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First Observation Lab



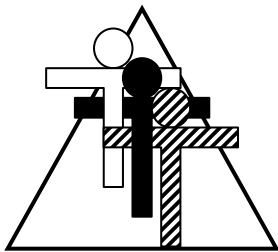
By Brad Fulton

Educator of the Year

(Voted by the California League of Schools – 2005)

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- ☑ Engage learners in the scientific process
- ☑ Develop skills in scientific observation
- ☑ Distinguish observations and conclusions
- ☑ Introduce chemistry concepts



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Brad Fulton Educator of the Year

- ◆ Consultant
- ◆ Educator
- ◆ Author
- ◆ Keynote presenter
- ◆ Teacher trainer
- ◆ Conference speaker

Known throughout the country for motivating and engaging teachers and students, Brad has co-authored over a dozen books that provide easy-to-teach yet mathematically rich activities for busy teachers while teaching full time for over 30 years. In addition, he has co-authored over 40 teacher training manuals full of activities and ideas that help teachers who believe mathematics must be both meaningful and powerful.

Seminar leader and trainer of mathematics teachers

- ◆ 2005 California League of Middle Schools Educator of the Year
- ◆ California Math Council and NCTM national featured presenter
- ◆ Lead trainer for summer teacher training institutes
- ◆ Trainer/consultant for district, county, regional, and national workshops

Author and co-author of mathematics curriculum

- ◆ Simply Great Math Activities series: six books covering all major strands
- ◆ Angle On Geometry Program: over 400 pages of research-based geometry instruction
- ◆ Math Discoveries series: bringing math alive for students in middle schools
- ◆ Teacher training seminar materials handbooks for elementary, middle, and secondary school

Available for workshops, keynote addresses, and conferences

All workshops provide participants with complete, ready-to-use activities that require minimal preparation and give clear and specific directions. Participants also receive journal prompts, homework suggestions, and ideas for extensions and assessment.

Brad's math activities are the best I've seen in 38 years of teaching!

Wayne Dequer, 7th grade math teacher, Arcadia, CA

"I can't begin to tell you how much you have inspired me!"

Sue Bonesteel, Math Dept. Chair, Phoenix, AZ

"Your entire audience was fully involved in math!! When they chatted, they chatted math. Real thinking!"

Brenda McGaffigan, principal, Santa Ana, CA

"Absolutely engaging. I can teach algebra to second graders!"

Lisa Fellers, teacher

References available upon request



I want...

- a) effective staff development
- b) affordable staff development
- c) ongoing staff development

(pick three)

14 new DVD presentations offer quality mathematics staff development at a fraction of the cost!

- Fast Facts and Fractions:** Help students master their multiplication facts and learn simple strategies for taming fractions.
- Hundreds Magic:** An engaging exploration of arithmetic, number sense, algebra, and mathematical reasoning.
- Number Line:** Help students compare and order fractions, decimals, and percents while developing reasoning skills.
- Safely Navigating Social Networks:** Help your students stay safer at home and school. Great for parents and staff
- Solving Linear Equations:** Simple steps and strategies to help your students find success with equations.
- Multiplying and Factoring Polynomials:** Help students learn the seamless way to tackle polynomials.
- Take Your Places:** A rich and engaging activity integrating number sense, operations, probability, and algebra.
- Integer Strategies:** Help students overcome integer operations with these classroom-tested strategies.
- Teaching 2-Digit Multiplication:** Use *Conceptual Layering* to maximize mathematical skill and reasoning.
- Leo's Pattern:** Learn how to use *conceptual layering* to help students transition from simple addition to algebra.
- Math Projects:** Emancipate the intelligence of your students with an authentic assessment and teaching strategy that will amaze both you and your students.
- Menu Math:** Students from grades two through college have finally made sense of algebra with this clever approach.
- The Power of Two:** Finally students understand exponents, the zero power, and even *negative* exponents!
- X Marks the Spot:** Practice with the four operations should be engaging, enriching, and empowering. Find out how to maximize the effectiveness of drill work with this easy approach.

To view the online video, go to:

[youtube.com/watchhttpress](https://www.youtube.com/watchhttpress)

You may use this activity with the video or follow the instructions in this manual to recreate the actual demonstration.

Purpose:

- To engage students in the scientific process
- To develop skills in careful scientific observations
- To help students differentiate between an observation and a conclusion or assumption
- To introduce chemistry concepts (polymers)

If using the video:

1. Pass out the activity sheet.
2. Play the video, pausing it as instructed so the students can complete the page.
3. At the conclusion, discuss these questions:
 - Why is it important for a scientist to make careful observations?
 - What is the difference between an observation and a conclusion?
 - What is your hypothesis for why the liquid in the cup appeared to disappear?
 - What is your hypothesis for how Mr. Fulton was able to eat the candle?

Or if you want to do the experiment yourself you will need:

- A white foam cup
- A potato
- A slivered almond
- A match
- A beaker of water
- Sodium polyacrylate (available from a chemical supply company)
- Other props of your choice

Procedure:

Ahead of time:

1. Place one teaspoon of sodium polyacrylate into the foam cup. Since the chemical is also white, it will not show up against the white background of the cup.
2. Core a potato and trim both ends. Do this just prior to the demonstration as the potato will turn brown upon exposure to air if prepared too far in advance.
3. Use a pencil or other sharp object to make a hole in one end of the potato.

4. Insert the slivered almond into the hole so that it looks like a candlewick. I like to burn the end of the slivered almond a bit so it looks like a blackened wick. This also makes it easier to light when the demonstration begins. I also trim the almond as narrow as possible to more closely resemble a wick.

With the students

1. Pass out the activity sheet.
2. Tell them that they will hear a story and observe some actions that you will be doing. They are to write down observations about your actions. They need not summarize the story. *The goal is to write as many accurate observations as possible.*
3. Begin telling a story such as the one in the video as you set out the props. Be sure to set the foam cup down on its side so students assume it is empty.
4. At some point in your story, set the cup upright and pour some water from the beaker into it.
5. Light the "candle".
6. After it burns for a while, blow it out.
7. Ask the students to finish writing their observations. Then call on them and list their responses on the board. Even if their responses are not accurate, list them anyway.
8. Ask the students to rate their confidence in the observations in column 1. For example, if they are absolutely sure it happened they should write 100%. If they are convinced it didn't happen, they should write 0%, and if they *suspect* it happened they might write something like 75%.
9. Call on them to tell you their level of confidence for each observation, and list these on the board.
10. Now suggest to them that you might have tricked them. For example in the video, I appear to drink some coffee. If they said, "He took a drink of coffee," ask them if they *observed* that the cup had coffee or if that was a assumption based on the observation that I put a coffee cup to my lips. In the former case, maybe they are 80% sure I drank coffee. On the other hand, if their statement was, "You drank from a coffee cup," then they might be 95% sure as they could directly observe me using a coffee cup. However, they might concede that there was a 5% chance there was nothing in the cup at all.
11. Ask them to adjust any of the confidence ratings on their observations under column 2.
12. Ask them which observations they adjusted and why.
13. Ask them if they are 100% sure of any of the observations at this time. Most will still say they are 100% sure that I poured water in the cup, I lit a candle, and that I blew it out. By this time, the sodium polyacrylate has had plenty of time to absorb the water and you can turn the cup upside down without any liquid spilling out. After their initial shock has passed, pop the "candle" in your mouth, chew it up, and swallow it.
14. Ask them once more to evaluate their confidence ratings in column 3.
15. You can conclude with the discussion questions listed in the video section.

The science connection:

- My students ask how I did the experiment. I don't tell them, and I think this is the best approach scientifically. I respond that Saturn won't tell me how many rings it has; I must make careful and accurate observations and then draw logical observations without making faulty assumptions. Many think I ate an apple and the wick was the stem. I ask them if they are 100% sure. If they say yes, I jokingly ask them if they would like to wager \$100. They realize they are not totally convinced.
- The almond contains fat (oil) that will burn nicely for a few minutes.
- Sodium polyacrylate, which is also called "waterlock" for obvious reasons, is a white polymer that will react with water to form a sticky gel. You might ask students to suggest possible uses for such a chemical. This can be a research assignment they can do for homework. The main use of sodium polyacrylate is in disposable diapers. It absorbs and holds the urine. One of the environmental problems is that this chemical then ends up in landfills where it reacts with ground water.

First Observation Lab

Name _____

Date _____ Period _____

Write your accurate observations here:

	1	2	3
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____
13. _____	_____	_____	_____
14. _____	_____	_____	_____
15. _____	_____	_____	_____
16. _____	_____	_____	_____
17. _____	_____	_____	_____
18. _____	_____	_____	_____
19. _____	_____	_____	_____
20. _____	_____	_____	_____