The Challenges of Assessing Teaching Effectiveness: Strategies for PER to Influence Practice

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Abstract

An ongoing concern within the PER community is how to promote the use of PER-based instructional strategies by non-PER college faculty. Three current trends suggest that PER has an opportunity to influence teaching practice by focusing more attention on assessment: 1) our research and that of others has found that neither faculty nor their institutions are satisfied with the way teaching is assessed; 2) the lack of ability to assess teaching effectiveness has been cited as a barrier to faculty use of research-based instructional strategies; and 3) current trends in higher education are encouraging institutions to pay more attention to assessing student learning outcomes. This talk will describe what PER currently knows about the assessment of student learning, some assessment trends outside of PER, and potentially productive ways for PER to influence the discussion about assessment.
Why is Assessment of Teaching Effectiveness Important?

Instructors
- Reflect and Improve
- Document teaching effectiveness (e.g., for tenure and promotion)

Institutions
- Provide feedback to faculty to help them improve
- Make personnel decisions (e.g., tenure and promotion)

Teaching Improvement
Quality Assurance
Ideally: Assessment Activities are Aligned and Consistent with Educational Research
What Assessment Sources are Currently Used? (Faculty perceptions inferred from interviews, N=30)

- Informal Postcourse Feedback
- Informal Formative Assessment
- Systematic Formative Assessment
- Exams & HW Performance
- Research-based Assessments
- Teaching Portfolios
- Peer Observations
- Student Evaluations of Teaching

% of Faculty Reporting the Use of this Source

Used by Institutions
Used by Faculty
Is Assessment of Teaching Effective?  
(Faculty perceptions inferred from interviews, N=30)
The Actual Situation

Institutions

Instructors

PER
Summary of Current Situation

1. Faculty and institutions have the same reasons for assessing teaching.
2. Faculty and institutions use almost non-overlapping methods to assess teaching.
3. Faculty do not believe that the methods used by institutions (largely student evaluations) are valid.
4. Neither faculty nor institutions make much use of research-based measures of student learning (e.g., existing conceptual inventories).
Why should PER care (Part 1)?
→ We Want Faculty to use PER Ideas

- Currently many faculty do not make changes that they believe in because they are afraid of decreased student ratings.
  - They are frustrated that institutions do not value measures of teaching effectiveness beyond student evaluations.
- Valid and accepted (by all stakeholders) measures of teaching effectiveness are necessary for widespread and sustainable change in teaching practices.
What can PER do?

- **Multiple Assessment Methods**
  - Emphasize to institutions and faculty that it is important to use multiple assessment methods.

- **Publicize Existing Research-Based Assessments**
  - Make it easier for faculty and institutions to learn about existing research-based assessments and how to interpret results

- **Develop New Research-Based Assessments**
  - for desired outcomes beyond conceptual understanding

- **Work with Professional Societies (AAPT, APS)**
  - These organizations are respected by faculty and institutions and also have the necessary communication structures
Why should PER care (Part 2)?

→ The Assessment Movement in Higher Education is Taking Off Without PER

- Discipline-specific assessment is coming
  - often in the form of program-level learning outcomes
- Goal is transparency and public accountability.
  - Strained budgets → increased pressure on institutions and disciplines to demonstrate their value
  - Regional accreditation is beginning to look at specific disciplines (inspired by the Bologna ‘tuning’ process in Europe)
- Good: Emphasis on learning outcomes
- Bad: Assessment tools and metrics are only loosely (if at all) based on theories of learning
Evidence of the assessment movement

Texas cuts “low-producing” physics programs

A coalition of affected institutions is preparing a proposal that could allow them to continue recruiting students and teaching advanced courses.

Despite petitions from university administrators, the Texas Higher Education Coordinating Board at a 27 October hearing denied last-ditch appeals from four schools to save their undergraduate physics programs. Ten other physics departments were among the many academic programs that failed the state requirement to graduate an average of at least five students per year and are slated to be closed or restructured: Five, including a master’s reinstatement for at least 10 years; the schools will still offer introductory physics courses to other depart and majors that need them.

In all, 545 academic programs Texas colleges and universities warned early this year that they underperforming and given an opportunity to prove they weren’t. About of them were given two years to show that they could boost their enrollment and matriculation numbers. The research going to but critics say programs runs out. Closing the Gap: large physics programs

From Physics Today, December 2011, p. 31
Panel Debates How to Measure Quality in Teacher Training

“During two days of debate, panelists here have grappled with how to define and measure "quality" in teacher preparation, and how to identify programs that are falling short. They've debated the degree to which programs should be judged based on the achievement of their graduates' future students, and suggested other ways of evaluating programs, such as surveys of principals and job-placement rates.”

PER Does not Frequently Study Program Level

- Was this lesson successful?
- Was this course successful?
- Was this program successful?

Does my Tutorial help students understand circuit diagrams?*

Does Peer Instruction improve FCI gains?**


Program Level Assessment has come to Physics, but without PER

Tuning physics in the US

Taking a page from the education reforms in Europe, groups around the world have been exploring tuning as a tool for making university programs more relevant and transparent. In the US, physics was one of two fields Utah began tuning last year.

Utah’s nine publicly funded colleges and universities took part in a tuning pilot project that included schools in Minnesota and Indiana. With $150,000 apiece from the Lumina Foundation for Education, each participating state picked two or three fields to tune; the exercise is part of the nonprofit, Indiana-based foundation’s goal of upping the percentage of people who earn a college degree from around 40% nationally.

Says Lumina program director John Vorhies, “The goal of higher education is to educate students to be lifelong learners who can succeed in a globally competitive environment. This means students must learn the competencies of their field and develop the skills to keep them up to date.”

“Even with a relatively high attrition, there are significant variations in how outcomes are achieved,” says Megan Stringfellow, the Utah System of Higher Education’s senior vice president for academic affairs, who led the state’s physics tuning panel. The UT-Chemistry student representative, Jeff Hodges, who is in his first year of PhD work at the University of Utah, says, “It shocks me to be in graduate school with people who do not have any [upper-division] E&M under their belt.” In the tuning process, he says, “we focused on defining degree programs. How do you tell a teacher what a student needs to know, without telling them how to teach? We came up with skill sets.”

Guided by input from students, alumni, faculty, and private-sector employers, the academic panel developed a list of dozens of skills. For starters, the list says a physics bachelor should have an understanding of the role of evidence, of cause and effect, of experiment, of scientific ethics, of science as a community effort. A bachelor should have estimation skills, understand simple models, practice laboratory safety, be able to carry out error analysis, and be able to present an informal talk on a lab experiment or class project.

“It is realistic to think we can accomplish a certain level by a certain date,” says Stringfellow. “We are not saying what the competencies are, or those competencies. We are saying, ‘This is a different set of students, a different set of outcomes, they have their own take on the definition of transparency, how they approach it.”

Lumina Foundation funds ‘tuning’ project in Utah focused on physics.

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What can PER do?

• By not focusing on the program level PER
  ◦ misses an important opportunity to influence practice
  ◦ remains unable to address important research questions related to learning progressions

• PER can
  ◦ Partner with Assessment Efforts
    • work with institutions, accrediting agencies, and faculty to match data collection efforts with current research on teaching and learning (i.e., assessment supports research and research supports assessment)
  ◦ Develop assessments and benchmarks for more topics
    • e.g., problem solving, critical/scientific thinking
  ◦ Develop tools for describing and monitoring learning progressions throughout an academic program
Summary

It is important for PER to:

- Help educate faculty and institutions about better ways to measure course-level teaching effectiveness:
  - Research-based measures
  - Multiple measures
- Work with institutions and accreditors to develop productive measures of program-level teaching effectiveness.
Thank You