

**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



**TRESTLE**  
 Transforming Education, Stimulating Teaching and Learning Excellence


A course transformation initiative, as a catalyst for sustainable and scalable change (in faculty).




BAY VIEW ALLIANCE

DUE 1525775, DUE 152533, DUE 1525345


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

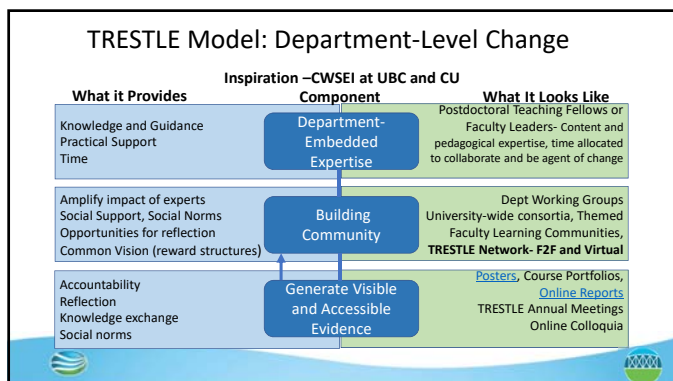


**Effective and Ineffective Strategies from STEM Improvement Literature**

<p><b>Insufficient</b></p> <ul style="list-style-type: none"> <li>• Providing information, evidence about effective practices</li> <li>• Efforts aimed at individual faculty or courses</li> <li>• Policy change</li> </ul>	<p><b>More Effective</b></p> <ul style="list-style-type: none"> <li>• Reflecting on teaching</li> <li>• Shared vision</li> <li>• Social norms</li> <li>• Social Support</li> </ul>	<p><b>Barriers</b></p> <ul style="list-style-type: none"> <li>• Lack of rewards/value</li> <li>• Lack of time</li> <li>• Logistics</li> </ul>
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**Change requires multiple at multiple levels of system, addressing faculty needs**





### Outcomes

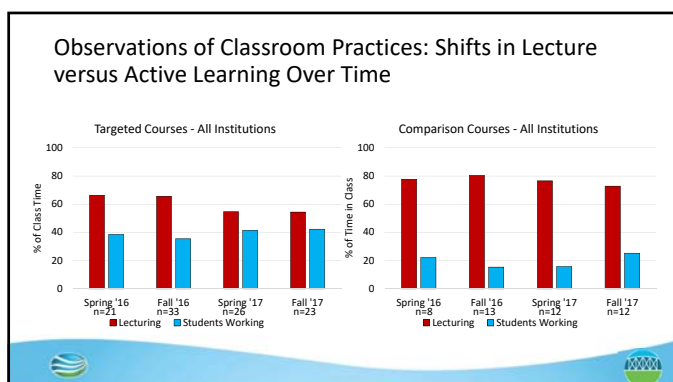
Common measures- Project data, faculty survey of practices and attitudes, classroom observations, syllabus analysis, case studies

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 (worksheets, student response systems)

[Chemistry Example](#)



### 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

### TRESTLE CASE STUDIES

UBC—Earth, Ocean, & Atmospheric Sciences  
 KU—Undergraduate Biology Program  
 Queens—Physics, Engineering Physics, & Astronomy  
 IUB—Computer Science

### 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



### 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



PLEASE HELP ANSWER THESE QUESTIONS BEFORE I GO MAD!

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?

OUR DIFFERENTIATING VALUE-ADDED STRATEGY IS TRANSFORMATIONAL CHANGE.

HOW WAS THAT? DOES ANYONE FEEL DIFFERENT?

MY URGE TO HURL HAS INCREASED A LITTLE BIT. THAT'S WHAT CHANGE FEELS LIKE.

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Learn more about TRESTLE:  
[www.trestlenetwork.org](http://www.trestlenetwork.org)

Learn more about the BVA:  
[www.bayviewalliance.org](http://www.bayviewalliance.org)

Friday AAC&U session 4:15-5:30, Independence H/I

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