Developing teachers’ capacity to promote argumentation in secondary science
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**Project Goals**
1. Develop an instructional model for argumentation aligned with NGSS
2. Develop a professional development model and resources to support NGSS enactment
3. Collect evidence of changes to teaching practice
4. Collect evidence of students’ opportunities to engage in argumentation practices

**PD Structure**
- Year 1: “open up” space for practices
- Year 2: Promote argument discourse
- Year 3: Authentic student work

**Context**
- District:
  - 32k Students K-12
  - 96% Latinx
  - 31% EL
  - 87% Free/Reduced Lunch
- Lead science teachers:
  - 11 grades 7-8
  - 14 grades 9-12
  - 7 grade/subject teams

**Lessons Learned**
- PD Challenges & Opportunities
  - Storylining an effective planning tool
  - Anchors phenomena
  - Organizes SEP engagement
  - Identifies opportunities for talk
  - Curricular revision may be too difficult for teachers
- Teacher Thinking & Practice
  - Choose productive phenomena with practice
  - Students need content before practice
  - Deficit thinking
  - Uncertainties around organizing talk
  - Fear chaos of misconceptions
  - Unsure “right” answer will emerge
  - Link productive talk moves to traditional goals
  - Need to reflect on purposes of learning science

**Changes in Teachers’ Practice**
- Measuring discourse quality – LIDO*
- Characterizing unit-level practice
- Slow changes to discussions

**Changes in Teachers’ Thinking**
- Student Responsibility
- Science Practices
- Science Relevance

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<thead>
<tr>
<th></th>
<th>Reduce Direct Instruction</th>
<th>Remove Procedures</th>
<th>Student-Centered Projects</th>
<th>Students Share Explanations</th>
<th>To learn method</th>
<th>To assess</th>
<th>To learn science concepts</th>
<th>To reinforce learning</th>
<th>Everyday Examples</th>
<th>Applying Science</th>
<th>Explain World</th>
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