

## Students' Beliefs about Professional and School Science

Kelli A. Millwood, William A. Sandoval, Jeffery Bockert, Kathy Griffis,  
 Sara Terheggen, Joe Wise, Christine L. Borgman  
 CENS Education: [www.cens.ucla.edu/Education/index.html](http://www.cens.ucla.edu/Education/index.html)

### Introduction

#### Previous Research

- Closed-ended questionnaires have been used to assess students' beliefs about the nature of professional science
- Consistent finding that students have naïve views about the nature of science
- Prior studies have not assessed students' beliefs about school science
- It is often assumed that students' beliefs in one context (professional science) are consistent and coherent with another context (school), this may not be the case

#### Students' Beliefs about Professional Science

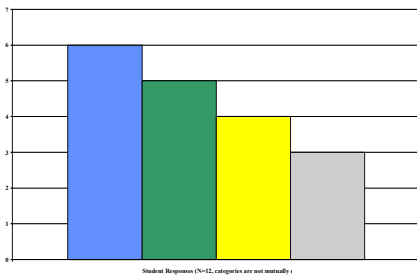
- **The purpose of experimentation**
  - To gain flawless knowledge which will provide the correct answer to a question
  - To gain evidence, which then becomes a theory
- **The status of scientific knowledge**
  - Scientific knowledge changes because right ideas replace wrong ideas
  - Theories as a whole do not change

### Methods

- 12 tenth grade students (5 female, 6 male) from one science class in an urban school
- Students' beliefs about professional science were measured with an open-ended questionnaire prior to an inquiry unit on protein synthesis
- Students' beliefs about school science were measured with a group interview, conducted after the inquiry unit
- Measurements were coded and analyzed for themes relevant to students' beliefs about the purpose of an experimentation and status of scientific knowledge

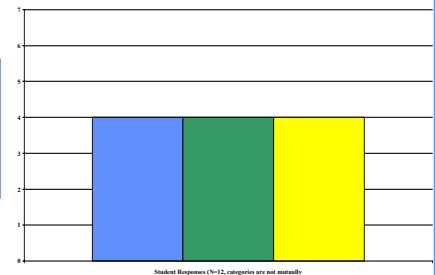
### Results and Discussion

Professional Science- Purpose of Experi  
(Fig.1)

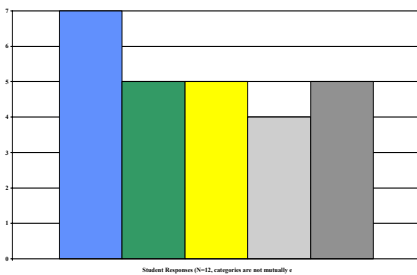


- Students see professional scientists as experimenting to get answers or understanding (Figure 1)
- Students see school science as getting right answers, and working with materials or following directions (Figure 2)
- Responses are short, vague, and ambiguous.

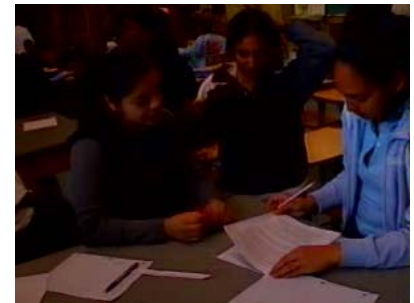
School Science- Purpose of Experi  
(Fig. 2)



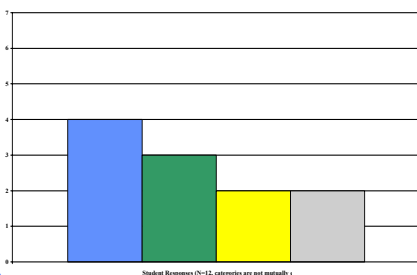
Similarity to Scientists' W  
(Fig. 3)



- Students saw their work as like scientists' work.
- Students' reasons for the likeness similar to ideas about professional experimentation: putting things together or figuring something out (Figure 3).
- Brevity and vagueness of students' responses suggest limited knowledge of what scientists actually do.



Professional Science- Sources of C  
(Fig. 4)



- All students agreed that professional and student scientific knowledge can change, but their reasons for the source of change are inconsistent between the two contexts.
- Students claimed professional science knowledge changes in general ways, through addition, replacement, or vague change in knowledge (Figure 4).
- Students claimed their school science knowledge could change due to specific changes in experimental materials or procedures (Figure 5).
  - In this case, such specific changes would not, in fact, have changed the broad outcome.

School Science- Sources of Ch  
(Fig. 5)

