Promoting 3-Dimensional Science Teaching and Learning through NGSS-Aligned Curricula and a Teacher Support System

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3-Dimensional Learning

• Scientific ideas are best learned when students also engage in science and engineering practices.

• To develop useable knowledge, knowing and doing cannot be separated, but rather must be learned together.

• This approach allows for problem-solving, decision-making, explaining real-world phenomena, and integrating new ideas.
What does 3D Science look like in classrooms?
Driving Question

How do we shift science learning in our schools to 3-dimensional science learning?
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How do we shift science learning in our schools to 3-dimensional science learning?

• New teaching and learning materials
• New support for professional learning
• New norms in classrooms & central offices
CREATE overview

The CREATE for STEM Institute at MSU develops and tests innovative classroom materials and teaching practices to answer important questions about how best to improve science education from kindergarten through college.
NextGenPBL Overview

The NextGenPBL Initiative leverages these materials and practices to help teachers and students meet the performance expectations (PEs) of the Next Generation/Michigan Science Standards.
System of Support

- High-quality teaching and learning materials
- Intensive, extensive professional learning opportunities
- Facilitated communities of support
Common Features -- Support

- Intensive: up to 60 hours of support per year
- Extensive: support throughout enactment
- Focused on “figuring out” vs knowing, telling -- for students and teachers alike
- Coherent within units, across units, across grade bands
<table>
<thead>
<tr>
<th>Curriculum Name</th>
<th>Grade Level</th>
<th>Grade Level and Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interactions (HS Physical Science)</td>
<td>9th grade</td>
<td>Year-long curriculum</td>
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<tr>
<td>PIRE (HS Physics and Chemistry)</td>
<td>11-12th grade</td>
<td>3 Physics units, 4 Chemistry units</td>
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<tr>
<td><em>CarbonTIME (HS/MS Life and Earth Science)</em></td>
<td>8-10th grade</td>
<td>Half-year curriculum</td>
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<tr>
<td>Health in Our Hands (MS Life Science)</td>
<td>6-8th grade</td>
<td>Three 8-12 week units</td>
</tr>
<tr>
<td>Elevate (MS Energy/Physical Science)</td>
<td>8th grade</td>
<td>One 16-week unit</td>
</tr>
<tr>
<td>3-5 MLPBL (Grade level PE’s addressed)</td>
<td>3rd-5th grade</td>
<td>Year-long curriculum</td>
</tr>
<tr>
<td>K-2 MLPBL (Grade level PE’s addressed) - currently</td>
<td>K-2nd grade</td>
<td>Year-long curriculum</td>
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<tr>
<td>in pilot testing</td>
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Common Features - Materials

- Research-based
- Phenomenon-driven
- 3-Dimensional
- Project-Based Learning
- Assessments aligned with NGSS, M-STEP*
Shifts

1. Focus on **figuring out** phenomena
2. **3-Dimensional** Learning
   - Organized around *Disciplinary Core Ideas* (DCI)
   - Central role of *scientific and engineering practices*
   - Incorporation of *Cross Cutting Concepts* (CCC)
3. Instruction builds towards **Performance Expectations** (PEs)
4. **Coherence**: building and applying ideas across time
Next Steps

- Do you have NGSS-aligned curricula and materials? How do you know?
- Do you have a plan and resources in place for supporting teachers in using these materials that embrace the vision of the Framework for K-12 Science Education?
- Are your classroom, building, and district cultures ready to support authentic 3-dimensional science teaching and learning?
Next Steps

Not sure whether our curricula and support packages are right for you?

- Meet virtually for free for 1 hour with Dr. Angela Kolonich, our Director of Professional Learning, to answer questions you have and receive a more detailed curriculum overview.
- We also offer consulting time to support your current NGSS implementation efforts, course sequencing, and curriculum design.
Next Steps

Contact us: reimannc@msu.edu; larson80@msu.edu

- We can work with you to determine a scope of work for professional learning in your district to meet your goals and needs.