Transforming STEM Teaching and Learning through Department-Embedded Expertise and Community Building
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Goal: Improve Undergraduate (STEM) Education
More specifically,
• Promote faculty adoption of teaching practices that improve learning and eliminate disparities.
• Test a model for change at multiple institutions, to study adaptations, learn from each others' discoveries

A Bay View Alliance Collaboration

Want to know more about work of the BVA? See today's 4:15 session in Independence H/I

Session Plan: The Project from Three Lenses
1. Project PI (Dea):
   Intervention model, strategies, outcomes
2. BVA Senior Scholars/Case Study Researchers (Pat and Mary):
   Department cultures, cross-institutional themes and differences
3. External Evaluator (Peter):
   Context of other multi-institutional change projects

What are some of the challenges in fostering lasting course transformation on your campus? (2 min- talk to neighbor)

Effective and Ineffective Strategies from STEM Improvement Literature

<table>
<thead>
<tr>
<th>Insufficient</th>
<th>More Effective</th>
<th>Barriers</th>
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<tbody>
<tr>
<td>• Providing information, evidence about effective practices</td>
<td>• Reflecting on teaching</td>
<td>• Lack of rewards/value</td>
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<tr>
<td>• Efforts aimed at individual faculty or courses</td>
<td>• Shared vision</td>
<td>• Lack of time</td>
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<td>• Policy change</td>
<td>• Social norms</td>
<td>• Logistics</td>
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Change requires multiple at multiple levels of system, addressing faculty needs
Outcomes
Common measures: Project data, faculty survey of practices and attitudes, classroom observations, syllabus analysis, case studies

Significant course transformation activity in 2 years:
- ~80 courses, 90 faculty members across 6 campuses (not including UBC), most showing improved learning

What kinds of changes are being made?
- Learning outcomes and assessment of student achievement
- Structure, accountability for out of class work
- Identifying learning bottlenecks, assignments to address them
- Class time on group or individual problem solving, cases, writing (workheets, student response systems)

Lessons Learned So Far
- Change takes time (more than we thought)
- Value of “creating occasions”
- Incentives with support and products that prompt reflection
- Department leadership, community, and shared ownership are key to making changes stick
- Co-teaching, shared learning outcomes, team campus visits
- Embedded expert are catalysts for engagement with other related programs (Department density analysis, Bennett and Greenhoot, 2017)
- Usual Suspect + Embedded Expert + Other Programs

What does success look like?
- Course transformation
  Number of courses transformed
  Number and proportion of credit hours
- Faculty change their teaching
  Number who keep it up
  Modify and innovate in other courses
- Classroom experience changes
  Better student performance
  Higher level of engagement
Success is not a one-shot event

- Expectations change
  - Students
  - Colleagues
- Attitudes and understandings change
  - How students learn and what learning is most important
  - Thinking beyond “my course” to “our program”
- Departmental cultures change
  - Support efforts to keep things fresh and up to date
  - Building community around teaching and learning

Challenges

- No existing structures for regular conversation about T&L
- Relevant people/units spread out across campus
- Changes in leadership
- Teaching as a private enterprise
- Substantive disagreements about what to do
- Time and velocity
- A bad match with the culture

UBC Geosciences: Co-Teaching

- New faculty teach a course with someone whose course (and teaching) have already been transformed
- Local study of the model shows significant benefits
- Department head: Costly, but not to do it “would be irrational”
- An investment in teaching start-up, parallel to the research start up package

Kansas Biology Program

Talking about Courses

- Case study interviews brought together groups of instructors teaching the same course
- An appetite for conversation: For one group, the second time in memory they sat down and talked
- Now regular facilitated conversations re course goals, text book, assessment....
- Connecting to larger conversations:
  - Other biology course teams
  - Department meetings
  - C-21 and TRESTLE meetings

Outcomes

- Structures for collaboration
- “An infrastructure of support”
- Coordinated decision making
- Robust conversation about T&L
- Building critical mass
- Extending and strengthening networks
Break for burning questions:
What should we go ahead and address now?

Some Challenges of Multi-Institutional Projects
- Keeping Track of Things (There are a Lot of Them!)
- Independent Projects with Own Agendas and Different Start Times
- Need for Frequent Contact and Updates (Role of Bi-Weekly Project Directors Telephone Meetings)
- Some of This Should be Face-to-Face (Role of Annual Meeting)
- Role of NCHEMS Surveys to Surface Issues
- All of This Amplified by Research University Settings

What Makes Change Hard?
Many of the Features that Enable Success for a “Project” are Obstacles When it Comes to Institutionalization:
- Distinctive Language and Culture
- Separate Lines of Authority (and Administrative Backing)
- Separate or Dedicated Funding

Some Lessons for Success
- Establish and Enforce Mutual Expectations (Both Formal and Informal)
- Create Substantive Products (Workshops, Writings, Webinars) as Soon as Possible
- Showcase Participants (Other than Project Directors) through Public Presentations and Face-to-Face Meetings
- Pay Attention to Administrative Details (the “Little Things”)

How are you/your campuses addressing the challenges of creating scalable change?

Learn more about TRESTLE:
www.trestlenetwork.org
Learn more about the BVA:
www.baysviewalliance.org
Friday AAC&U session 4:15-5:30, Independence H/I