen we breathe in combines with internal carbon to produce heat. This is how the warm-blooded mammals keep up their temperature. But, like the flame is to the human, the human is to the whole earth. The earth also breathes in oxygen and breathes out carbon dioxide. Each day as the sun comes up and also each spring season as the plants flourish, the forests breathe in about half of the earth's carbon dioxide and breathe out oxygen. Roughly, the other half comes from the oceans. This carbon dioxide then creates the blanket that is necessary for the earth to keep warm and not freeze. So the flame of the candle is like our body, and the tree is like the earth itself. All are carbon-based, breathe and keep our essential warmth through carbon dioxide.



Here are some fables that deal with this: [\[Fable #1\]](#) [\[Fable #7\]](#)  
[\[Fable #10\]](#) [\[Fable #14\]](#) [\[Fable #15\]](#) [\[Fable #16\]](#) [\[Fable #27\]](#)  
[\[Fable #38\]](#) [\[Fable #56\]](#) [\[Fable #64\]](#) [\[Fable #67\]](#) [\[Fable #77\]](#)  
[\[Fable #78\]](#) [\[Fable #100\]](#) [\[Fable #102\]](#) [\[Fable #107\]](#) [\[Fable #116\]](#)  
[\[Fable #117\]](#) [\[Fable #130\]](#) [\[Fable #131\]](#) [\[Fable #132\]](#) [\[Fable](#)  
[#133\]](#) [\[Fable #138\]](#) (Bickart, 2020a, Volume 1; 2020b, Volume  
2; 2020c, Volume 3). Below are two of my favorite fables. The  
first one deals with teaching using fables. The second is a tribute  
to the true teacher. I hope you like them.



## #77 *The First Teacher*



*Two young people, Wendy and John, were playing in the woods. They were friends for as long as their young stories remembered. John made a joke and Wendy laughed. John made a suggestion and Wendy listened, then took the suggestion to heart. Then Wendy listened to another and another. John watched. “Do you listen to everyone?” John asked. “Yes,” said Wendy. And she did. And she also asked them questions and laughed at their jokes. She listened until she saw who they truly were. One day, Wendy told John, “You have just opened the doors of my life and let me out.”*

*After many, many years, John made a joke and a suggestion and Wendy laughed and listened. Then, she took the suggestion to heart. Suddenly, John realized that Wendy was his teacher.*

***The Teacher***

*To serve people  
is a great honor.*

*To follow them  
is to lead them.*

*To appreciate  
who they truly are  
is to teach them.*

*And this is the greatest honor.*

***TRUE TEACHERS MAY LOOK LIKE FOLLOWERS***



## #133 *Speaking in Fables*



*There once was a magical place. If people who could speak normally went in, they were changed while they were inside, then they came out SPEAKING IN FABLES. What does that mean, you say? Well, to speak in fables one must take an ordinary situation and then see something extra. Then, one must put the extra with the ordinary to come out with something EXTRAORDINARY! That's hard to understand, so I'll give you a simple example.*

*An ordinary way to speak about a candle is to say that we see it every day and we light it in order to see better or we light it just*

*for fun. But to speak in fables, one must observe the flame so carefully that you notice that flames are hot and always go up. It is as if they are little droplets of Sun, going up to return to their home. And if you continue speaking in fables, you would follow such an extraordinary comparison with more observations. You would trace the origin of the fable all of the way back to the Sun. You would say that the flame came from burning wick and wax. The wax came from the Earth, which came from decaying plants, which grew from sunlight. And so, to speak in fables, one might end with thanks to the Sun for every flame - the small droplets of Sun on Earth.*

*Oh yes, and where is that magical place where one learns to speak in fables? It is called a school.*

### *LEARN TO SPEAK IN FABLES*

# *Speaking in Fables*

## Why Use Fables to Teach Science?

### **Conversation Starters**

- Do you someone who tells good stories? Do you like good stories?
- Do you the difference between a story that is fictional and one that is factual? Can you think of a fictional story that you like?
- Can you think of a fictional story that you like?
- What do you think could be one meaning of saying, “*put the extra with the ordinary to come out with something EXTRAORDINARY!?*”
- Do you think you could make a story from a scientific fact?

\*\*\*\*\*

### References

- Bickart, J. (2020a). *Bickart's Just-in-Time Fables (Volume 1)* (Vol. 1). Asheville, NC: Red Shirt Interactive Group.
- Bickart, J. (2020b). *Bickart's Just-in-Time Fables (Volume 2)* (Vol. 2). Asheville, NC: Red Shirt Interactive Group.
- Bickart, J. (2020c). *Bickart's Just-in-Time Fables (Volume 3)* (Vol. 3). Asheville, NC: Red Shirt Interactive Group.
- Faraday, M. (1860/2012). *The chemical history of a candle*. Hoboken, N.J.: BiblioBytes.