Guidance Document: Pennsylvania STEELS Classroom Implementation Descriptors

This document provides guidance to educators at all levels to support the use of the *Pennsylvania STEELS Implementation Descriptors for Students and Teachers*. It addresses the following questions:

- What are the *STEELS Classroom Implementation Descriptors?*
- How are the *STEELS Classroom Implementation Descriptors* organized?
- What are the uses for the *STEELS Classroom Implementation Descriptors?*
- What will be needed to move towards full STEELS Implementation?
- Where can I learn more about each of the *STEELS Classroom Implementation Descriptors?*

What are the *STEELS Classroom Implementation Descriptors*?

Pennsylvania's Science, Technology & Engineering, and Environmental Literacy & Sustainability (STEELS) Standards were approved in 2022 with a plan for full implementation in all local education agencies (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.

But what do these standards really look like in the classroom when they are being fully implemented? The *STEELS Classroom Implementation Descriptors* is a resource that provides examples of what classrooms implementing STEELS might look like.

How are the *STEELS Classroom Implementation Descriptors* organized?

These descriptors are organized as an Innovation Configuration (IC) Map, which is a tool that describes the way an innovation should be implemented, along with less-than-ideal variations. In this case, the innovation is defined as:

> *Student and teacher behaviors and actions that will prepare all students to meet the Pennsylvania STEELS standards and reflect up-to-date research about how students learn best, including learning and assessing that is phenomenon- or problem-based, multi-dimensional, and student-centered.*

The *STEELS Classroom Implementation Descriptors* are organized around the following five components essential for STEELS implementation.

For each area, the IC Map offers specific, concrete descriptions of what ideal STEELS implementation looks like (and does not look like) in terms of behaviors of teachers and students.[1] These descriptions are organized into subcomponents that include teacher actions, student actions, and classroom snapshots that illustrate various levels of implementation within that area.

Column 1 for each table represents **full implementation** of the STEELS Standards, and when put into practice, the teacher and student actions in that column will lead to the greatest academic outcomes for students. Each table then shows variations to represent all possible ways that innovation might be implemented other than full implementation. Educators may use these variations to recognize classrooms on the journey toward full implementation and identify the factors that will help them move toward full implementation. A complete description of the variations for each area can be found in the Appendix. See an example of the variations below:

A.3: Student questions and prior experiences about phenomena and problems drive coherent learning.

Column 1:	**Column 2:**	**Column 3:**	**Column 4:**
Students ask questions about the phenomena or problems based on their own prior experiences, and the teacher uses these questions to motivate the learning.	Students ask questions about the phenomena or problems based on their own prior experiences, but the teacher does not use these questions to motivate the learning.	The teacher asks the questions about the phenomena or problems that motivate the learning.	Neither students nor teachers ask questions about phenomena or problems; the teacher tells students what they will learn next.

The **STEELS Classroom Implementation Descriptors** illustrate different configurations or ways that teachers could approach implementing the STEELS Standards. Teachers and teams can review their practice and ways they are implementing the STEELS Standards and compare it with those practices presented on the resource.

See additional notes about the organization of the *STEELS Standards Classroom Implementation Descriptors* in the table on the following page.

[1] Hord, S; Stielgelbauer, S; Hall, G; George, A. *Measuring Implementation in Schools: Innovation Configurations*. 2006. SEDL.

Design Considerations of the STEELS Classroom Implementation Descriptors	
☑ **Representations of different variations of implementation.**	⊘ **Not a continuum from "best" to "worst".** While column 1 is full implementation and the highest number is farthest from implementation, the middle variations are not necessarily in progressive order from best to worst. Only column 1 represents full implementation.
☑ **Describing full STEELS classroom implementation in the "1" column.** All "1" columns represent full classroom implementation.	⊘ **Different columns or levels do not necessarily match across subcomponents (e.g., 3 does not always match other 3s), and some subcomponents have different numbers of columns.** Across the different subcomponents, there are different variations represented and all "2", "3", or "4" columns do not necessarily match each other in their level of implementation.
☑ **Classroom examples bring to life one possible way the key area might look.** These examples are intended to illustrate specific, concrete ways the teacher and student actions might play out in a classroom.	⊘ **The classroom examples are not intended to be prescriptive.** Some examples refer to specific routines or phenomena. They are intended as illustrative examples and are not intended to dictate specific curricular requirements. The teacher and student behaviors point to the important aspects that can be seen in the example.
☑ **As a whole, these descriptors define teacher and student behaviors when implementing the STEELS Standards.** Educators can focus on any individual subcomponent to focus improvement efforts, but full implementation is represented by all components.	⊘ **This resource is not inclusive of all best practices in education.** There are many aspects of effective teaching and learning (e.g., classroom management, providing clear directions to students) that are beyond the scope of the STEELS implementation descriptors.
☑ **These descriptors only provide a snapshot of teacher and student behaviors.** These illustrate classroom-level implementation actions.	⊘ **These descriptors do not focus on the system-level components that will be necessary for STEELS implementation.** High-quality resources, adequate instructional time, and a number of other enabling factors need to be in place before students and teachers can move towards ideal implementation in all components.

What are the uses for the *STEELS Classroom Implementation Descriptors*?

This resource is intended to provide a concrete image of what it means to put the STEELS Standards into action. Because STEELS represent a major innovation in both what is taught in classrooms and how it is taught, the *STEELS Classroom Implementation Descriptors* can be helpful in a number of ways including[2]:

- **Communicating a Clear Picture of Implementation —** Defining best practice for educators and those who support them.
- **Evaluating Progress —** Describing and evaluating the implementation of education reforms, including charting progress over years of implementation and contexts. For example:
    - **K–12 teachers** may use it as a self-reflection tool to consider the degree to which they are implementing STEELS in key areas, identifying their strengths, areas for growth, and progress over time.
    - **An instructional coach, school leader, LEA leader, or IU leader** may use it to gather feedback via observations from a group of teachers to determine patterns across classrooms to help inform future support.
- **Informing Professional Learning —** The IC concept has been used to plan professional learning and to evaluate the progress of implementation to develop supports. For example:
    - **A PLC or other collaborative group** may use it when reflecting on a recent lesson and to guide the next steps for instruction.
    - **An instructional coach, teacher leader, school leader, LEA leader, or IU leader** may use it as a coaching tool with individual teachers to reflect on teaching practices and identify focus areas.
    - **Leaders at various levels** may analyze patterns from observations across multiple classrooms to help inform future professional learning.

> **"The IC Map SHOULD NOT be used for teacher evaluation. This is a diagnostic tool and one that can be used for professional development. An IC Map can be useful in thinking about current practice and for getting ideas about what could be done differently. It is not appropriate for teacher evaluation."**
>
> *– Measuring Implementation in Schools: Innovation Configurations*, page 30

Key considerations for use of the resource are outlined in the table on the following page.

[2] Hord et al. *Measuring Implementation in Schools: Innovation Configurations*. 2006. https://sedl.org/cbam/ic_manual_201410.pdf

How the STEELS Classroom Implementation Descriptors **SHOULD** and **SHOULD NOT** be used:	
☑ **Useful to inform concrete action steps to support teachers moving to full implementation of STEELS (represented by Column 1).**	⊘ **Teachers do not need to hit all variations progressively on their way to full implementation.** For example, if a teacher determines their actions currently match the "4" column, they do not necessarily need to hit columns "3" and "2" on their way to "1".
☑ **Assumes the use of quality resources to support instruction.** This resource is designed to be used regardless of curricular program. A high-quality instructional program that includes STEELS innovations paired with professional learning will support teachers to move toward full STEELS implementation.	⊘ **Does not assume teachers must create all of their own lessons, units, and assessments.** Many LEAs have previously expected teachers to develop their own curriculum and resources from scratch. However, the complexity of the shifts required by the STEELS Standards means it is no longer reasonable for teachers to search for and compile their own instructional resources online to plan what they will teach.[3]
☑ **Written as things you might observe in a classroom.** The descriptions in this resource include teacher and student actions one could observe in a classroom.	⊘ **Not expected that all subcomponents would be observable in every class period.** Some components might be more frequently observed than others. In addition, different subcomponents are written at different grain sizes to better illustrate each area of the STEELS Standards implementation.
☑ **Can help identify patterns across a science program to evaluate how implementation is going.** This tool can help identify trends across classrooms and schools to look for strengths and areas of growth while moving to the STEELS Standards.	⊘ **Should not be used to evaluate individual teachers and classrooms.** This resource should not be used in formal teacher evaluation; rather, it should be used as a supportive resource to improve practice.
☑ **Can be helpful to prepare for and reflect on classroom observations.** The level of detail of the *STEELS Classroom Implementation Descriptors* is helpful to gain a clear understanding of what to look for in classrooms, reflect on teacher and student behaviors, and identify next steps to support teachers.	⊘ **Is not currently designed as a classroom walkthrough data collection tool.** The format of the resource includes many details, making it challenging to refer to and use as a data collection tool.

[3] *Frequently Asked Questions: High-Quality Instructional Programs and Resources that Support Pennsylvania STEELS Standards*, Pennsylvania Department of Education. 2025.

What will be needed to move towards full STEELS implementation?

Full implementation of the Pennsylvania STEELS Standards will require coordination and change across system levels. As described in the resource, *Key Considerations and Milestones for Pennsylvania LEAs to Implement the STEELS Standards*:

"Implementation" means to move all parts (e.g., instructional materials, assessments, professional learning) of a school or LEA into alignment with STEELS Standards, a process that results in all students having the opportunity to learn and demonstrate learning of the new learning goals.

Thus, reaching the ideal state as described in the *STEELS Classroom Implementation Descriptors* will require attention to other key system areas including: STEELS Leadership, High-Quality Instructional Programs, High-Quality Professional Learning, High-Quality Assessments, and Adequate, Sustained Support.

- **STEELS Leadership:** LEA leaders, school leaders, and professional learning providers are critical for successful implementation. To read more about how leaders can support and enable teacher and student actions, see the *Pennsylvania STEELS Standards: Administrator Reference Guide*.
- **High-Quality Instructional Programs:** The instructional approach outlined in the ideal column of the STEELS Implementation Descriptors represents a major shift in teaching and learning. High-quality instructional programs will be an essential resource for both teachers and students.
- **High-Quality Professional Learning:** Teachers and leaders will need professional learning to create a clear understanding of STEELS innovations, such as phenomena-based, multi-dimensional learning.
- **High-Quality Assessments:** A system of high-quality, aligned assessments will help provide a full picture of student learning and help educators to build on students' current thinking and adjust instruction in real time.
- **Adequate, Sustained Support:** Full STEELS implementation will be a multi-year process requiring adequate time, funding, and resources for both instruction and teacher learning.

Where can I learn more about each of the Implementation Descriptors?

Each section of the *STEELS Classroom Implementation Descriptors* links to resources where users can learn more about the content of each descriptor. See those links here:

STEELS Classroom Implementation Descriptor Subcomponents	Resources to Learn More
A.1: Phenomena (observable events) or Problems (situations somebody wants to change) are the "Why".	• Using Phenomena in Lessons and Units • Problems with Problems: Improving the Design of Problem-Driven Science and Engineering Instruction • Critical Feature 2.2: Matching the phenomenon or problem to the Disciplinary Core Idea learning goals *(pp. 19-20)* • Qualities of a Good Anchor Phenomenon for a Coherent Sequence of Science Lessons
A.2: Meaningful phenomena and problems are experienced as directly as possible.	• Critical Feature 2.7: Engaging students with relevant and meaningful phenomena, problems, and activities *(pp. 32-33)*
A.3: Student questions and prior experiences about phenomena and problems drive coherent learning.	• Critical Feature 2.5: Supporting students to feel as if they are driving the learning *(pp. 27-29)*
B.1 Students are the "doers" in the classroom, engaging in multi-dimensional learning to make sense of phenomena and solve problems.	• What is multi-dimensional learning with the PA STEELS? • Critical Feature 2.3: Integrating Learning of the Three Dimensions *(pp. 21-23)* • Science and Engineering Practices (SEPs) • Technology and Engineering Practices (TEPs) • Crosscutting Concepts (CCCs) • Disciplinary Core Ideas (DCIs) • Why focus on science and engineering practices--and not "inquiry?" Why is "the scientific method" mistaken? • Why should students learn to plan and carry out investigations in science and engineering?

C.1: Scaffolding strategies support student learning.	• EQuIP Criterion II.E: Differentiated Instruction (pp. 27-29)
C.2: Vocabulary is introduced in context and only after students have learned the related concepts.	• Words for Science Learning: Which Words and When?
D.1: Classroom culture fosters a student-centered learning community.	• How can teachers guide classroom conversations to support students' science learning? • Talk Activities Flowchart • Excerpt from Ready, Set, SCIENCE!; The National Academies Press; 2008
D.2: Students are aware of their own learning and how it can be applied to explain phenomena and solve problems.	• Principle #3: Metacognition from *How Students Learn: History, Mathematics, and Science in the Classroom*
E.1: Assessment tasks support all students to demonstrate use of multiple dimensions to make sense of phenomena or solve problems.	• Assessing STEELS FAQ • TAPS Phenomena Resource • Critical Feature 3.1: Requiring use of multiple dimensions • Critical Feature 3.2: Supporting students with accessible and coherent assessments • SCALE Science Scaffolds Resource
E.2: Assessments are used to support students in progressing with their multi-dimensional thinking.	• Critical Feature 3.3: Including scoring guidance and supporting teachers to provide feedback related to student use of the three dimensions

Appendix

The following table shares the factors that differentiate each column within the subcomponents of the *STEELS Classroom Implementation Descriptors*.

STEELS Classroom Implementation Descriptors: Variation Factors	
Component A. Phenomena and/or Problems	
A.1: Phenomena (observable events) or Problems (situations somebody wants to change) are the "Why".	• Frequency of presence of phenomena/problems • Role of phenomena/problems in instruction • Extent to which activities/learning goals help make sense of phenomena/problems
A.2: Meaningful phenomena and problems are experienced as directly as possible.	• Authenticity • Mode of experiencing phenomena/problems
A.3: Student questions and prior experiences about phenomena and problems drive coherent learning.	• Presence of student questions and experiences about phenomena/problems • Degree to which student questions are used to motivate next steps in sense-making
Component B. Multi-Dimensional Learning	
B.1: Students are the "doers" in the classroom, engaging in multi-dimensional learning to make sense of phenomena and solve problems.	• Presence of grade-appropriate STEELS dimensions • Student-led integration of multiple dimensions to make sense of phenomena/problems
Component C. Reaching All Students through Scaffolding and Language Development	
C.1: Scaffolding strategies support student learning.	• Level of scaffolding to engage students in grade-level learning experiences • Use of scaffolding over time
C.2: Vocabulary is introduced in context and only after students have learned the related concepts.	• Timing of vocabulary introduction • Role of vocabulary in instruction

Component D. Student-Centered Classroom Culture	
D.1: Classroom culture fosters a student-centered learning community.	• Presence of structures for discussion and collaboration • Frequency of use of collaboration and discussion structures
D.2: Students are aware of their own learning and how it can be applied to explain phenomena and solve problems	• Frequency of student reflection opportunities • The extent to which students reflect on learning about more than one dimension • The extent to which students reflect on how learning helped them make sense of phenomena or design solutions to problems
Component E. Multi-Dimensional, Phenomenon- or Problem-Driven Assessment	
E.1: Assessment tasks support all students to demonstrate use of multiple dimensions to make sense of phenomena or solve problems.	• Degree to which tasks elicit understanding of targeted dimensions • Degree to which tasks ask students to use the dimensions to make sense of phenomena or solve problems • Degree to which tasks are accessible enough for students to demonstrate their multi-dimensional thinking
E.2: Assessments are used to support students in progressing with their multi-dimensional thinking.	• Degree to which assessment data is analyzed after assessment is implemented • Degree to which assessments are used for the purpose of supporting learning • Degree to which assessments are used for students to revise their thinking