Pennsylvania STEELS Standards:
Administrator Reference Guide

This reference guide will:

- Introduce administrators to Pennsylvania's Science, Technology & Engineering, and Environmental Literacy & Sustainability (STEELS) Standards
- Provide an overview of the key instructional and conceptual shifts required by STEELS Standards
- Outline the critical role administrators will play in the implementation process
- Share additional resources for administrators working to transition to the new rigorous learning goals

What Are the STEELS Standards?

Science, Technology & Engineering, and Environmental Literacy & Sustainability (STEELS) Standards were approved in 2022 with a plan for full implementation in all LEAs by 2025. These standards set high expectations for all K–12 students to study the natural and human-made world through inquiry, problem solving, critical thinking, and authentic exploration.

A major difference between the STEELS Standards and previous standards is "multi-dimensional" learning.

Multi-dimensional learning refers to the thoughtful and deliberate integration of several of the following dimensions: Scientific and Engineering Practices (SEPs), Technology and Engineering Practices (TEPs), Disciplinary Core Ideas (DCIs), and Crosscutting Concepts (CCCs).

Through multi-dimensional learning, the STEELS Standards emphasize that students are actively engaged in meaningful science, technology, engineering, environmental literacy, and sustainability learning. This approach enables students to view these fields as interrelated and connected to their everyday lives.

The STEELS Standards represent a fundamental shift in science, technology, engineering, environmental literacy, and sustainability education, which requires a different approach to learning. Teachers can use a range of strategies to engage students and create opportunities for students to demonstrate their thinking and learning.

How Will K–12 Education in Pennsylvania Change with the New Standards?

Science, Technology, Engineering, Environmental Literacy, and Sustainability Education will...

Focus less on:	Focus more on:
1. Learning of ideas disconnected from questions about phenomena or problems	**1.** Systems thinking and modeling to explain phenomena and to give a context for the ideas to be learned
2. Teachers providing information to the whole class	**2.** Students conducting investigations, solving problems, and engaging in discussions with teacher guidance
3. Teachers posing questions with only one right answer	**3.** Students discussing open-ended questions that focus on the strength of the evidence used to generate claims
4. Students reading textbooks and answering questions at the end of each chapter	**4.** Students reading multiple sources and developing summaries of information
5. Worksheets	**5.** Students writing of journals, reports, posters, and media presentations that offer explanations and arguments

The numbered information above is adapted with permission from: National Research Council. (2015). *Guide to implementing the Next Generation Science Standards*. The National Academies Press. https://doi.org/10.17226/18802

What can Administrators do to Support Implementation?

School leaders must intentionally and effectively orchestrate people, programs, and available resources in the following ways:

Communicate a shared vision for STEELS instruction and establish it as a priority.

Leaders must have the ability to "inspire teachers, parents, school community leaders, and students around a common vision" for STEELS content areas. This requires leaders themselves to have a clear vision of effective teaching and learning in these disciplines as well as a plan for how to make effective teaching and learning a reality for all teachers and students. (*Science Teachers' Learning*, page 195)

Provide support for teachers and useful feedback on teacher practice.

Effective leaders know the teaching strategies adequately to be able to measure progress, determine the best instructional guidance initiatives or adjustments that are needed, and provide effective, formative feedback to teachers on their instruction (*Science Teachers' Learning,* page 194).

Empower teacher leaders.

School and LEA leaders can't manage this change alone; they must support other individuals in the school in assuming leadership roles. Leaders will need to designate teams that include teachers to lead implementation of the standards and necessary changes in curriculum, instruction, and assessment (*Science Teachers' Learning*, page 195; *Guide to Implementing the NGSS*, page 37).

Be critical consumers of any new curricula.

Before actually selecting the materials to be purchased, school and LEA leaders must become critical consumers of curriculum materials based on the features that will support teachers to meet the vision of the STEELS Standards. Effective approaches for selecting and adopting materials include a clear set of criteria and a transparent, evidence-based process that engages teachers. (*Guide to Implementing the NGSS*, page 56–57)

Shift resources to where they're most needed.

LEA and school leaders make difficult decisions about time and resources, and at times will need to realign resources to match teacher needs in a specific LEA context. For example, if curriculum is an Open Education Resource (OER), a leader may consider using funds allocated for an instructional program for curriculum-based professional learning instead (*Science Instructional Materials Selection and Modification: A Landscape Analysis*, page 7; *Science Teachers' Learning*, page 204).

Encourage and enable professional learning for both school leaders and teachers.

School leaders who don't understand the enormity and importance of the changes in the classroom will likely fail to provide adequate resources, professional learning, and collaboration opportunities needed by teachers to make this shift successfully (*Guide to Implementing the NGSS*, page 49; *Science Teachers' Learning*, page 204).

Increase teacher collaborative structures.

Teachers planning, sharing ideas, and reflecting when implementing a new initiative is critical to success. Creating or supporting these opportunities for teachers would provide the structure necessary to address challenges and celebrate successes together. (*Science Teachers' Learning*, page 179)

Adjust requirements and expectations.

Part of building an environment of continuous improvement includes providing flexibility for teachers rather than placing outdated demands that undermine implementation of new strategies needed. Policies that may need to be adjusted include criteria for evaluating teachers, classroom observation requirements, and/or lesson planning requirements. (*Guide to Implementing the NGSS*, page 49)

Make changes to instructional time or course structures.

Most modifications teachers make to instructional materials are due to having inadequate instructional time to follow programs with fidelity. School leaders should examine and make adjustments to class schedules to ensure adequate instructional time. (*Science Instructional Materials Selection and Modification Landscape Analysis*, page 7; *Science Teachers' Learning*, page 194)

See the research referenced in this guide here.

What are Key Questions that Administrators Should Consider During Implementation?

- What instructional programs and resources do my teachers and students need, and how do I make sure they are high quality?
- How can I make sure all teachers have access to sustained, high-quality curriculum-based professional learning?
- What formative assessments are available to help teachers continually evaluate their students' learning?
- How can we connect the STEELS Standards with work we are doing to improve teaching and learning in English language arts, mathematics, and social studies?
- What tools will I use to monitor implementation? How will we measure success?

What are Some Common Pitfalls that can Undermine Successful Implementation?

- Expecting instruction to change overnight (*Guide to Implementing the NGSS*, page 35)
- Expecting teachers to do it alone (*Guide to Implementing the NGSS*, page 35)
- Asking, "Which standard are you teaching today?" (*Guide to Implementing the NGSS*, page 58)
- Expecting individual elementary (*Science and Engineering in Preschool Through Elementary Grades*, page 157) or secondary (*Science and Engineering for Grades 6–12*, page 153) teachers to write their own curriculum
- Failing to communicate with parents and community about what is changing and why you are changing it (*Guide to Implementing the NGSS*, page 84)

All links above are citations to National Academies Consensus Studies related to the implementation of today's science standards.

Where can I Learn More about STEELS Standards?

- Pennsylvania Department of Education STEELS Hub on SAS (https://www.pdesas.org/Page/Viewer/ViewPage/58/)
- Pennsylvania Department of Education Learning Communities on Science; Technology and Engineering; and Environmental Literacy, Sustainability, Ecology, and Agriculture (https://www.pdesas.org/Home/FeaturedContent?contentItemId=800524)
- Pennsylvania Department of Education Content Advisors (https://pdesas.zendesk.com/hc/en-us/articles/206603763-PDE-Content-Advisors)
- Your local Pennsylvania Intermediate Unit (IU) office (https://www.paiu.org/)