

Hands-On Physical Science and Atmospheric Science Instruction: Effects and Experiences

Effects: Informal Instruction

Effectiveness of Informal Instruction

As part of our work with CMMAP, we have been evaluating the effectiveness of all aspects of our work.

We can show clear evidence of changes in understanding during our formal training sessions with teachers and with students. More interesting is the informal work that we do.

At a typical Little Shop of Physics school visit, students receive very little direct instruction. Students explore at their own pace with minimal guidance.

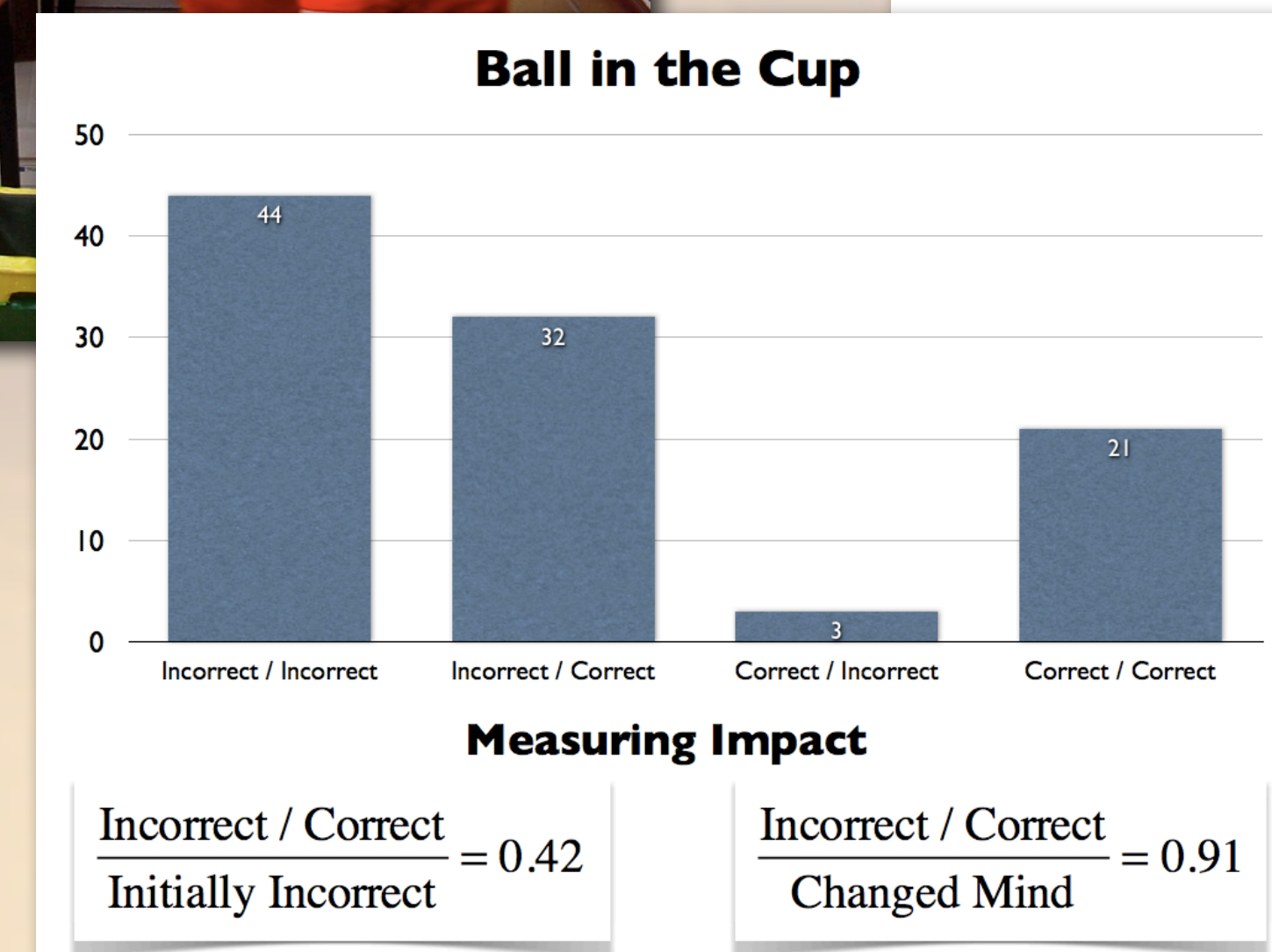
Students taking part in Little Shop activities come away with an enhanced appreciation for science and the process of science. But do they learn anything?

The answer is yes. They do. And we have data to show it.



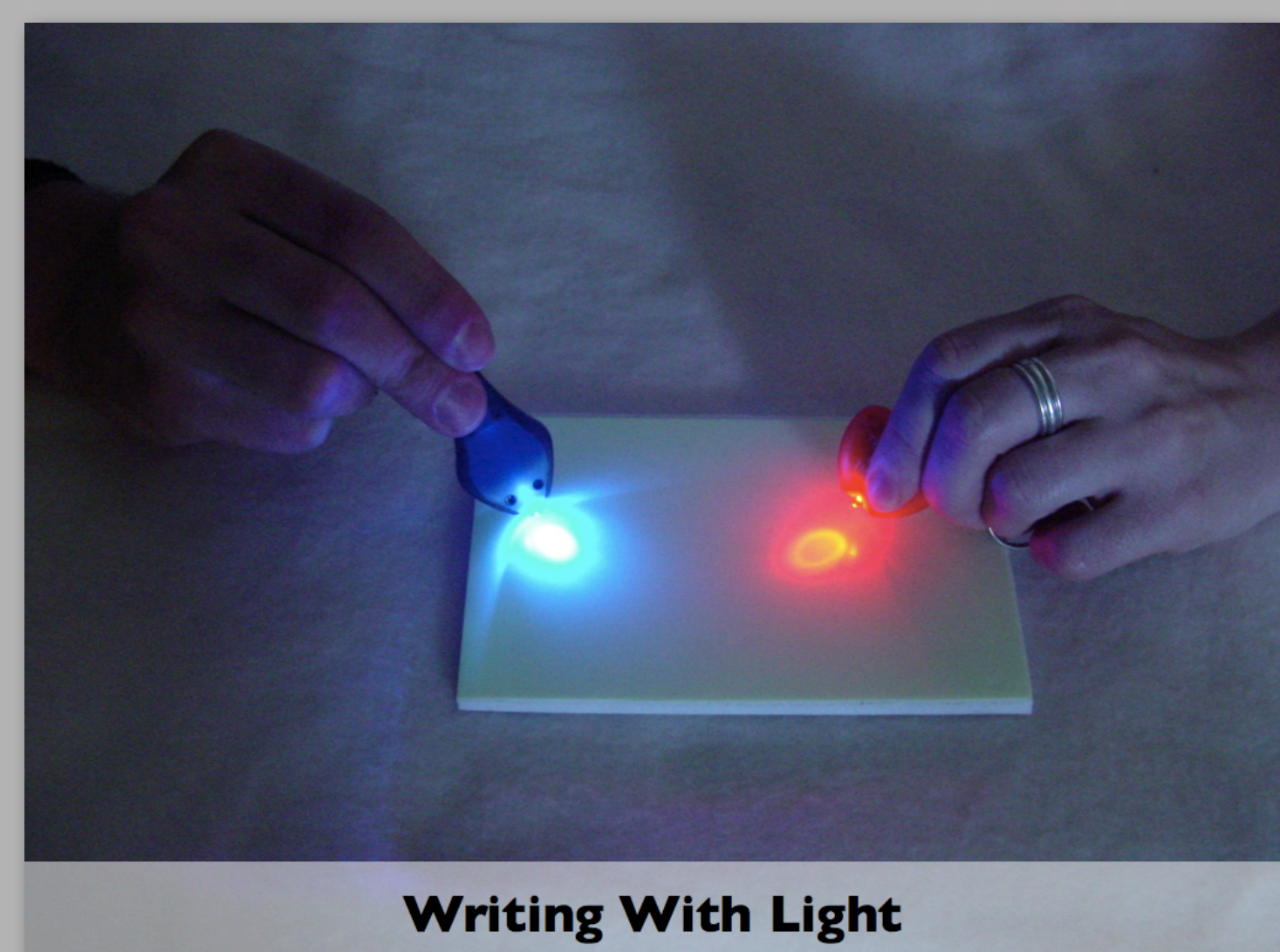
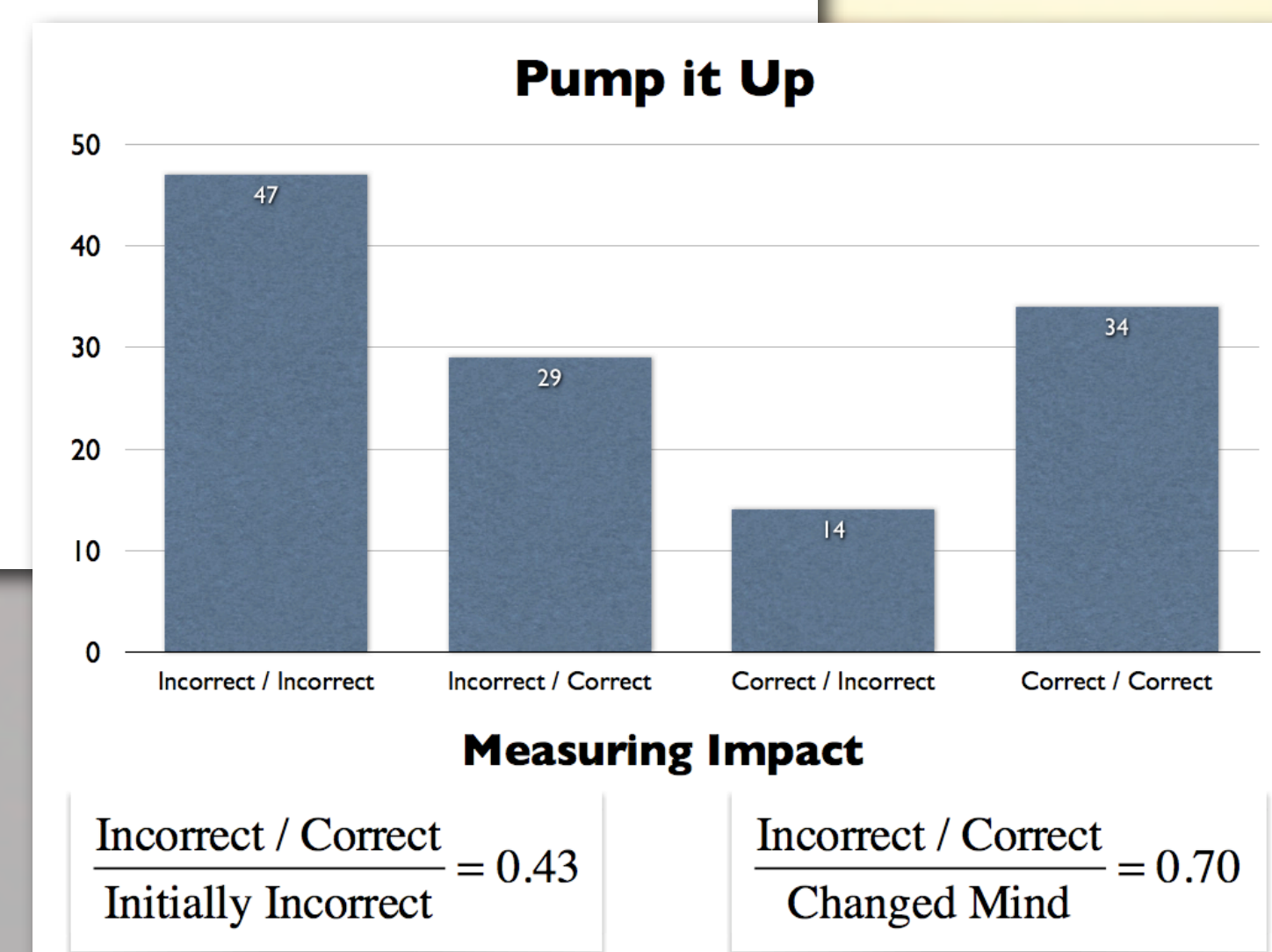
The Ball in the Cup
The picture at right shows a particular experiment in the Little Shop of Physics. When the air stream is turned on,

- The ball flies out of the cup.
- The ball is pulled in to the cup.



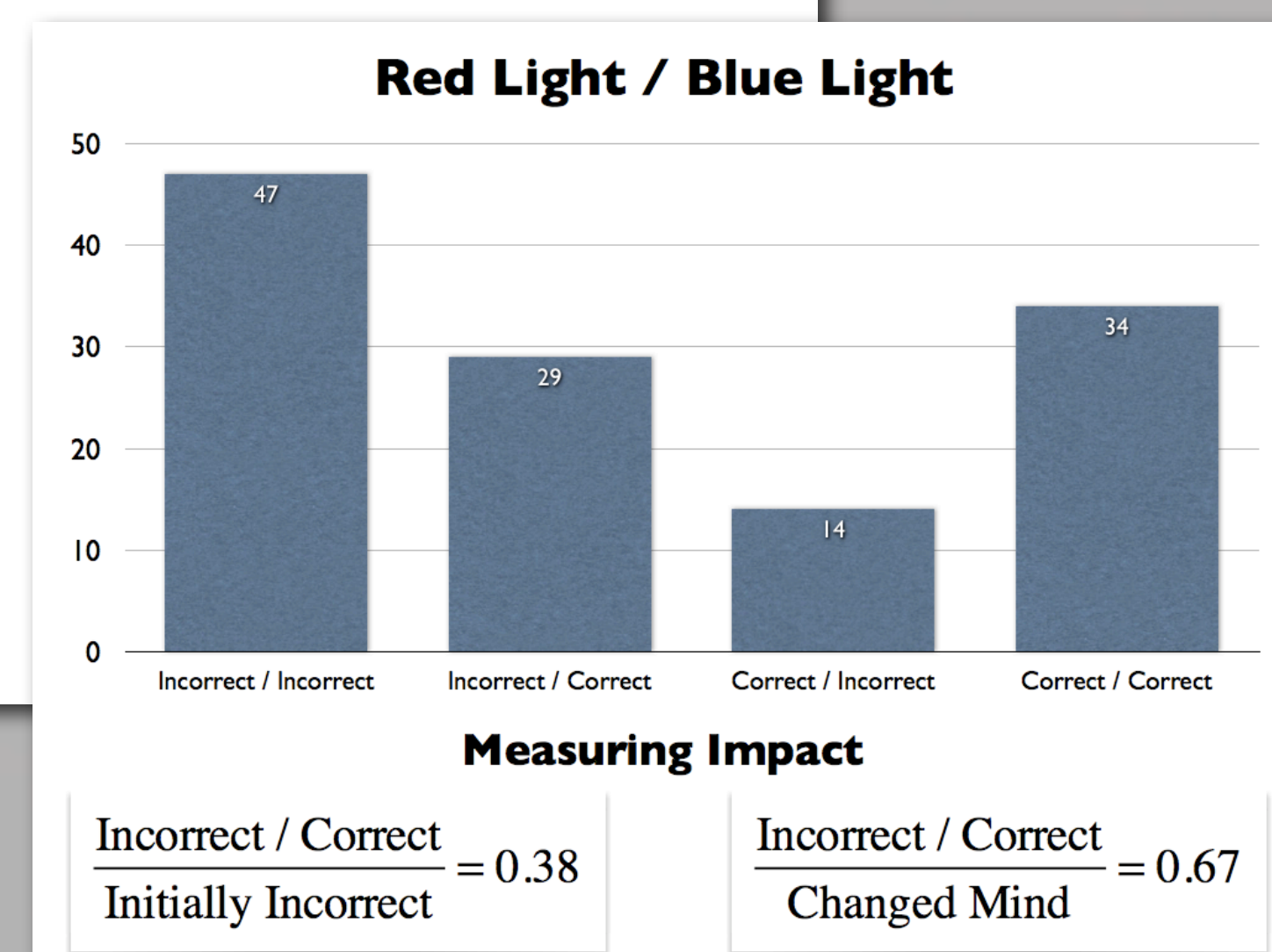
Pump It Up
A bike pump is used to pump air into a bottle. As the pressure goes up, what happens to the temperature of the air?

- The air warms up
- The air stays the same temperature
- The air cools down



Red Light, Blue Light
Light is composed of bundles of energy we call *photons*. Which type of light has photons of higher energy?

- Red light
- Blue light



Brian Jones
Sheila Ferguson
Nisse Lee
Christine Aguilar

*Little Shop of Physics
Department of Physics
Colorado State University*

Michael Lacy

*Department of Sociology
Colorado State University*

Teaching Teachers

We have good data to show increased understanding and confidence among teachers in our one-week summer class. But we also have compelling data to show that we can increase understanding of complex concepts in a shorter evening session.

Our workshops showcase effective pedagogy in addition to content.

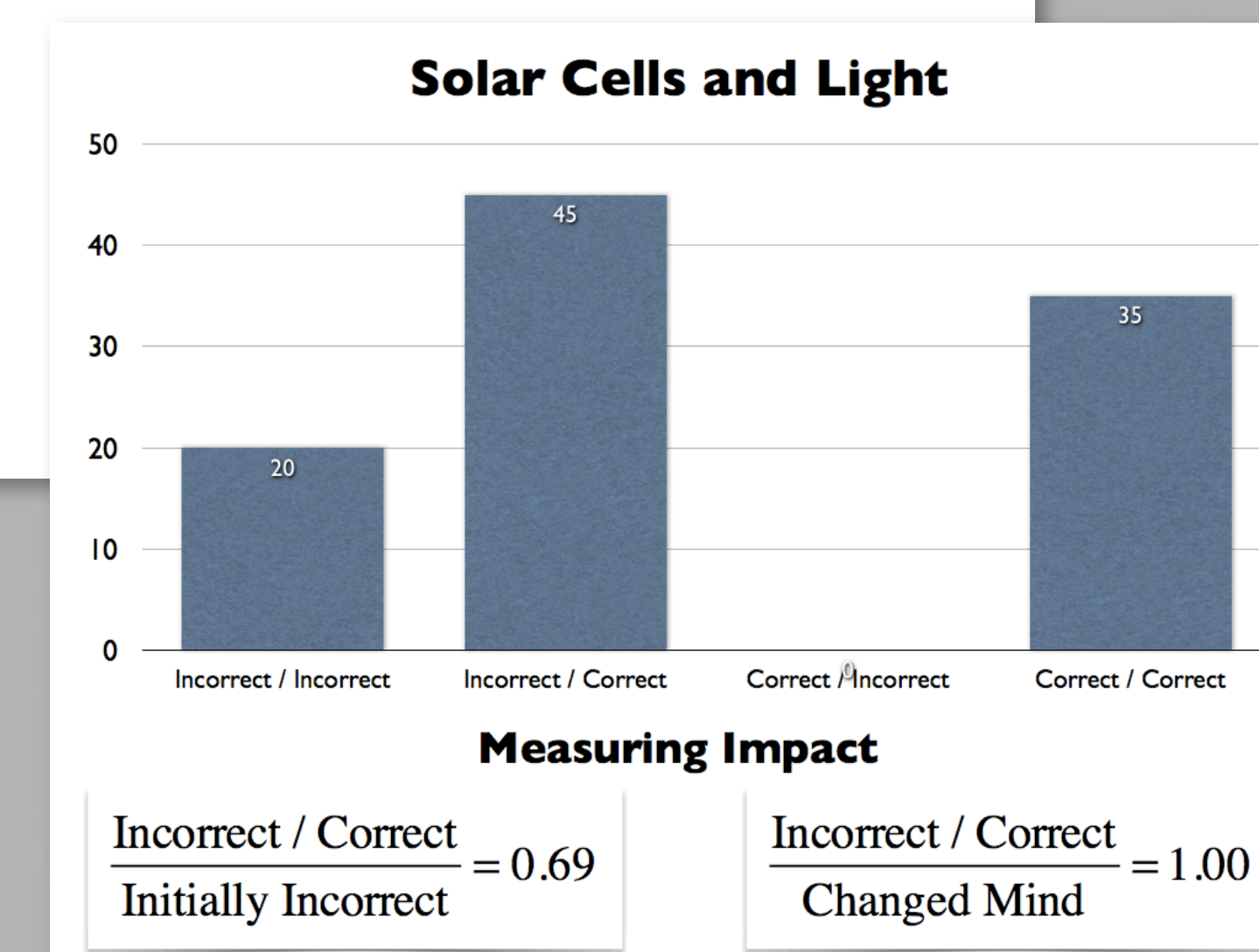
Our data show that instruction is most effective when concepts are presented a few times in a mix of styles including hands-on, open-ended exploration, guided inquiry, discussion and lecture. Our workshops always involve such a mix.

We provide teachers with knowledge but also with the tools they need to effectively teach their students.



Different types of LED flashlights require different voltages to operate. Which color flashlight will require the highest voltage?

- Red
- Green
- Blue



Experiences: Getting Involved

Getting Involved

The best way to learn something is to teach it to someone else.

If you'd like to get involved with the programs of the Little Shop of Physics, now's your chance!

Here is an overview of the activities for 2009-2010 for which we could use your help.

Be a science e-mentor for students in South Carolina

Inspire students at a Women in Science conference

Encourage local students to study science on Math, Science, & Technology Day

Share the joy of hands-on experiments and activities with the Fort Collins community at the 19th Annual LSOP Open House



Work with students at Timberview Middle School and/or present an hour long atmospheric workshop for teachers in Colorado Springs

Intrigue attendees of the Colorado Global Climate Conference with LSOP atmospheric experiments

Help high school science students discover connections between LSOP experiments and concepts they've studied in school

Dazzle and discuss LSOP experiments at Super Science Saturday in Boulder