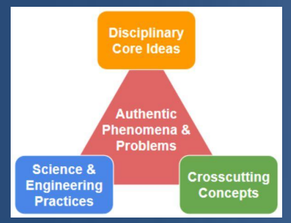

Science in 3D: An Overview for School Leaders

This document introduces school leaders to the learning approach featured in the Science Georgia Standards of Excellence (GSE) and provides a general overview of the key instructional shifts required. This resource can guide principals and other school leaders as they provide critical support for teachers in the implementation process.

What is 3D science learning?

The GSE are standards with a purpose, setting the standard for what students should know and be able to do across K-12 science. A major difference between the GSE and previous science standards is "three-dimensional" (3D) learning. 3D learning refers to the intentional integration of three distinct dimensions: Scientific and Engineering Practices (SEPs), Disciplinary Core Ideas (DCIs), and Crosscutting Concepts (CCCs). Through 3D learning, the GSE emphasize that science is not just a series of isolated facts. This enables students to view science more as an interrelated world of inquiry and phenomena rather than a static set of science disciplines. The GSE represent a fundamental shift in science education and require a new approach to teaching science. Looking ahead, teachers can use a range of strategies to engage students and create opportunities to demonstrate thinking and learning.

How can leaders support implementation?

- Focus on what the students are doing first and then think about what the teacher has designed to make that happen;
- Know the standards enough to identify and provide feedback on aspects of the three dimensions during classroom visits
- Engage teachers on how the three dimensions are incorporated into lessons.

What are some common pitfalls to avoid?

- Expecting instruction to change overnight (35)
- Expecting teachers to do it alone (35)
- Asking "Which standard are you teaching today?" (58)
- Failing to communicate with parents and community about what is changing and why you are changing it (84)

Additionally, leaders can:

- Build a long-term plan that focuses on the building's collective vision for science education (20)
- Elevate teacher leaders and support them as they work to help their colleagues (38-40)
- Find ways to provide high-quality, intensive professional learning to all teachers (41-46)
- Seek out professional learning for yourself (49)
- Connect what is happening with science in your building to other buildings in your district, state, or any NGSS-adopted state (70-73)
- Be critical consumers of new curricula (56, 57)
- Provide leadership to develop or revise a system of assessment for measuring student learning in science (61-66)

How will science education change?

LESS

1. Learning of ideas disconnected from questions about phenomena
2. Teachers providing information to the whole class
3. Teachers posing questions with only one right answer
4. Students reading textbooks and answering questions at the end of each chapter
5. Worksheets
6. Oversimplifying activities for students who are perceived to be "less able" to do science and engineering

MORE

1. Using systems thinking and modeling to explain phenomena and to give a context for the ideas to be learned
2. Students conducting investigations, solving problems, and engaging in discussions with teacher guidance
3. Students discussing open-ended questions that focus on the strength of the evidence used to generate claims
4. Students reading multiple sources and developing summaries of information
5. Students writing journals, reports, posters, and media presentations that offer explanations and arguments
6. Providing supports so that all students can engage in sophisticated science and engineering practices

What are key questions leaders should consider during implementation?

- What kind of professional development is available and how do I ensure my teachers and I have access to it? How do I know if it's high quality?
- What GSE-aligned instructional materials do my teachers and students need and how do I make sure they get them? How do I know if the materials are high quality?
- What formative assessments are available to help teachers continually evaluate their students' learning?
- How can we connect the GSE with work we are doing to improve teaching and learning in English language arts and math?

For more information about 3D Science

- http://www.georgiastandards.org/
- http://www.georgiascienceteacher.org
- http://www.negaresa.org/science/ (Northeast Georgia RESA Science)
- http://ngss.nsta.org/ (National Science Teachers Association)
- http://stemteachingtools.org/brief/21 (STEM Teaching Tools: What school building administrators should know about the new vision for K-12 science education
- http://www.nap.edu/read/13165/chapter/1 (*A Framework for K-12 Science Education*)

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Adapted from NGSS: An Overview for Principals. (2016). Achieve, Inc.; Information in boxes from: National Research Council's Guide to Implementing the Next Generation Science Standards; All parenthetical numbers in boxes refer to pages in the NRC document.

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