Developing a Non-Threatening System of Peer Review of Teaching in Biology Departments

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Concerns in the Biology Department

- Fewer than half of students who start in the major graduate in the major

- Students are leaving biology majors because of dissatisfaction with *instruction* and the *curriculum*

- Students from groups traditionally underrepresented in STEM are disproportionately affected

AAAS 1990; NSF 1996, Seymour and Hewitt 1997; Henderson, Beach, and Finkelstein 2008, 2011; President’s Council of Advisors on Science and Technology 2012
National Reports and Recommendations

- *Bio2010* (2003): Active learning and interdisciplinary curricula
- *SFFP* (2009): Integrative competencies through courses
- *PCAST* (2011): Focus on first two years of undergraduate STEM education
Core competencies from AAAS: Vision & Change (2011)

1. Ability to apply the process of science
2. Ability to use quantitative reasoning
3. Ability to use modeling and simulation
4. Ability to tap into the interdisciplinary nature of science
5. Ability to communicate and collaborate with other disciplines
6. Ability to understand the relationship between science and society
Planning a Retreat

• Formation of a peer review committee
  – Composed of 4 faculty members, the department chair, and the TLC director
  – Met in the weeks leading up to the retreat

• Information gathering: What does peer review of teaching look like at other institutions?

• Creation of an annotated bibliography (pre-workshop reading)
Retreat Schedule (9:00-12:30)

• Welcome: Introductions, Process, Outline, Expectations
• What are the goals of peer review?
• What are the hallmarks of effective teaching?
• How can effective teaching be measured?
• What is a rubric and how is it helpful for reviewing?
• How should it be done?
  – Who should do the reviewing?
  – How often should each person (or each course) be reviewed?
  – If $5000/year was available, how best could it be used as incentive for the process?
Rationale for Peer Review Process

Department chair provided an overarching goal:

To create a sustainable system of peer review that would contribute to the improvement of teaching within the department

- In your group discuss goals for developing and implementing peer review process in the department (5 min).

- Report out
Rationale for Peer Review Process

1. Improve teaching effectiveness of individual faculty by providing feedback on teaching

2. Expose reviewers to a range of teaching styles and approaches, and thereby make them more aware of best practices

3. Provide information that can be used to assess and adjust, if necessary, course content for the audience or curriculum

4. Find Role models

5. Provide data for accurate and equitable decisions on tenure, promotion, and merit pay increases (complement student evaluations)
What are the Hallmarks of Effective Teaching?

• Take a few minutes individually to jot down several hallmarks of effective teaching
• Discuss these in your groups and consolidate into the 5-6 important hallmarks
• Report out
• Vote on top 3 – post a sticky dot
• List in order of priority
Hallmarks of Effective Teaching

1. Demonstrate enthusiasm to inspire students
2. Engage students through active learning activities
3. Challenge students
4. Get students to think like scientists
5. Relate course material to everyday life, research, and other courses to make it more relevant to students
6. Make learning outcomes and expectations clear
7. Promote math and quantitative skills
8. Promote reading and writing
9. Revisit core concepts throughout the course and build themes across lectures
10. Provide opportunities for students to practice important skills
11. Inspire students to want to learn more about course material
12. Provide feedback to students throughout the course
How can Effective Teaching be Measured?

• Creating observation protocol (multiple out there, why to create our own)

  – Emphasis on the process
  – Priorities
  – Consensus
  – Ownership
  – Easy to use
Rubrics - Definition

A rubric is an assessment tool for communicating expectations about quality. It provides a set of criteria and standards which are typically linked to objectives that are used to assess performance.
<table>
<thead>
<tr>
<th></th>
<th>Emerging</th>
<th>Developing</th>
<th>Proficient</th>
<th>Advanced</th>
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<tbody>
<tr>
<td><strong>Content</strong></td>
<td>- Information is often inaccurate and/or irrelevant.</td>
<td>- Accurate information without supporting evidence.</td>
<td>- Accurate information is shared using evidence <em>(logical arguments, data, or graphs)</em>.</td>
<td>- Accurate information shared using multiple pieces of evidence <em>(logical arguments, data, or graphs)</em>.</td>
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<td>- Student is unable to accurately answer questions posed by the audience.</td>
<td>- Student is able to accurately answer a few questions posed by the audience.</td>
<td>- Student is able to accurately answer most questions posed by audience.</td>
<td>- Student is able to answer or suggest resources to answer questions.</td>
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<td>- Audience does not know purpose of presentation.</td>
<td>- Some audience members can restate the purpose of the presentation.</td>
<td>- Audience can restate purpose of presentation <em>(ethics)</em>.</td>
<td>- Audience can restate purpose of presentation.</td>
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<tr>
<td><strong>Style</strong></td>
<td>- Audience wonders who is presenting</td>
<td>- Uses some emotion, <em>humor</em>, or suspense</td>
<td>- Engages audience with emotion, <em>humor</em>, or suspense as appropriate to the topic such as videos, comics, pictures, or personal stories <em>(passion)</em>.</td>
<td>- Generates enthusiasm and emotional response.</td>
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<td>- Nothing funny, emotional, or suspenseful</td>
<td>- Uses presentation aids ineffectively</td>
<td>- Uses presentation aids effectively to enhance delivery</td>
<td>- Presentation aides excite and impress audience – riots are possible</td>
</tr>
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<td><strong>Organization</strong></td>
<td>- Little to no sequencing; topic is vague or unclear</td>
<td>- Displays some sequencing of ideas, but lacks elements: introduction, transitions, or conclusion</td>
<td>- Displays and can explain logical sequencing of ideas and information.</td>
<td>- Obtains audience feedback on presentation.</td>
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<td>- No attempt for audience participation</td>
<td>- Audience participation attempts, but lacks appropriate focus</td>
<td>- Includes opportunity for active participation from audience by asking questions, small group discussions, or T-P-S <em>(simulation)</em>.</td>
<td>- Audience participation results in a motivation for movement to action (product, demonstration, questions, etc.).</td>
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### Using Rubrics

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Using Rubrics

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<td>Sets expectations for those being assessed</td>
<td>Can diminish the breadth or depth of evaluation</td>
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<td>Facilitates fair and accurate evaluation</td>
<td>If inappropriately designed, can emphasize things that are easy to measure but aren’t highly valued</td>
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<td>Provides specific feedback (strengths as well as areas for improvement)</td>
<td>If inappropriately used (e.g., for summative rather than formative feedback), can create apprehension</td>
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Creating a Rubric (From Retreat)

• Split into new groups
• Each group assigned 3 hallmarks
• Brainstormed about ways to measure each hallmark
• Reported out the top 3 methods
How can Effective Teaching be Measured? (Handout Report)

1. Enthusiasm and inspire students
   • Look at the proportion of attendance in the class – students won’t go to class if they don’t see value. How many students go late or leave early.
   • How much do students ask questions? What proportion of students are paying attention? The energy level of the instructor – does he/she appear to be enthusiastic and putting energy into the presentation?

2. Students should be challenged
   • Look at assignments, assessments, objectives and expectations, blackboard, exams. Use Bloom’s taxonomy and look for presence of higher level thinking: expecting the questions that students ask to differ depending on the level of the course. Recall vs. synthesis.

3. Promote math/quantitative skills
   • In general, in the rubric – is math present or absent? Are there math equations? Are they expected to infer or predict? (e.g. what kind of math and are students challenged?) Depends on the requirements and the course.
How can Effective Teaching be Measured?

- Presentation
- Instructor-student interaction
- Lecture content
- Lecture organization
- Assessment
- Course content and organization

The rubric – Evaluation of teaching performance

Course review report
Developing a Peer Review Process and Procedures

• Overview of peer review processes at other institutions

• Discussion

  1. Who should conduct the peer reviews?  ALL
  2. How often should each faculty member be reviewed?  YEARLY
  3. How many classroom visits/year should the review entail?  2/2
  4. Should reviewer identity be kept confidential?  NO

• Survey of faculty to vote on options
Post-Retreat

• Planning committee (New group)
  – Review retreat feedback and survey
  – Finalize development of the rubric
  – Develop procedures for implementing peer review

• Pilot

• Validate using student course evaluations

• Revise

• Full implementation
Final Peer Review Process

- Assistant professors and new lecturers reviewed by 2 colleagues each year; others every 3 years
- Reviews conducted within a 2-week period near middle of semester
- Reviewers also examine syllabus and course materials
- Reviewers meet in person with instructor for discussion of feedback
Lessons Learned

- Faculty members need to have ownership over the change process
- Administration needs to provide leadership and support for the change effort
  - Expertise, e.g., consultation/facilitation by science education specialists
  - Recognition
    - Peer review committee members freed of other departmental service obligations
    - Peer review documents posted on departmental website
Lessons Learned

- Pursue both top-down and bottom-up change strategies
- Recognize the centrality of the department
- Involve key departmental personnel
- Acculturate new instructors
- Tailor professional development programming to the population served
- Encourage collaborations
- Change initiatives must be built on a foundation of evidence
Resources

• A Discipline-Based Teaching and Learning Center (Marbach-Ad, Egan, and Thompson 2015)

• Scientific Teaching (Handelsman et al. 2006)

• Strategies to support active and collaborative learning (McGill University)

• The PULSE vision & change rubrics
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