# **Pennsylvania STEELS Standards:** Secondary Administrator Reference Guide

Pennsylvania's Science, Technology & Engineering, and Environmental Literacy & Sustainability (STEELS) Standards set clear expectations for what all 6–12 students should know and be able to do. This reference guide aims to inform secondary school administrators about what is included in Pennsylvania's new STEELS Standards and provide considerations for supporting their implementation in middle and high school grades.



## Why are STEELS Standards Important for Secondary Students in Pennsylvania?

Students who can make sense of their environment and solve problems will be better prepared to live and study in a world that is increasingly rooted in science, technology, engineering, environmental literacy, and sustainability.

The STEELS Standards are designed as a progression of knowledge and skills from kindergarten through high school, providing students with opportunities to develop more sophisticated knowledge over time.

The study of these fields has always been important in both middle and high school, but it is even more crucial now to prepare students for success in college, career, and citizenship.

### What is New about the STEELS Standards in Grades 6-12?

The STEELS Standards were approved in 2022 with a plan for full implementation in all LEAs by 2025. These standards guide the study of the natural and human-made world by fostering students' growing curiosity about the world around them.

These research-based learning goals represent a fundamental shift in science, technology, engineering, environmental literacy, and sustainability and require a different approach to learning. The STEELS Standards emphasize that students are actively learning in these disciplines — a type of learning that is more than a series of isolated facts. This approach enables students to view these fields as interrelated and connected to their everyday lives. 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 to support students to make sense of the world around them: Scientific and Engineering Practices (SEPs), Technology and Engineering Practices (TEPs), Disciplinary Core Ideas (DCIs), and Crosscutting Concepts (CCCs).

### How Will Instruction Designed for the STEELS Standards Look Different in Classrooms?

The shift to instruction that prepares students to meet the STEELS Standards will take time and require support from high-quality instructional programs and professional learning. Implementing the STEELS Standards will require changes in classrooms; however, schools and LEAs will need to plan for a transition period and not expect the change to happen overnight. Some of these new approaches might include:

#### Students are active and talking about their learning.

When students are successfully using <u>science and engineering practices along with technology and engineering practices</u>, they are actively discussing and negotiating their ideas. This is a shift from classrooms where students sit quietly in rows, copying notes during a lecture.

#### Students figure out the answer, rather than the answer being written on the board.

Teachers are often required to write the day's learning goal or standard on the board. With the emphasis on students developing explanations of phenomena or designing solutions to problems, the learning goal <u>should now be written</u> in a way that doesn't "give away" the answer to the students — such as a question students will be working to figure out.

#### Students know why they are engaging in classroom activities beyond "because the teacher said so."

Because conceptual understanding is linked to a student's ability to develop explanations of phenomena and design solutions, students should readily know the answer to the question "why do I need to know this?" This focus on <u>real-world application</u> allows students to see science, technology and engineering, and environmental literacy and sustainability as applicable and useful in their everyday lives.

### What Can Secondary Administrators do to Support STEELS Standards Implementation?

### Attend STEELS Standards professional learning for administrators.

Professional learning designed for leaders will increase capacity to provide instructional leadership for STEELS learning goals, including effective coaching and supervision of teachers, alignment of policies, equitable resource allocation, and planning for professional learning opportunities (*Science and Engineering for Grades 6–12*, page 198).

#### Communicate a shared vision for STEELS Standards learning and establish this shared vision as a building priority.

Establishing a building wide vision for STEELS Standards learning and <u>shared responsibility to achieve it</u> is key for a successful school or districtwide program. Effective leaders "inspire teachers, parents, school community leaders, and <u>students around a common vision</u>" that can be used to describe the reasoning behind changes during the transition to the new learning goals. (*Science Teachers' Learning*, page 195)

# Select high-quality instructional programs and resources.

It is unreasonable to expect middle and high school teachers to search for and compile their own instructional resources online to plan what they will teach. Districts should plan to <u>evaluate and select materials</u> based on a clear set of criteria that reflect the instructional shifts of the STEELS Standards and a transparent, evidence-based process that engages teachers. Modification of programs to fit the unique needs of the STEELS Standards is best done through districtwide initiatives to promote coherence and highquality experiences for all students. (*Science and Engineering for Grades* 6–12, page 153; *Guide to Implementing the NGSS*, page 56)

Provide teachers with sustained professional learning opportunities that support the enactment of high-quality instructional programs and resources.

Secondary teachers need opportunities to develop their instructional practice through <u>effective professional learning</u> <u>experiences that are sustained</u>, coherent, and <u>connected to</u> <u>their curricular program</u>. In addition, planning time with colleagues teaching the same course to analyze student work and address common challenges will <u>support coherence and</u> <u>quality</u>. In cases where there is only one teacher of a subject (e.g., physics) in a school, a <u>modeling learning community</u> <u>has been an effective option</u>. (*Science and Engineering for Grades 6–12*, pages 190, 198, 257; *The Elements*, page 10)

### Consider a course sequence that will ensure all students have the opportunity to learn all middle and high school STEELS Standards.

The Pennsylvania STEELS Standards lay out what students need to know by the end of the 6–8 grade band and the 9–12 grade band, but not in each specific grade level. These new learning goals include content which may not have been previously required of all students. Districts and schools, therefore, will need to make decisions about course content and sequencing that ensures all students have the time and opportunity to become proficient in all of the STEELS Standards. Schools may consider whether to select an instructional program that is designed around an integrated course model or the more traditional domain-specific course sequence (e.g., biology, chemistry, physics). Reviewing available programs can be a helpful starting point when determining both course content and sequencing. (*Science and Engineering for Grades 6–12*, page 230; *NGSS Appendix K*)

# Assess and adjust recruitment and staffing models to align with new STEELS learning goals.

Changes in course content to meet the STEELS Standards may require staff with additional expertise and teaching credentials. When hiring new staff, prioritize candidates with a strong foundation in STEELS disciplines as well as individuals who have practical experience in these fields along with teaching skills to support effective and engaging instruction. (*Science and Engineering for Grades 6–12*, page 188)

# Ensure teachers and students have access to safe and effective equipment, space, and technology.

- Equipment and space: An integrated lab/classroom space with a flexible layout is ideal as it allows for "seamless. transition from data gathering to other forms of sensemaking instructional strategies, such as small group and. whole-class discussions." In addition, storage space is important for both equipment and for ongoing student work from multiple class periods, as projects will often extend over multiple class periods. (Science and Engineering for Grades 6–12, pages 215, 219)
- **Technology:** Districts should ensure they also have access to <u>technology</u> to support *learning* (e.g., document-sharing

application designed for classrooms) and technology that supports *science investigation, engineering design, and environmental solutions* (e.g., access to databases). This also includes any technology accommodations that support students with special needs. (*Science and Engineering for Grades 6–12*, page 232)

• Safety: Consider what <u>safety practices and guidelines</u> will need to be put in place to avoid injury in instruction, with special attention to the <u>Pennsylvania Department</u>. <u>of Education Safety Guide</u>. Guidelines may be needed for <u>outdoor learning spaces</u> as well. (NSTA Safety and School Science Instruction Position Statement; *Science and Engineering for Grades 6–12*, page 227)

## Manage and monitor progress of STEELS Standards implementation.

STEELS Standards implementation will require a wellexecuted plan and management, which includes the key action of monitoring progress along the way. Leaders will need to determine which measurable data they will collect and <u>use to inform the direction of their work</u> and how progress will be communicated to others. (*District Implementation Indicators*, page 2; *Framework for Leading NGSS Implementation*, page 37)

#### Engage with families.

School leaders should engage with families and the local community to support children's opportunities for engaging in STEELS Standards learning. Relationships between teachers and the local community can lead to instruction that is <u>more meaningful and relevant to students</u>, as well as improve out-of-school learning opportunities. (*Building Family-Centered Models for Science Education through Learning in Places*)

### Where Can I Learn More about STEELS Standards Implementation in Middle and High School Grades?

- PDE STEELS Hub on SAS (<u>https://www.pdesas.org/Page/</u> <u>Viewer/ViewPage/58/</u>)
- STEM Teaching Tools #21: What School Building Administrators Should Know About the New Vision for K–12 Science Education (https://stemteachingtools.org/brief/21)
- STEM Teaching Tool #22: Research Brief: How Teacher Social Networks Support and Constrain Sustainable Reform (https://stemteachingtools.org/brief/22)
- Your local Pennsylvania Intermediate Unit (IU) office (<u>https://www.paiu.org/</u>)

See the research referenced in this guide <u>here</u>.