Mobilizing a Community for Learning

South Carolina’s Academic Standards for Science and Engineering
• Performances by students = scientific practices + core content ideas

• “Develop and use a model to support explanations about the transfer of matter and energy into and out of ecosystems.”
Not all science practices are “equal”

- Asking questions
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using math, info, computational thinking
- Constructing explanations
- Engaging in argument from evidence
- Obtaining, evaluating, communicating info

Modeling and explanation
Models are externalized ideas that change over time in response to evidence—pushing towards explanation.
OK, but what does this look like in the classroom?
Teaching 3rd graders about sound

Will we see:
- Hypothesizing?
- Asking questions?
- Modeling?
- Explanation?
- Arguing with evidence?
- Designing studies?
- Analyzing data?
“Less is more” pays off: The emergence of sophisticated ideas
What science ideas have to be "pulled together" by our 3rd graders?

- Sound as energy
- Sound traveling through gases, liquids, solids
- Air as the medium of transmission
- Resonance
- Conservation of energy
- Propagation of sound waves in all directions at once
What new teaching will demand

Some of this teaching will be very familiar:

– Lab activities
– Experiments
– Readings

Some will seem very different:

– Basing a unit on one complex phenomenon
– Emphasis on evidence-based explanations
– Asking students to make their thinking public
– Revising ideas in response to new evidence
– Using talk differently in the classroom
The 5 tasks of the teacher leader community

1. Assembling colleagues who can work towards a shared vision of instructional excellence
2. Becoming familiar with the Standards + with ambitious forms of teaching
3. Imagining how all these ideas about practice get represented to teachers
4. Developing tools to help teachers “take the first steps”
5. Arranging for teachers to observe each other taking risks to improve instruction
Just following the Standards will not ensure good teaching

<table>
<thead>
<tr>
<th>What students are capable of</th>
<th>Trends in teaching</th>
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<tbody>
<tr>
<td>• Can reason about abstractions</td>
<td>• Lack of student engagement</td>
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<tr>
<td>• Can construct and revise scientific models</td>
<td>• Content presented as facts, definitions, algorithms</td>
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<tr>
<td>• Can defend, adapt, theories based on evidence</td>
<td>• Few connections between activity and science ideas</td>
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<tr>
<td>• Can design experiments that include</td>
<td>• Student ideas not used as resources, no challenging</td>
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<td>sophisticated controls for external variables</td>
<td>of ideas</td>
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<tr>
<td>• Can monitoring own progress towards deep</td>
<td>• Questioning and discourse the weakest aspect of classroom practice</td>
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<td>understanding</td>
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Corcoran & Gerry, 2011; Kane & Staiger, 2012; Pasley, 2002; Roth et al., 2006; Weiss et al., 2003
For scientists, practices are the means to:

• Discovery
• Innovation
• New puzzles

For students, engagement in practices:

• Fosters deep understanding of content
• Engages them with evidence and argument
• Not just “imitating scientists”