PA Steels Standards & Storylining

Phenomena-Based, Three-Dimensional Science Teaching and Learning

Goals	Objectives
How can students use scientific reasoning and evidence to explore and explain natural phenomena?	Students will analyze data and observations to construct explanations of natural phenomena using scientific reasoning. Students will support their explanations with evidence from investigations, models, or reliable sources.
In what ways can students engage in inquiry and problem-solving to develop a deeper understanding of scientific concepts?	Students will formulate questions and design investigations to explore scientific concepts. Students will apply problem-solving strategies to interpret data and develop conclusions based on evidence.

Why the Shift?

Shift 1: Focus on Phenomena

Shift 2: Three Dimensional Learning

Shift 3: Supports Equity, Inclusion and Belonging in Science

Shift 1: Phenomena

The new STEELS standards overall focus is the concept of sensemaking, and what better way to engage students' senses than with the study of phenomena? The focus on phenomena shifts traditional Science standards from general knowledge skills into real world application and relevance for the 21st century. This approach engages students, elicits curiosity, and sustains student investigation and observation within their natural world.

Shift 2: Three Dimensional Learning

There are three distinct and equally important dimensions to learning science. These dimensions are combined to form each standard—or performance expectation—and each dimension works with the other two to help students build a cohesive understanding of science over time.

Practices = Green
Disciplinary Core Ideas = Blue
Crosscutting Concepts = Purple

Science, Technology & Engineering, and Environment Literacy & Sustainability (STEELS)

Grade 1

3.1.1.A Life Science: From Molecules to Organisms: Structures and Processes

Students who demonstrate understanding can *use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.*

Clarifying Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.

Assessment Boundary: N/A

Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Crosscutting Concepts (CCC)
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. • Use materials to design a device that solves a specific problem or a solution to a specific problem.	**LS1.A: Structure and Function** • All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. **LS1.D: Information Processing** • Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs.	**Structure and Function** • The shape and stability of structures of natural and designed objects are related to their function(s). ***Connections to Engineering, Technology, and Applications of Science*** **Influence of Science, Engineering and Technology on Society and the Natural World** • Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world.

Pennsylvania Context: Examples of Pennsylvania context include adaptations of Pennsylvania-recognized organisms such as hemlock, mountain laurel, and white-tailed deer.

PA Career Ready Skills: Identify multiple ways to solve conflicts and practice solving problems.

Shift 3: Supports Equity, Inclusion and Belonging in Science

Instructional Approach: The new standards were created with an asset-based approach focused on what students can do rather than what they cannot do or areas of weakness. Instruction should include various learning pathways for students that builds on the skills they already have. Reflection, iteration and feedback are essential to this approach.

Content Area Shifts: Shifts in equity, inclusion and sustainability is not only evident in the language woven throughout the performance expectations but in the chosen focus strands such as “Influence of Society on Technological Development”, “Sustainability and Stewardship”, “Human impact on Earth Systems”, “Ecosystem Dynamics, Functioning, and Resilience”.

Development of the Standards

The new STEELS standards: Science, Technology and Engineering, Environmental Literacy and Sustainability (STEELS) Standards were developed using:

A Framework for K-12 Science Education
Next Generation Science Standards (NGSS)

Illinois Storylines

The **NGSS Illinois Biology Storylines** are designed to engage students in real-world, phenomenon-based learning that aligns with the **Next Generation Science Standards (NGSS)**. Each storyline is structured around an anchoring phenomenon and follows a **three-dimensional learning approach** (Disciplinary Core Ideas, Science and Engineering Practices, and Crosscutting Concepts). Here’s a quick summary of key storylines:

Ecosystems & Human Impact – Students explore ecosystem interactions, biodiversity, and how human activities (such as climate change and deforestation) affect ecosystems.

Inheritance & Variation of Traits – Students investigate how genetic and environmental factors influence traits, including natural selection, mutations, and evolution.

Cellular Processes & Energy – This storyline focuses on photosynthesis, cellular respiration, and the role of energy in sustaining life.

Structure & Function – Students study how cell structures contribute to function, including specialized cells, DNA, and protein synthesis.

Interdependence in Organisms – Explores symbiotic relationships, food webs, and ecosystem dynamics to understand the balance of life.

Evolution & Natural Selection – Students examine fossil evidence, genetic variation, and environmental pressures that drive evolutionary change.

Contact information

BHS Biology Team Presenting Today:

Mrs. Rachele Felix - rfelix@bwschools.net

Mrs. Stephanie Neal sneal@bwschools.net

Mr. Kent Radomsky kradomsky@bwschools.net