Essential Steps to Support NGSS Implementation

STEM Smart workshops are funded by the National Science Foundation grant #1449550. Any opinions, findings, and conclusions or recommendations at this event or in these materials are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.
Implementing 3D Science learning

- The vision comes from “A Framework for K-12 Science Education” (NRC, 2011)

- NGSS are intended to communicate and establish a path to this vision

- Standards are not curriculum guides, those need to be developed
  (Joe Krajcik will talk more about this)

- Align assessments to the vision, as well as to the specifics of the standards
  (Jonathan Osborne will talk more about this)
Three support structures required

- Aligned Curriculum resources
- Aligned policies and assessments
- Aligned Professional Development – including both teaching and assessing in a 3 dimensional learning
What is 3D science learning

- Students **engage in science and engineering practices** and apply **cross-cutting concepts** as the path to learning the **disciplinary core ideas of science and engineering** and to understanding the **nature of science**

- Practices and CCC’s are tools for problem solving which students learn to use by using them

- Students develop a disposition to address unfamiliar problems using these tools
Cross-cutting concepts

- How can I say they are tools when they are concepts?
- Each provides a lens that can be useful to examine and address any science problem (and some non-science ones as well)
- Think of them as supporting effective questioning and analysis strategies
- Also helping students to build interconnected knowledge structures about science
- Because they are relatively new, expect their use and assessment to evolve

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Alignment

- Cannot be superficial “check the box”, standard by standard
- Practices are intertwined, rarely used in isolation
- 3 dimensionality should not be superficially enforced on every lesson or task, it is an overall goal
- Students need the whole toolbox and they need to learn how and when to use each tool, curriculum must develop these abilities, assessment must ask students to use them,

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The need for curriculum embedded assessment tasks (performance tasks)

- For both formative and summative purposes
- Curriculum resources must integrate such tasks in the learning cycle,
- Reduce the distinction between an assessment task and a learning task
- Many of the NGSS standards are more suited to this approach than to external “drop in” testing tasks

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A bit about policies

- Science teaching needs time, space, equipment and supplies
- Science teaching needs specialized knowledge (science and science pedagogy)
- Science teaching needs administrators who understand the vision and the needs

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Warning – defining what works based on the wrong measures can be fatal!

- Need intermediate outcomes, not just student scores on external tests
- Need to be sure measured quantities are related to the vision
- Need to change what we measure over time, as intermediate goals are met
- We all have much to learn and must share both our successes and our challenges to facilitate overall progress

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An opportunity

- Science education can and should improve its effectiveness and inclusiveness
- The Framework’s vision provides a preliminary map of the path forward
- All of us can contribute to exploring further and refining that map
- Do not let the perfect be the enemy of the good!