Paired teaching for faculty professional development

Jared Stang and Linda Strubbe
Department of Physics and Astronomy

For more info, please see Stang & Strubbe (2015):
submitted to Proceedings of the Western Conference on Science Education;
http://arxiv.org/abs/1507.05948

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Paired Teaching Program in PHAS at UBC
Not team teaching

Not “serial monogamy”
Why paired teaching

Active learning techniques significantly improve student learning. (Freeman et al. 2014, “Active learning increases student performance in science, engineering, and mathematics”, PNAS, 111(23), 8410-8415)

→ Short-term goal: Help faculty adopt active learning techniques

-- by teaching together with another instructor who is experienced in using these techniques

→ Long-term goal: Improve student learning
Defining paired teaching

- Both instructors present for ~all teaching activities
- Typically in large first-year lecture courses (in PHAS)
  - Typically in courses that have already been “transformed” to active learning structure
- Interleave teaching through the semester
  - (e.g., topic by topic, first half/second half, or even back and forth throughout each lecture)
- Attend an orientation before school year begins
- Pairs encouraged to meet weekly to discuss and reflect on their teaching (in addition to planning logistical aspects)
- Varying levels of involvement of STLFS:
  - e.g., occasionally observe lectures
  - occasionally attend pair meetings
  - interview each partner before, (maybe during), and after the semester
  - follow up with novice instructor in subsequent teaching
<table>
<thead>
<tr>
<th>Course (Semester)</th>
<th># of Instructors (across all sections)</th>
<th>Common course materials used?</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 101 Energy and Waves (Spring 2013)</td>
<td>4</td>
<td>Yes</td>
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<td>4</td>
<td>Yes</td>
</tr>
<tr>
<td>PHYS 101 Energy and Waves (Spring 2015)</td>
<td>4</td>
<td>Yes</td>
</tr>
<tr>
<td>PHYS 102 Electricity, Light and Radiation (Spring 2015)</td>
<td>4</td>
<td>Yes</td>
</tr>
<tr>
<td>PHYS 117 Dynamics and Waves (Fall 2015)</td>
<td>2</td>
<td>One section (New course)</td>
</tr>
<tr>
<td>PHYS 158 Introductory Physics for Engineers II (Spring 2016)</td>
<td>4</td>
<td>Yes</td>
</tr>
<tr>
<td>PHYS 170 Mechanics I (Spring 2016)</td>
<td>4</td>
<td>No</td>
</tr>
<tr>
<td>PHYS 101 Energy and Waves (Spring 2016)</td>
<td>4</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Theoretical background: Paired teaching is rooted in an apprenticeship paradigm

### Behaviour paradigm
- Novices and experts are on the same scale
- Novices need to acquire more tools

### Development paradigm
- Novices and experts have different personal theories
- Novices become experts through perturbation of their personal theories

### Apprenticeship paradigm
- Novices and experts are from different worlds
- Novices acculturate into world of the expert

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Theoretical background: Strategic knowledge is important for teaching expertise

- **Domain Knowledge**
- **Heuristic Strategies**
- **Control Strategies**
- **Learning Strategies**

55/45 split ⇒ revote

55/45 split after revote?!

Strategic knowledge
- Often tacit
- Varies with context

Apprenticeship paradigm: Actual participation in expert’s world is critical for transfer of strategic knowledge.


Professor X, last year: “When we go in next year, I would advocate to keep the general format... This sort of interplay of elements, between five, ten minutes of lectures, worksheets, some demos, some PhETs.”

When teaching alone, Professor X continued to use the same teaching techniques as when paired teaching.
Observation Results
A case study of Professor X: In PHYS 3XX

Professor X, last year: “Next year I’m going to do Phys 3XX again, and I’ll probably try to transform that… I will try to see if I can develop guided worksheets” in order to “try and let them work things out more directly with their own brains.”

Professor X transferred the use of active techniques to their upper year course.
Students felt that having two instructors had a positive effect on what they got out of class.
Student Survey Results (N = 269, from 2 courses)

Overall: Having two instructors in this course was ...

- a large advantage
- a small advantage
- neutral
- a small disadvantage
- a large disadvantage

Compared to courses with one instructor, students felt that having two instructors was overall an **advantage**.
Interview Results (so far)

Four areas which appear to influence effectiveness of paired teaching:

- Approach / goals of novices towards paired teaching
  - Likely related to prior teaching experience
- Using existing materials for a transformed course makes it easier to start using active learning techniques
- Sequence of teaching assignments
- Relationship between teaching partners

Results from: Stang & Strubbe (2015); submitted to Proceedings of the Western Conference on Science Education; http://arxiv.org/abs/1507.05948
Summary:
Preliminary recommendations to department:

- Ask instructors to volunteer (or even apply) to pair-teach
- Place teaching pairs in courses where interactive materials already exist
- Think carefully about future teaching assignments
- Hold an orientation for teaching pairs:
  - Clarify expectations
  - Support deciding on professional development goals
  - Encourage informal interaction before course starts
  - Encourage weekly reflection meetings