



# Essential Steps to Support NGSS Implementation

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# 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



# 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,



# 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



# 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





# 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



# 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!