Shifts in Teaching of Science with STEELS (Science Technology Engineering Environmental Literacy and Sustainability)

Methacton School District
Education Committee

April 8, 2025

Instructional Shifts

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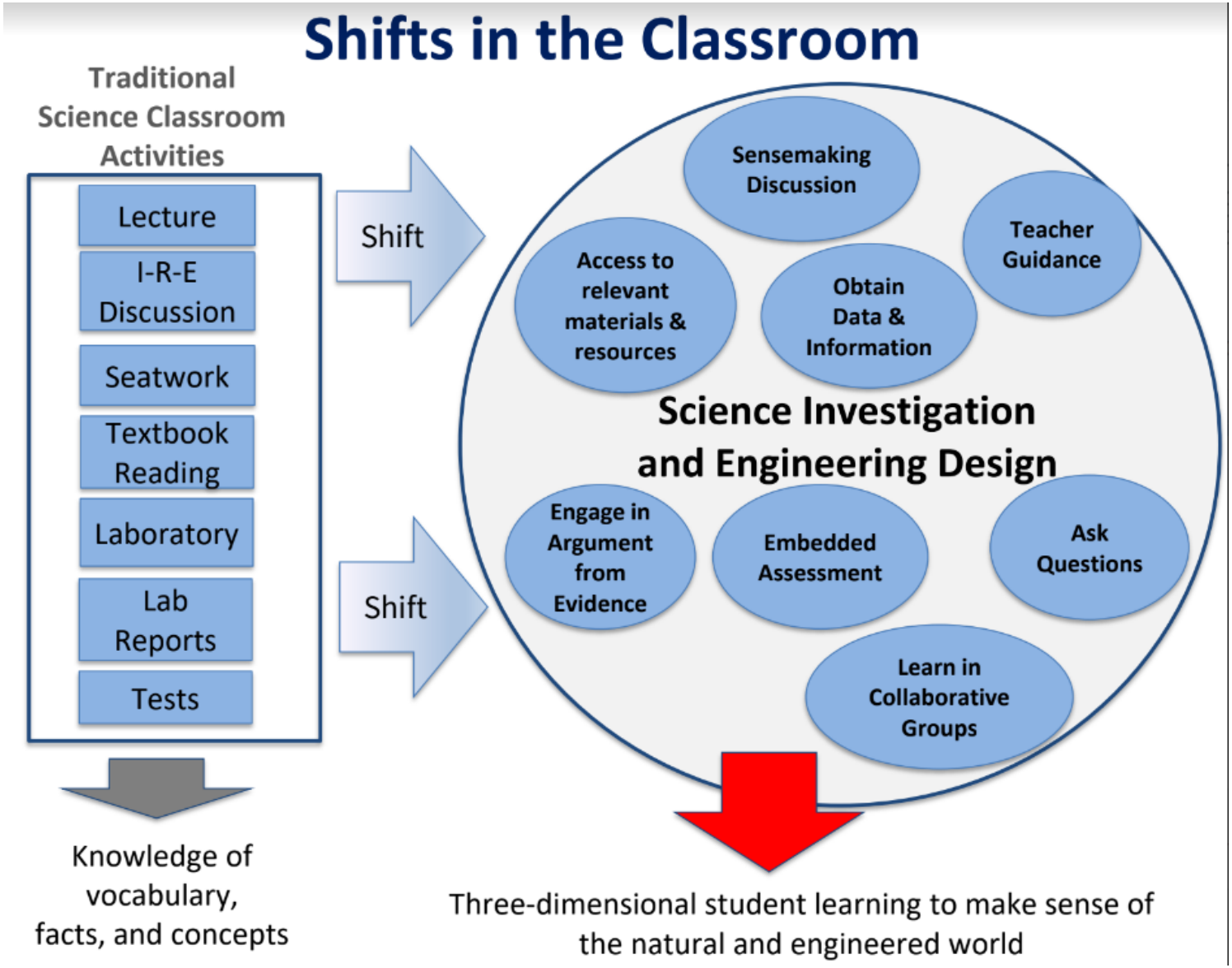
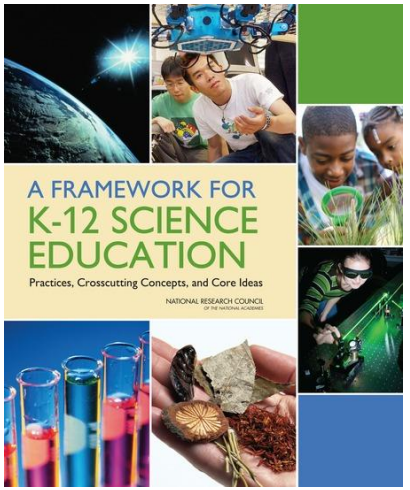


Guiding Assumptions

- Children are born investigators
- Focus on core ideas, practices, and connections
- Understanding develops over time – sense making
- Connects to student interest and experiences
- Requires both practices and knowledge
- Promotes equity



Phenomena . . .

- Grounded in relevant, real-world scenarios
- Observable events that occur in students' world that can be explained or predicted
- Relevant experiences, data, images, videos
- Engineers design solutions using explanations to problems that arise from phenomena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PATHÉ
BRIDGE

Explore Phenomenon

- What parts or components from the video do you think are important for explaining the phenomenon?
- What is not important?
- What are you uncertain about?

The Old vs. The New Standards

Legacy Standards

- Explain 72
- Describe 65
- Identify 42
- Recognize 24
- Demonstrate 16
- Differentiate 13
- Examine 10

STEELS Standards

- Develop/Use Models 46
- Construct Argument 22
- Plan and Conduct Investigation 18
- Analyze Data 16
- Make/Use Observations 14
- Mathematical Representation 11

Shift in Focus

- Focus is on making sense.
- Students explain phenomena and solve problems.
- Students explain phenomena by developing and applying the **science and engineering practices**, **disciplinary core ideas**, and **crosscutting concepts** in a real-world context.
- Students become critical thinkers and problem-solvers that can apply their knowledge in novel, real-world situations.

Shift in Focus

- Reflect the interconnected Nature of Science as it is practiced and experienced in the real world.
- Science standards are student performance expectations – NOT curriculum.
- Focus on deeper understanding of content as well as application of content.
- Science and Engineering are integrated.
- Prepare students for college, career, and citizenship.

Phenomena – Remember?

- Phenomena must be grounded in real-world scenarios.
- Phenomena-based scenarios that are engaging, relevant and accessible.
- Phenomena are observable events that occur in the universe that can be explained or predicted.
- Scientists develop general ideas, based on evidence, that can be used to explain and predict phenomena.
- Engineers design solutions using explanations to problems that arise from phenomena.

PA STEELS Standards

- PA Standards are performance expectations.
- All standards are multi-dimensional.
- Foundation Boxes include:
  - Disciplinary Core Ideas
  - Science and Engineering Practices
  - Crosscutting Concepts

PA STEELS Standards

Kindergarten

3.3.K.C Earth and Space Sciences: ~~Earth and Human Activity~~

Students who demonstrate understanding can *use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.*

Clarifying Statement: ~~Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas~~, and, grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.

Assessment Boundary: N/A

Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Crosscutting Concepts (CCC)
Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, storyboard) that represent concrete events or design solutions. • Use a model to represent relationships in the natural world.	**ESS3.A: Natural Resources** • Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.	**Systems and System Models** • Systems in the natural and designed world have parts that work together.

Pennsylvania Context: Examples of Pennsylvania context include a wide variety of habitats from mountains to urban areas, each of which provides the specific food, shelter, water, and space required by the variety of plants and animals found in each habitat. Local nature centers can provide information on the types of native Pennsylvania wildlife and native wild plants that can be found in each region of the state.

PA Career Ready Skills: Identify similarities and differences between self and others.

Connections to Other Standards Content and Practices

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Possible Connections

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Connections to Other Standards Content and Practices

Will involve less

- Rote memorization of facts and terminology
- Learning of ideas disconnected from questions about phenomena
- Teachers providing information to the whole class

Will involve more

- Facts and terminology are learned as needed while developing explanations and designing solutions supported by evidence based arguments and reasoning
- Systems thinking and modeling to explain phenomena and to give a context for the ideas to be learned
- Students conducting investigations, solving problems, and engaging in discussions with teacher guidance

Will involve less	Will involve more
• Student reading textbooks and answering questions at the end of each chapter	• Students discussing open-ended questions that focus on the strength of the evidence used to generate claims
• Worksheets	• Students reading multiple sources and developing summaries of information
• Teachers posing questions with only one right answer	• Student writing of journals, reports, posters, and media presentations that offer explanations and arguments

Will involve less:

- Oversimplification of activities for students who are perceived to be “less able” to do science and engineering
- Tests
- Knowledge of vocabulary, facts, and concepts

Will involve more:

- Provision of supports so that all students can engage in sophisticated science and engineering practices
- Assessments embedded within the learning experiences
- Multi-dimensional student learning to make sense of the natural and engineered world

Assessment Timeline

pennsylvania
DEPARTMENT OF EDUCATION

Year	Test	Students	Components
2024 – 2025	PSSA Science	5th Grade Students	Field Test of STEELS standards. Accountability waiver approved by USDoE. Participation is required and will be submitted to USDoE. It will be displayed on the school report cards.
2025 – 2026	PSSA Science	5th Grade Students	Full implementation of STEELS Standards
2024 – 2025	PSSA Science	8th Grade Students	Field Test of STEELS standards. Accountability waiver approved by USDoE. Participation is required and will be submitted to USDoE. It will be displayed on the school report cards.
2025 – 2026	PSSA Science	8th Grade Students	Full implementation of STEELS Standards
2024 – 2025	Biology Keystone Exam	End of Course Exam	Operational alignment to the 2010 Keystone Biology Standards
2025 – 2026 Winter Wave	Biology Keystone Exam	End of Course Exam	Operational alignment to the 2010 Keystone Biology Standards
Spring 2026	Biology Keystone Exam	End of Course Exam	Full Implementation of STEELS Life Science Standards
Fall 2025	CDTs	Grades 3 – 12	Full Implementation of STEELS Standards

Thank you!!

Questions?