https://goo.gl/gh22eY

Richard Bacolor
Wayne County RESA
@RichBacolor
Equity in science education: The struggle continues…

“Equity in science education requires that all students are provided with equitable opportunities to learn science and become engaged in science and engineering practices; with access to quality space, equipment, and teachers to support and motivate that learning and engagement; and adequate time spent on science. In addition, the issue of connecting to students’ interests and experiences is particularly important for broadening participation in science.”

— NRC Framework, p. 28
33 Districts + 108 PSAs
7740 K-5 Teachers
2900 MS Science Teachers
4800 HS Science Teachers
290,000 Students
“You can't be what you can't see.”

MARIAN WRIGHT EDELMAN
Founder & President
Children’s Defense Fund
The number one factor affecting student achievement is a guaranteed and viable curriculum.

-Marzano, 2003
SHOW ME THE LESSONS!!!
<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Description</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommendation 9</td>
<td>Provide teachers with training, guidelines, and tools to revise or adapt existing curriculum materials in support of the vision.</td>
<td>1</td>
<td>2</td>
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<tr>
<td>Recommendation 10</td>
<td>Facilitate decision making processes to determine the scope and sequence.</td>
<td>1</td>
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<tr>
<td>Recommendation 11</td>
<td>Establish a clear set of measures and tools to evaluate whether new materials are consistent with the vision.</td>
<td>1</td>
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<td>5</td>
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<tr>
<td>Recommendation 12</td>
<td>Attend to issues of K-12 coherence within and across grade bands (K-2, 3-5, MS, HS).</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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MS. Engineering Design

Students who demonstrate understanding can:

**MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

**MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

**MS-ETS1-3.** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

**MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

<table>
<thead>
<tr>
<th>Science and Engineering Practices</th>
<th>Disciplinary Core Ideas</th>
<th>Crosscutting Concepts</th>
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</thead>
<tbody>
<tr>
<td>Develop and Use Models</td>
<td>Guarranteed and Viable Curriculum</td>
<td></td>
</tr>
<tr>
<td>Analyze and Interpret Data</td>
<td>Aligned to NRC 3-Dimensions</td>
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<tr>
<td>Obtain, Evaluate, and Communicate Information</td>
<td>Students Explaining Phenomena</td>
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<td></td>
<td>Students Solving Problems</td>
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<td>Structure and Function</td>
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<tr>
<td></td>
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<td>Systems and System Models</td>
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<td></td>
<td></td>
<td>Patterns</td>
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<td></td>
<td></td>
<td>Scale, Representation, Equality</td>
</tr>
</tbody>
</table>
3D Curriculum Review as a Design Challenge

Criteria
- Level Specific: K-5, MS, HS
- Framework-ready review teams
- Participation from most districts in the county
- Usable evaluation tool
- Produces useful data for Curriculum Directors
- Models 3D teaching and learning

Constraints
- Enough time?
- Enough space?
- Enough trained reviewers?
- Enough Subs?
- Enough programs to review?
- WRESA can’t choose a “best” product for every district.
People: Train, Select, Invite

Process: Get the right data

Product: Share the Information
NGSX PD: 280 Teachers

35 Reviewers

6 Vendors

Update: 400+ Ts
Dear Curriculum Directors,

Please choose two teachers from your NGSS participants to attend the K-8 Curriculum Review Day at Wayne RESA. These teachers will need to participate in a 1 hour webinar prior to the event. Complete information and a registration link for the webinar and May 2 event are contained on the flyer. Please forward to your two selected teacher leaders.

Please let me know if you have any questions regarding the event.

Richard Baclor, Wayne County RESA, Science

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Wayne RESA & the STEM Advisory Team

**Science Curriculum Review Symposium (K-8)**

Join NGSS/MSS trained teacher-leaders from across Wayne County for six vendor presentations of K-8 materials aligned to the new 3-Dimensional Michigan Science Standards. Participants will learn about currently available materials as well as gain important experience for curriculum review and evaluation.

**Pre-symposium Webinar**

**TUESDAY, APRIL 18 OR THURSDAY, APRIL 20**

8 A.M. - 9 A.M. or 4 P.M. - 5 P.M.

Previous NGSS or WRESA Michigan Science Standards training is required to attend. In order to maximize presentation time during the event, we have scheduled a 1-hour webinar to describe the review process, the evaluation rubric, and answer any event-related questions. There are four webinar dates/times to choose from. Please use this link to register by **March 31, 2017**: [https://goo.gl/forms/thiiS89fF3z56Kt1](https://goo.gl/forms/thiiS89fF3z56Kt1)

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**Science Curriculum Review Symposium**

**WAYNE RESA ANNEX**

**TUESDAY, MAY 02**

8 A.M. - 4 P.M.

Vendors presenting include: STEM Scopes (A coalesce Learning), Science Dimensions (HMH), Phenomenal Science (CMU), Bring Science Alive (TCI), Next Generation (FOSS), and Amplify Science. Data and analysis from this event will be shared county-wide.

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Richard Baclor
Science Consultant
Wayne RESA

“If teaching were telling, we’d all be so smart we could hardly stand it.”

Robert Mager, 1968
Curriculum Review Day at
Wayne RESA

AGENDA

May 2, 2017
8:30am-4:30pm
Wayne RESA
Annex Rooms 1,2,3

7:30–8:30am
Set Up and Coffee Social

8:30–9:30am
STEM Scopes
Contact: John Spicko 810-444-1904
http://www.acceleratelearning.com/

9:30–10:30am
Science Dimensions
Contact: Brent Pulido 734-983-8027
http://www.hmhco.com/

10:30–11:30am
Phenomenal Science
Contact: Darcy McMahon 989-774-4387
http://phenomscience.weebly.com/

11:30–12:30pm
Lunch Break

12:30–1:30pm
Bring Science Alive!
Contact: Matt Moorman 269-806-2331
https://www.teach1.com/science/

1:30–2:30pm
Next Generation
Contact: Kathleen Schutter 859-404-3870
https://www.deltaeducation.com/foes/next-generation/

2:30–3:30pm
Amplify Science
Contact: Monty Lammers 719-964-4501
https://www.amplify.com

3:30–4:30pm
Debrief
Q&A w/Vendors
1. Learn about the importance of explaining phenomena and designing solutions in lessons designed for the NGSS. Once you are comfortable with the role of explaining phenomena and designing solutions in the NGSS framework, use the table below to help gather evidence that either student problem-solving or sense-making of phenomena is used to address the needs of students.

<table>
<thead>
<tr>
<th>Explaining Phenomena or Designing Solutions</th>
<th>NGSS designed lesson will look less like this</th>
</tr>
</thead>
</table>
| A different, new, or unrelated phenomenon is used to start every lesson. | The purpose and focus of the lesson are to support student understanding of all three dimensions of the NGSS.
| Student sense-making of phenomena or designing solutions to problems is not essential. | Lessons work together in a coherent storyline to help students develop the science ideas that they learn.
| Students get direct, (preference, assignment, through) a phenomenon or problem that is relevant to them. | Phenomena are brought into the lesson after students develop the science ideas so students can apply what they learned.

*Lessons designed for the NGSS include clear and compelling evidence of the following:

A. Explaining Phenomena or Designing Solutions: The lesson focuses on supporting students to make sense of a phenomenon or design solutions to a problem.

<table>
<thead>
<tr>
<th>Evidence of Quality?</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
</tr>
<tr>
<td>Inadequate</td>
</tr>
<tr>
<td>Adequate</td>
</tr>
<tr>
<td>Extensive</td>
</tr>
</tbody>
</table>

2. Record evidence about how explaining phenomena or designing solutions to problems are represented in the lesson. Include detailed support for whether or not the lesson met Criterion A.

3. If you are working in a group, compare lists of evidence and reasoning and come to consensus about whether this lesson met Criterion A.

Phenomena/Solutions: The lesson focuses on supporting students explanations of phenomena or design solutions to problems.

Strongly Disagree | 1 | 2 | 3 | 4 | 5 | Strongly Agree

Explaining Phenomena or Designing Solutions: comments or questions?

[Long answer text]

3-Dimensions: The lesson helps students develop and use multiple SEPs, CCs, and DCIs to engage in sense-making or problem solving.

Strongly Disagree | 1 | 2 | 3 | 4 | 5 | Strongly Agree
How can we check alignment to the new Standards?

1. **Learn about the importance of explaining phenomena and designing solutions** in lessons designed for the NGSS here: [www.nextgenscience.org/phenomena](http://www.nextgenscience.org/phenomena). Once you are comfortable with the role of explaining phenomena and designing solutions, use the table below to help gather evidence that either student problem-solving or sense-making of phenomena drives the lesson:

<table>
<thead>
<tr>
<th>Phenomena or Designing Solutions</th>
<th>NGSS designed lessons will look less like this:</th>
<th>NGSS designed lessons will look more like this:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explaining phenomena and designing solutions are not a part of student learning or are presented separately from &quot;learning time&quot; (i.e. used only as a &quot;hook&quot; or engagement tool) used only for enrichment or reward after learning; only loosely connected to a DCI.</td>
<td>The focus is only on getting the &quot;right&quot; answer to explain the phenomenon</td>
<td>Student sense-making of phenomena or designing of solutions is used as a window into student understanding of all three dimensions of the NGSS.</td>
</tr>
<tr>
<td>A different, new, or unrelated phenomenon is used to start every lesson.</td>
<td>Lessons work together in a coherent storyline to help students make sense of phenomena.</td>
<td></td>
</tr>
<tr>
<td>Teachers tell students about an interesting phenomenon or problem in the world.</td>
<td>Phenomena are brought into the lesson after students develop the science ideas so students can apply what they learned.</td>
<td></td>
</tr>
</tbody>
</table>

2. **Record evidence** about how explaining phenomena or designing solutions to problems are represented in the lesson. Describe in the response form below how this evidence is or is not an adequate indicator the criterion is being met. Include detailed suggestions for improvement.

### Lessons designed for the NGSS include clear and compelling evidence of the following:

- This lesson focuses on supporting students to make sense of a phenomenon or design solutions to a problem.

<table>
<thead>
<tr>
<th>What was in the materials, where was it, and why is this evidence?</th>
<th>Evidence of Quality?</th>
<th>Suggestions for Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>□ None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Inadequate</td>
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</tr>
</tbody>
</table>

3. If you are working in a group, **compare lists of evidence and reasoning and come to consensus** about whether this lesson met Criterion A.

**Criterion A. Explaining Phenomena or Designing Solutions**

**A. Phenomena**

**B. 3-Dimensions**

**C. 3-D Integration**

**D. Relevance**

**E. Student Ideas**

**F. Building on Prior Knowledge**

**G. WHAT ELSE?**

a. **Literacy?**

b. **Assessments?**
Prepping through technology...no subs needed.
WRESA K-5 CURRICULUM REVIEW DATA ANALYSIS

Lesson Screening for 3D Alignment

35 teachers and administrators from Wayne County participated in the K-5 Curriculum Review Day. Six curriculum publishers presented a model lesson from one of their current NGSS aligned units in Life Science. Participants experienced a model lesson from each publisher and used a Lesson Screening rubric to rate the alignment based on nine defined criteria.
WRESA Curriculum Review Data Analysis

1. Review the 9 Criteria.
2. Rank the Criteria. What is most important in your science curriculum alignment?
3. Review the data. Use the analysis matrix to produce a weighted score for the lessons.
4. Read the comments sections for your top scoring lessons. What stands out? What other information is needed?
NEXT STEPS:

1. Organize a local review team.
2. Review and/or adjust the process and criteria.
3. Consider a schedule for pilot.
4. Consider MS, HS review processes.

Criterion A: The lesson focuses on supporting students' explanations of phenomena or design solutions to problems.

% of participants who agreed, were neutral, or disagreed with the above statement:

Criterion B: The lesson helps students use multiple SEPs, CCCs, and DCIs to engage in sense-making or problem-solving.
Don’t forget about student voice…3D is new for them too. Post pilot survey data…
Questions?