Evaluating the teaching beliefs and practices of geoscience faculty

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Beliefs and practice are critical components of an instructor’s professional growth.

A baseline measure of beliefs & practices benefits professional development.

Adopted from Clarke & Hollingsworth (2002)
Study Populations

• Population One:
  • Faculty who attended a teaching workshop at the Earth Educators’ Rendezvous (n = 32)

• Population Two:
  • Faculty adopting materials created for the InTeGrate project (n = 8)
Evaluating Teaching Practices

• Variety of observation protocols
  • Reformed Teaching Observation Protocol (RTOP)¹
  • Classroom Observation Protocol for Undergraduate STEM (COPUS)²

• Self-report survey
  • Teaching Practices Inventory (TPI)³

¹ Sawada & Piburn 2002, ² Smith et al. 2013, ³ Wieman & Gilbert 2014
Teaching Practices Inventory

Surveys a wide range of practices across eight categories

I. Course information provided to students via hard copy or course webpage. (check all that occurred in your course)

- List of topics to be covered
- List of topic-specific competencies (skills, expertise, ...) students should achieve (what students should be able to do)
- List of competencies that are not topic related (critical thinking, problem solving, ...)
- Affective goals – changing students’ attitudes and beliefs (interest, motivation, relevance, beliefs about their competencies, how to master the material)
- Other (please specify)

If you selected other, please specify ____________________________

B. Personal Response System (PRS)

If a student response system is used to collect responses from all students IN REAL TIME IN CLASS, what method is used? (check all that occurred in your course)

- electronic (“clickers”) with student identifier
- electronic anonymous
- colored cards
- raising hands
- written student responses that are collected and reviewed in real time
- Other (please specify)

If you selected other, please specify ____________________________

Discussed how to teach the course with colleague(s)

- 1 Never
- 2
- 3
- 4
- 5 Very Frequently

Number of PRS questions posed followed by student-student discussion per class ____

Number of times PRS used as quiz device (counts for marks and no student discussion) per class ____

10-15 minutes to complete
Teaching Practices Inventory

Scoring rubric provides an “Extent of use of research-based Teaching Practices” (ETP) score from 0-67

Categories Include:

1. Course information provided to students (6 points)
2. Supporting materials provided to students (7 points)
3. In-class features and activities (15 points)
4. Assignments (6 points)
5. Feedback and testing (13 points)
6. Other (10 points)
7. Training and guidance of teaching assistants (6 points)
8. Collaboration and sharing in teaching (4 points)
TPI Results

• Population One: $n=32$, $\mu = 35.3$

• Population Two: $n=7$, $\bar{y} = 36.3$

Original TPI Study

One Department @ UBC
$n=28$, $\mu = 33.4$

Five STEM Departments @ UBC
$n=179$, $\mu = 30.5$

1 Wieman & Gilbert 2014
ETP Results Analysis

• What differentiates instructors who score a 45 vs. 25 on the TPI?

• Instructors scoring a 45 report:
  • Less time lecturing
  • More group discussions
  • Student predictions before demo or video
  • Use of clickers with student discussion
  • Explicit group assignments
  • Feedback on assignments before grading
Evaluating Teaching Beliefs

Variety of self-report survey instruments

- Beliefs About Reformed Science Teaching & Learning (BARSTL)
  
  How People Learn About Science
  
  Beliefs About Reformed Science Teaching & Learning (BARSTL)

  Science Teaching Efficacy Belief Instrument (STEBI)

- Approaches to Teaching Inventory (ATI)

- Interview protocol
  
  - Teacher Beliefs Interview (TBI)

Teacher Beliefs Interview

Seven question semi-structured interview

Example: How do you decide what to teach and what not to teach?

Transcription and Coding:
1. Traditional
2. Instructive
3. Transitional
4. Responsive
5. Reform-based

“...based on my experience and familiarity with the subject matter....”

“...I teach things that I think are going to be of value to the student...what the students are interested in.”

“...I let the student guide, at least to some degree...I’ll provide a survey...”

TBI Score from 7-35

Total score of 7 = Traditional, 14 = Instructive, 21 = transitional, etc.
TBI Results

- Population One: Attended a teaching workshop (n=18)
- Population Two: Adopting materials created for InTeGrate (n=8)
- Population Three: Faculty who developed InTeGrate materials (n=21)
TBI & ETP Score

Is there any relationship between TBI and ETP scores?

R² = 0.0011

TBI and ETP Scores (n=24)
Conclusions & Future Work

• The TPI & TBI are useful for gathering initial teaching beliefs and practices data

• Further data collected as part of a longitudinal study will help us refine these relationships

• We hope to collect ETP and TBI data from a larger sample of geoscience faculty

• Questions?

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