

What experiences influence the teaching beliefs of future geoscience professors?

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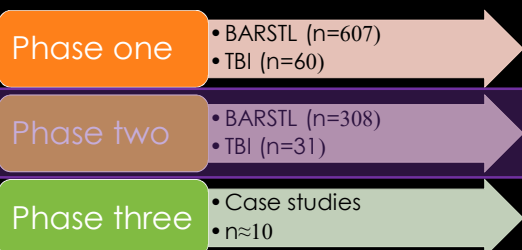


OBJECTIVE

- Determine what factors are most influential in shaping the teaching beliefs of graduate students and post-docs.
- BARSTL (Beliefs about Reformed Science Teaching and Learning¹)
- TBI (Teacher Belief Interview²)

¹Sampson, Enderle, & Grooms, 2013
²Luft & Roehrig, 2007

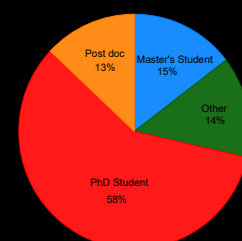
RESEARCH DESIGN



3

STUDY POPULATION

- n=308
- 58% female
- 32% of participants' academic status changed



Academic program

BARSTL: BELIEFS ABOUT REFORMED SCIENCE TEACHING AND LEARNING SURVEY

- 32-item Likert-type questionnaire; participants select their degree of agreement with the statements

During a lesson, students need to be given opportunities to test, debate and challenge ideas with their peers.

1: Strongly Disagree 2: Disagree 3: Agree 4: Strongly Agree

- Possible scores: 32 - 128 points, with higher scores reflecting reformed, student-centered beliefs

Sampson et al., 2013

BARSTL: BELIEFS ABOUT REFORMED SCIENCE TEACHING AND LEARNING SURVEY

- 32-item Likert-type questionnaire; participants select their degree of agreement with the statements

Sub-categories:

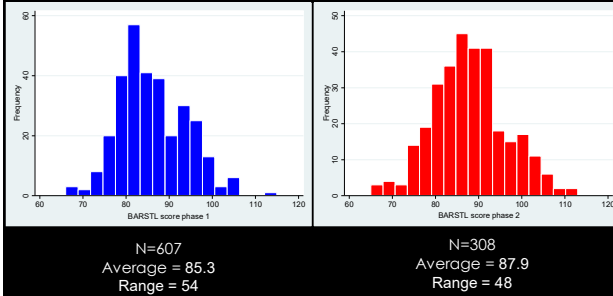
- 1) How people learn about science
- 2) Lesson design & implementation
- 3) Characteristics of teachers & the learning environment
- 4) The nature of the science curriculum

- Possible scores: 32 - 128 points, with higher scores reflecting reformed, student-centered beliefs

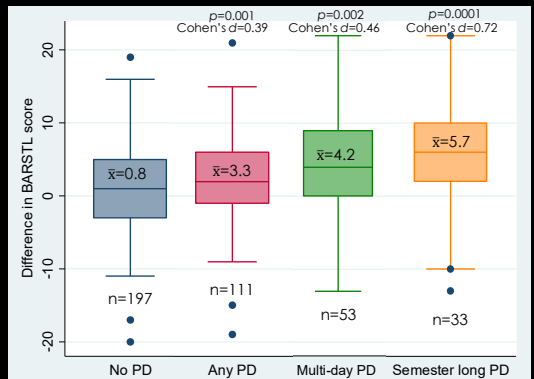
Sampson et al., 2013

BARSTL PHASE ONE VS TWO

$p < 0.001$
Cohen's $d = 0.21$



PARTICIPATION IN PROFESSIONAL DEVELOPMENT



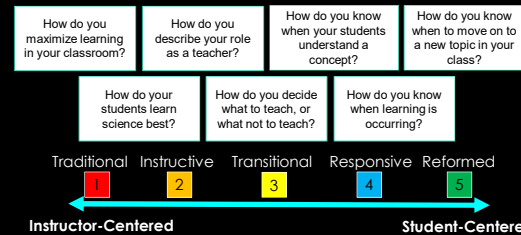
NON-SIGNIFICANT VARIABLES: BARSTL

- Gender
- TA experience
- Lecturer experience
- Race
- Ethnicity
- Citizenship



TBI (TEACHER BELIEF INTERVIEW)

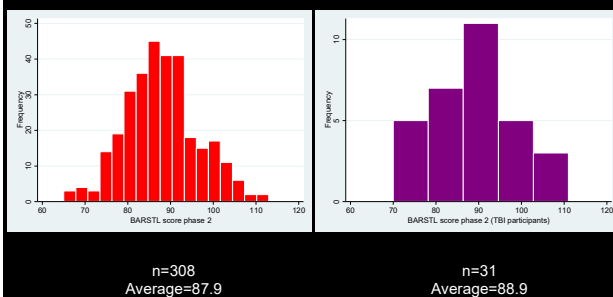
- Semi-structured interview consisting of seven questions
- Questions target different aspects of pedagogy



Possible scores range from 7 to 35, with high scores representing reformed pedagogical beliefs

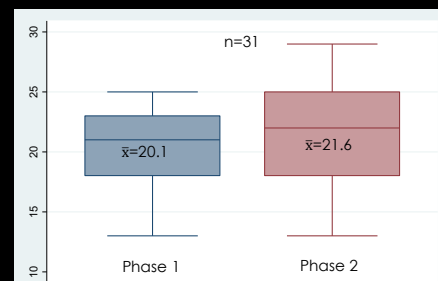
Luft & Roehrig, 2007

TBI POPULATION



TBI PHASE ONE VS TWO

$p=0.002$
Cohen's $d=0.45$



EXAMPLE

How do you know when your students understand a concept in class?

Ideally, when they can explain it back to you or explain it back to somebody else in their own words.

That's what we did in tutoring a lot – that was if someone, especially in group tutoring if somebody answered a question, and other people were just sitting there.

We'd always have them go around and each explain in their own words before we'd move on to the next topic.



Instructive

In later classes, if someone brings up a topic again or maybe emails you later to ask about it, I would say that that would show they understood.

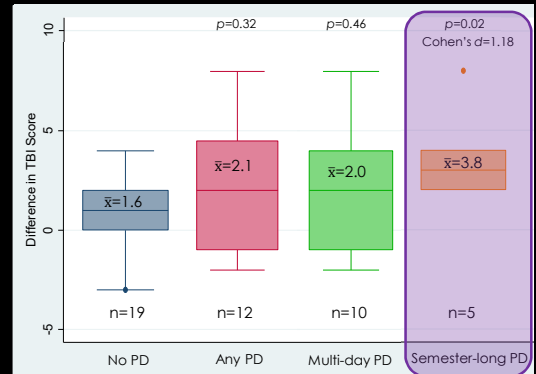
And of course, on tests and stuff, if they perform well, then I would take that as a measure of their understanding as well.

Asking a specific question like, "Okay, if relative humidity increases as air rises, then that would mean it decreases when it sinks," they're kind of like twisting the question around and furthering their understanding of the concept, that kind of thing.



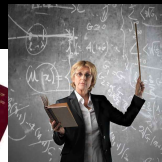
Responsive

PARTICIPATION IN PROFESSIONAL DEVELOPMENT



NON-SIGNIFICANT VARIABLES: TBI

- Any PD
- Gender
- TA experience
- Lecturer experience
- Race
- Citizenship
- Plans for a future academic career



K KEEP
E EDUCATING
Y YOURSELF



CONCLUSIONS

- Participation in professional development related to teaching is the experience most likely to result in a shift toward more student-centered teaching beliefs.
- Teaching beliefs can be altered in as little as one semester.
- Longer experiences are most likely to impact beliefs. Experiences resulting in a large shift toward more student-centered teaching beliefs include:
 - Discipline based education graduate course
 - Science discovery center course on explaining scientific concepts to a non-science audience
 - Course on teaching Earth science and incorporating Next Generation Science Standards
 - Course on teaching a diverse student body in STEM

WHAT'S NEXT?

- Phase 3: Case studies
 - Detailed interviews with ~10 participants
 - Questions will cover many topics including teaching motivation, advising, teaching support, teaching opportunities, challenges, knowledge of DBER and many more.



QUESTIONS?