Assessment Planning for Research-Based Educational Programs

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Why assessment in higher education?

- To send your child off to a $40,000-a-year school, you just get 'the feeling.' Asked whether Mary's college is getting the job done, Mary's mother responded: "The truth of the matter is, I think it's good – but I have no way of knowing that – that's my point. She seems happy. For this kind of money, she ought to be."
- Toppo, 2006, as cited in Dwyer, Millett, and Payne (2006)

Assessment

- Assessment is a systematic process, linked to student learning outcomes, and producing evidence of programmatic effectiveness.
- Though potentially controversial, connecting programmatic assessment with student learning outcomes has obtained significant acceptance in assessment practices. (Dr. Courtney Bell, personal communication, NSF Discovery Research K12 PI Meeting, November 10, 2009, Washington, DC).

Assessment in Higher Education

- Traditional format:
  1. Admissions data, student grades
  2. Graduation rates; years to complete
- *Today, assessment attempts to answer the question: What happens between admissions and graduation?*
  1. Formative
  2. Summative

Assessment in Higher Education

- According to the Educational Testing Service (Dwyer, Millett, & Payne; 2006, p. 1), higher education efficacy is measurable through attainment of four goals:
  1. Preparation for the world of work;
  2. Content knowledge and skills;
  3. Dispositions; "soft skills such as teamwork, communication, creativity;"
  4. "Student engagement with learning."

Assessment Process

- Vision, mission and programatic objectives
- Student learning outcomes
  - Rubrics
- Informs current program efficacy
- Informs future program decision-making
- Easier said than done
- **Up to each program to define**

Our example: The National Science Foundation's Engineering Research Center for Revolutionizing Metallic Biomaterials Education and Outreach Program

- Vision: The vision of the NSF-ERC for Revolutionizing Metallic Biomaterials Education and Outreach is to train future engineers for industry, research and development in a multidisciplinary environment that values diversity of thinking, innovation, and entrepreneurship.

Research Question

- ***Is the NSF ERC for Revolutionizing Metallic Biomaterials (ERC-RMB) Education and Outreach Program effective in advancing its vision and obtaining its stated student learning outcomes?***

Student Learning Outcomes (REU/RET)

1. Understand bioengineering, diversity of thinking, innovation, entrepreneurship, their relationship with individual academic/career goals, and their scientific application to societal problems
2. Can identify way these concepts and ERC-RMB intensive research experiences ***apply*** to individual academic/career goals and to societal problems
3. Can identify personal learning goals and self-assess changes in learning over time.

Assessment Plan Design

- Vision, mission statement, program objectives
- Mixed-methods

1. Entrance/exit interviews
   - Goal attainment scaling
2. Teaching modules
3. Post REU/RET perceptions survey

Institutional Review Board

- Assessment requires data collection
- The more organic the collection, the closer to the human subject you draw.
- Therefore the need for IRB approval.

Assessment Plan Implementation

- Informed Consent
- Entrance/Exit Individual Interviews

Demographic Data

- 7 REUs; mean age 21.5; 5 males, 2 females; 4 AA, 2 Caucasian, 1 Asian; western, northern, and southeastern regions of the US; 6 US citizens, 1 permanent residency
- 5 RETs; permanently licensed in NC; mean age 39; 3 males, 2 females; 3 Caucasian, 1 AA, 1 Asian; southeastern US; US citizens

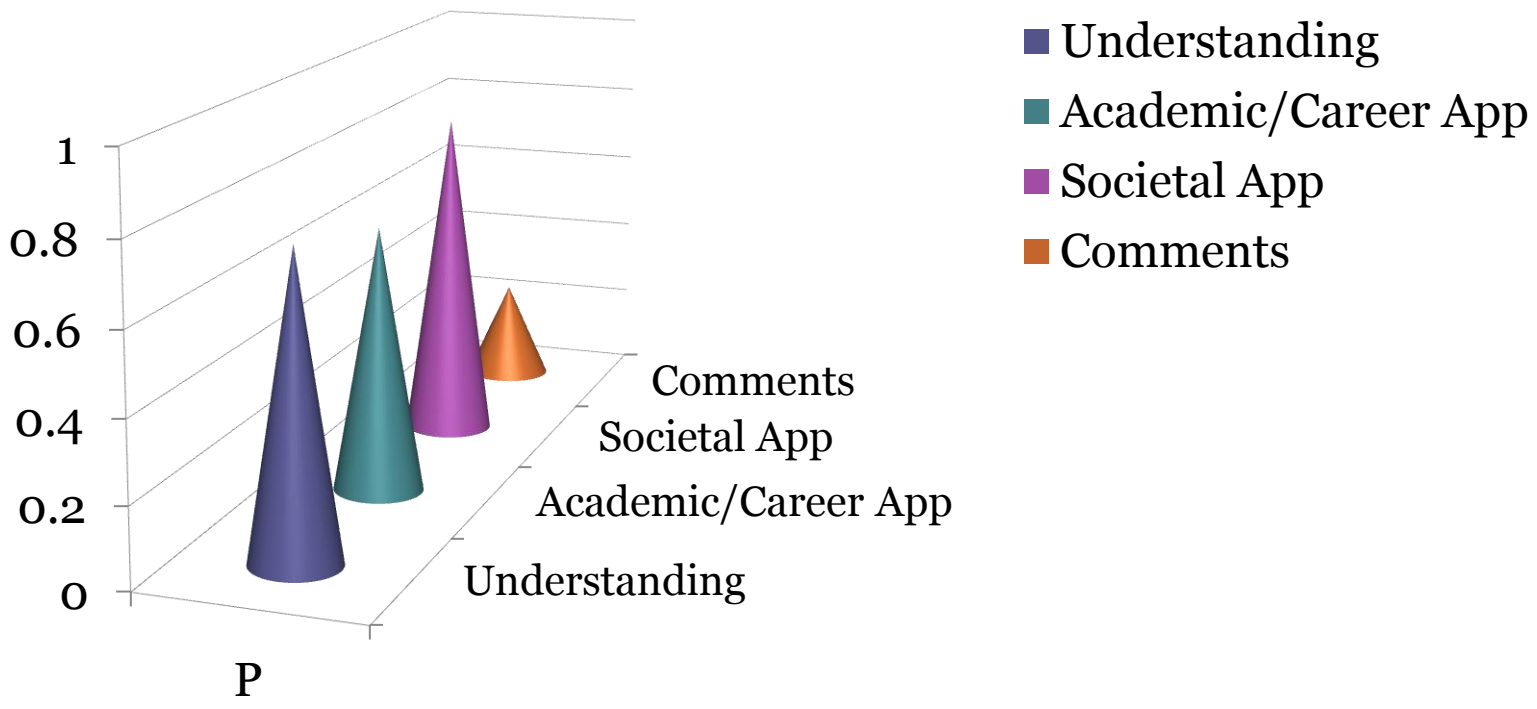
Entrance/Exit Interview Data

- 7 REUs and 5 RETs participated in entrance interviews; 5 REUs and 4 RETs participated in exit interviews.
- Descriptive data reviewed for keywords, themes and factors
- Percentages computed

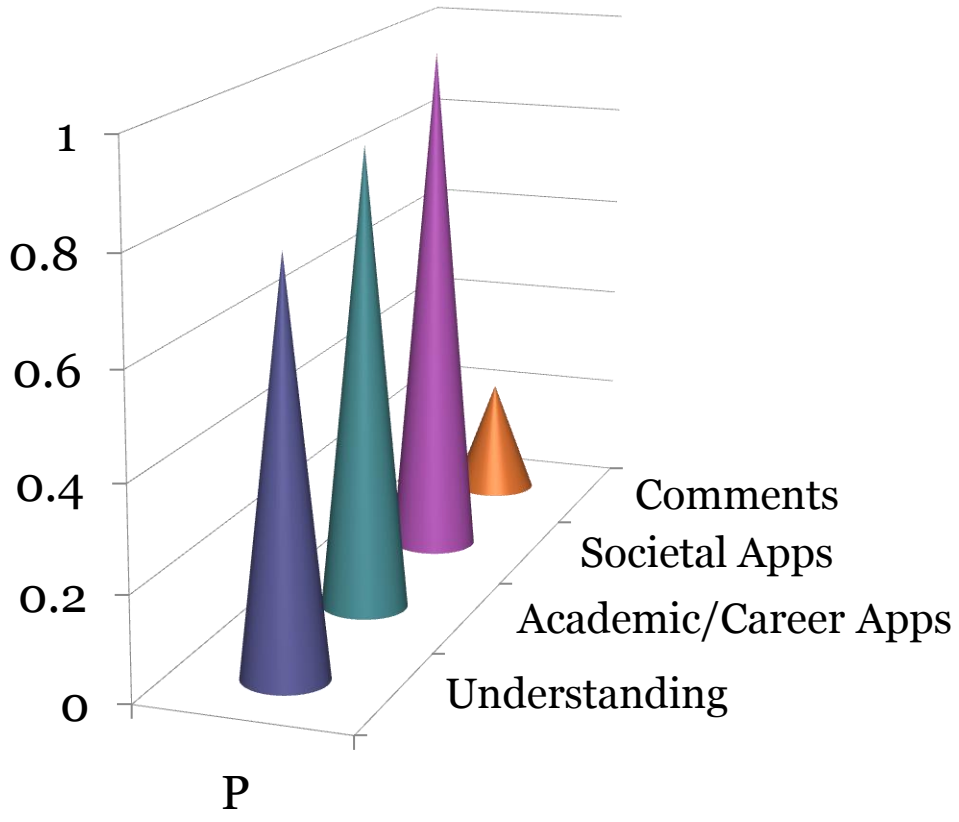
Ex: Bioengineering

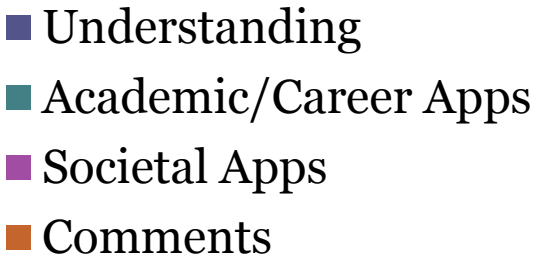
- Q1: Define bioengineering
  - Keywords: biology, engineering, combining, joining, biologic sciences
- Q2: Apply bioengineering to academic/career goals
  - Classroom instruction, curriculum, teaching, students, major, nanotechnology, graduate studies
- Q3: Apply bioengineering to societal needs
  - Specific medical applications
- Q4: Additional comments

REU/RET Bioengineering Entrance Data (*n = 12*)



REU/RET Bioengineering Exit Data (*n* = 9)





Analysis and Interpretation

- Understanding slightly increased (2%); strong beginning
- 22% increase in ability to apply bioengineering to academic/career goals
- Ability to apply bioengineering to societal problems increased from 83% to 100%

Additional Assessment Planning Hints

- Clear vision and mission
- Concrete program objectives
  - Standards
- Student learning outcomes
  - Standards
  - Faculty/expert opinion
  - Advisory component
- Mixed methods
  - Quantitative and qualitative components
- Careful reporting