

# Wyomissing Area School District



## Curriculum Workshop: STEELS Standards

March 13, 2024

## Participants

- Ms. Andrea Kupiszewski - Grade 6 Science
- Mrs. Lauren Neithamer - Grade 7 Science
- Mrs. Robin Kline - Grade 5 Science
- Dr. John Yoder - Grade 8 and HS Science
- Ms. Kami Fecho - JSHS Instructional Coach
- Dr. Melissa Woodard - Assistant Superintendent

## Agenda/Outline

- Engage in an Anchoring Phenomenon Experience
- Discussion - Changes in Instructional Practice
- Share experiences related to Professional Learning and Implementation of Piloted Resources (Coaching Support)
- Discussion - Evolution of Student Learning
- Discussion - Evidence of Student Learning
- Present Overview of STEELS Standards

## Staying Cool

I've been buying iced drinks for years using the regular cup, but my drink always warms up and waters down. The designers of the fancy cup claim the cup can keep a drink colder for longer.

Fancy cup

Regular cup



### Turn and Talk

- Why does the drink in the regular cup warm up?
- How could the fancy cup keep the drink from warming up?

**Claim: The fancy cup works better than the regular cup.**

How could we test this claim?

What evidence could we collect to prove or disprove the claim?

**Fancy cup**

**Regular cup**



## Stop and Jot

1. Write the claim.
2. Write how you could test the claim and the evidence you want to collect.

→ Be prepared to share with the class.

# Cold Cup Test



Below your Stop and Jot ideas, draw a data table following your teacher's instructions.

*Cold Cup Test*

*Claim: The fancy cup works better than the regular cup.*

*We could test this by...*

	1	10	20	30	Temp change
<i>Regular cup</i>					
<i>Fancy cup</i>					

# Systems we are trying to explain

## The Cup Systems



**Fancy cup**

**Regular cup**



## Turn and Talk

- What are the parts of each cup system?
- What does each part do in the system?
- How do the parts work together to keep a drink cold?

# Cup Systems Models

Draw systems models for the regular cup and fancy cup.

**Your models should explain how the drink in the regular cup warms up and how the fancy cup could keep the drink colder for longer.**



*Cup System Models*

*Regular cup*

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*Fancy cup*

*Cold Cup Test*

*Claim: The fancy cup works better than the regular cup.*

*We could test this by...*

	1	10	20	30	Temp change
<i>Regular cup</i>					
<i>Fancy cup</i>					



# Initial conclusions and home learning



## Discuss

- What conclusions can we draw from the temperature data?



## Home learning

- What systems keep something inside them the same temperature (either hot or cold) without using electricity?

# What Does STEELS Stand For?

**S - Science**

**T - Technology**

**E - Engineering**

**E - Environmental**

**L - Literacy &**

**S - Sustainability**

**Standards!**

# STEELS Standards

- Standards are performance expectations
- Guide the study of the natural and human-made world through inquiry, problem-solving, critical thinking, and authentic exploration
- All standards are three-dimensional
  - Three components
    - Disciplinary Core Ideas (DCI)
    - Science and Engineering Practices (SEP)
    - Cross-Cutting Concepts (CCC)

The integration of these disciplines in the standards highlights the interconnectedness of scientific, technological and engineering-focused study; the integral relationship between humans and the environment; and the importance of integrating the teaching and learning of science, technology and engineering.

- Asking questions (for science) and defining problems (for engineering)
- **Developing and using models**
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations (for science) and designing solutions (for engineering)
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

## Crosscutting Concepts



- Patterns
- Cause and effect
- Scale, proportion, and quantity
- **Systems and system models**
- Energy and matter
- Structure and function
- Stability and change

## Shift in Focus: Students will...

- Engage in **science and engineering practices** as part of sustained and meaningful investigations applying **disciplinary core ideas** and **cross-cutting concepts**.
- Explain phenomena by developing and applying the **science and engineering practices, disciplinary core ideas, and crosscutting concepts** in a real-world context.
- Utilize critical thinking and problem-solving to apply knowledge in novel, real-world situations.

# STEELS Standards

(STEELS)

## TABLE OF CONTENTS

### 3.1 Life Science

Structure and Function  
Growth and Development of Organisms  
Organization for Matter and Energy Flow in Organisms  
Information Processing  
Interdependent Relationships in Ecosystems  
Cycles of Matter and Energy Transfer in Ecosystems  
Ecosystem Dynamics, Functioning, and Resilience  
Social Interactions and Group Behavior  
Inheritance of Traits  
Variation of Traits  
Evidence of Common Ancestry and Diversity  
Natural Selection  
Adaptation  
Biodiversity and Humans

### 3.2 Physical Science

Structure and Properties of Matter  
Chemical Reactions  
Nuclear Processes  
Forces and Motion  
Types of Interactions  
Definitions of Energy  
Conservation of Energy and Energy Transfer  
Relationship Between Energy and Forces  
Energy in Chemical Processes and Everyday Life  
Wave Properties  
Electromagnetic Radiation  
Information Technologies and Instrumentation

### 3.3 Earth and Space Science

The Universe and Its Stars  
Earth and the Solar System  
The History of Planet Earth  
Earth Materials and Systems  
Plate Tectonics and Large-Scale Interactions  
The Role of Water in Earth's Surface Processes  
Weather and Climate  
Biogeology  
Natural Resources  
Natural Hazards  
Human Impact on Earth System

### 3.4 Environmental Literacy and Sustainability

Agricultural and Environmental Systems and Resources  
Agricultural Systems  
Environment and Society  
Watersheds and Wetlands  
Environmental Literacy Skills  
Investigating Environmental Issues  
Environmental Experiences  
Evaluating Solutions  
Sustainability and Stewardship  
Environmental Sustainability  
Environmental Stewardship  
Environmental Justice

### 3.5 Technology and Engineering

Applying, Maintaining, and Assessing Technological Products and Systems  
Impacts of Technology  
Influence of Society on Technological Development  
Design in Technology and Engineering Education  
Integration of Knowledge, Technologies, and Practices  
Nature and Characteristics of Technology and Engineering  
Core Concepts of Technology and Engineering  
History of Technology

# Physical Science

3.2 Physical Science								
3.2	Students who demonstrate understanding can:							
Strand	Kindergarten	1	2	3	4	5	6–8	9–12
Conservation of Energy and Energy Transfer	<p><b>3.2.K.C</b> Make observations to determine the effect of sunlight on Earth's surface.</p> <p><b>3.2.K.D</b> Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.</p>	Intentionally Blank	Intentionally Blank	Intentionally Blank	<p><b>3.2.4.B</b> Make and communicate observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.</p>	Intentionally Blank	<p><b>3.2.6-8.M</b> Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.</p> <p><b>3.2.6-8.N</b> Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.</p> <p><b>3.2.6-8.O</b> Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.</p>	<p><b>3.2.9-12.R</b> Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).</p>



# Earth and Space Science

3.3 Earth and Space Science								
3.3	Students who demonstrate understanding can:							
Strand	Kindergarten	1	2	3	4	5	6–8	9–12
Earth Materials and Systems	Intentionally Blank	Intentionally Blank	<p><b>3.3.2.B</b></p> <p>Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.</p>	Intentionally Blank	<p><b>3.3.4.B</b></p> <p>Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.</p>	<p><b>3.3.5.C</b></p> <p>Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.</p>	<p><b>3.3.6-8.E</b></p> <p>Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.</p>	<p><b>3.3.9-12.H</b></p> <p>Analyze geoscience data to make the claim that one change to Earth's surface can create feedback that causes changes to other Earth systems.</p>
								<p><b>3.3.6-8.F</b></p> <p>Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.</p>
Plate Tectonics and Large-Scale System Interactions	Intentionally Blank	Intentionally Blank	<p><b>3.3.2.C</b></p> <p>Develop a model to represent the shapes and kinds of land and bodies of water in an area.</p>	Intentionally Blank	<p><b>3.3.4.C</b></p> <p>Analyze and interpret data from maps to describe patterns of Earth's features.</p>	Intentionally Blank	<p><b>3.3.6-8.G</b></p> <p>Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of past plate motions.</p>	<p><b>3.3.9-12.J</b></p> <p>Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.</p>

# Environmental Literacy and Sustainability

3.4 Environmental Literacy & Sustainability				
3.4	Students who demonstrate understanding can:			
Strand	K–2	3–5	6–8	9–12
<b>Agricultural and Environmental Systems and Resources</b> Agricultural Systems	<a href="#">3.4.K-2.A</a> Categorize ways people harvest, redistribute, and use natural resources.	<a href="#">3.4.3-5.A</a> Analyze how living organisms, including humans, affect the environment in which they live, and how their environment affects them.	<a href="#">3.4.6-8.A</a> Develop a model to describe how agricultural and food systems function, including the sustainable use of natural resources and the production, processing, and management of food, fiber, and energy.	<a href="#">3.4.9-12.A</a> Analyze and interpret how issues, trends, technologies, and policies impact agricultural, food, and environmental systems and resources.
<b>Agricultural and Environmental Systems and Resources</b> Environment and Society	<a href="#">3.4.K-2.B</a> Examine how people from different cultures and communities, including one’s own, interact and express their beliefs about nature.	<a href="#">3.4.3-5.B</a> Make a claim about the environmental and social impacts of design solutions and civic actions, including their own actions.	<a href="#">3.4.6-8.B</a> Analyze and interpret data about how different societies (economic and social systems) and cultures use and manage natural resources differently.	<a href="#">3.4.9-12.B</a> Apply research and analytical skills to evaluate the conditions and motivations that lead to conflict, cooperation, and change among individuals, groups, and nations.
<b>Agricultural and Environmental Systems and Resources</b> Watersheds and Wetlands	Refer to other standards in this document to build a learning progression.	<a href="#">3.4.3-5.C</a> Examine ways you influence your local environment and community by collecting and displaying data.	<a href="#">3.4.6-8.C</a> Develop a model to describe how watersheds and wetlands function as systems, including the roles and functions they serve.	<a href="#">3.4.9-12.C</a> Analyze and interpret how issues, trends, technologies, and policies impact watersheds and water resources.
<b>Environmental Literacy Skills</b> Investigating Environmental Issues	Refer to other standards in this document to build a learning progression.	<a href="#">3.4.3-5.D</a> Develop a model to demonstrate how local environmental issues are connected to larger local environment and human systems.	<a href="#">3.4.6-8.D</a> Gather, read, and synthesize information from multiple sources to investigate how Pennsylvania environmental issues affect Pennsylvania’s human and natural systems.	<a href="#">3.4.9-12.D</a> Apply research and analytical skills to systematically investigate environmental issues ranging from local issues to those that are regional or global in scope.
<b>Environmental Literacy Skills</b> Environmental Experiences	<a href="#">3.4.K-2.C</a> Explain ways that places differ in their physical characteristics, their meaning, and their value and/or importance.	Refer to other standards in this document to build a learning progression.	<a href="#">3.4.6-8.E</a> Collect, analyze, and interpret environmental data to describe a local environment.	<a href="#">3.4.9-12.E</a> Plan and conduct an investigation utilizing environmental data about a local environmental issue.
<b>Environmental Literacy Skills</b> Evaluating Solutions	Refer to other standards in this document to build a learning progression.	<a href="#">3.4.3-5.E</a> Construct an argument to support whether action is needed on a selected environmental issue and propose possible solutions.	<a href="#">3.4.6-8.F</a> Obtain and communicate information on how integrated pest management could improve indoor and outdoor environments.	<a href="#">3.4.9-12.F</a> Evaluate and communicate the effect of integrated pest management practices on indoor and outdoor environments.

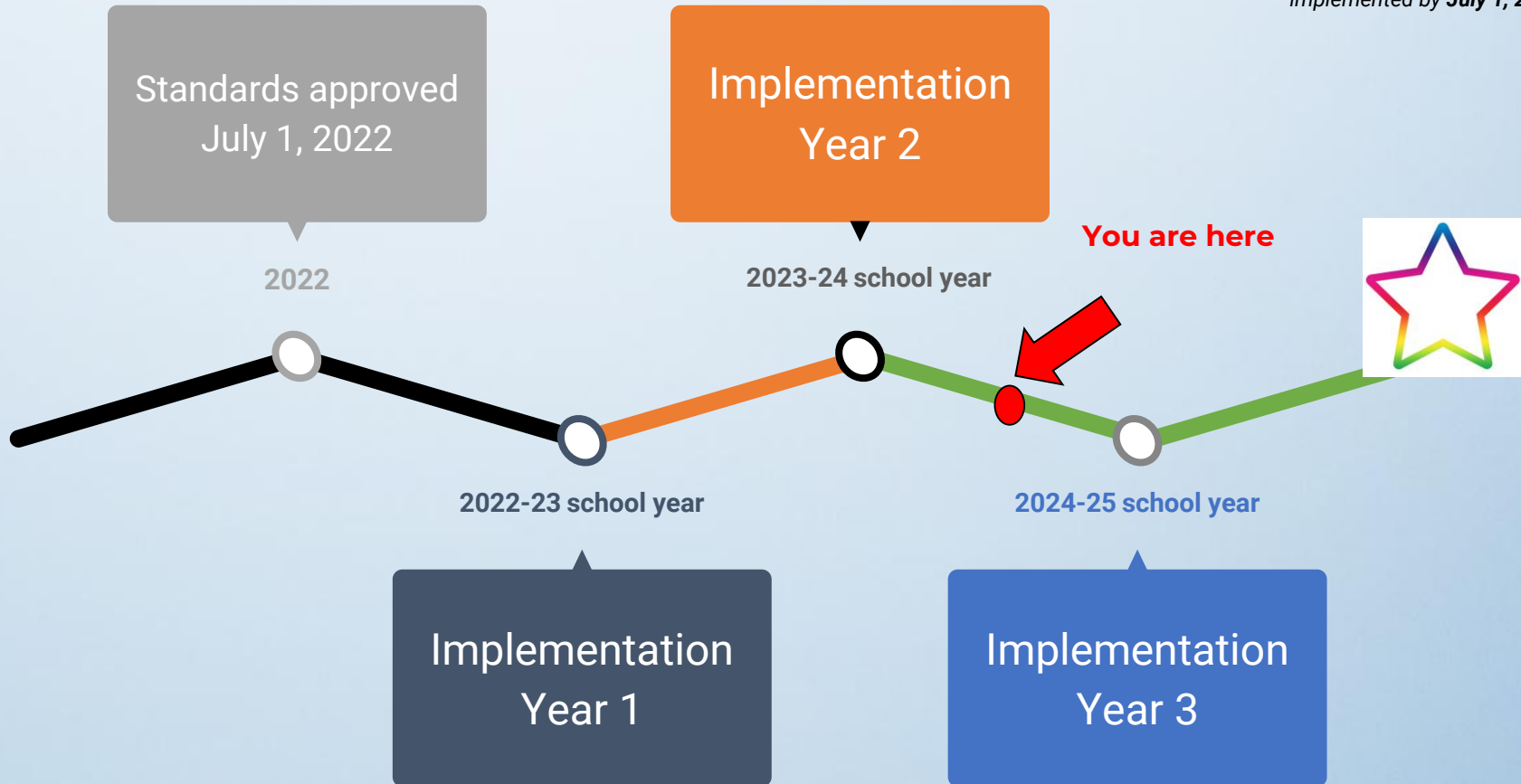
# Technology and Engineering

## 3.5 Technology & Engineering

	K-2	3-5	6-8	9-12
<p><b>Applying , Maintaining, and Assessing Technological Products and Systems</b></p> <p><b>Impacts of Technology</b></p> <p><b>Influence of Society on Technological Development</b></p>	<p><b>3.5.K-2.E</b> Illustrate helpful and harmful effects of technology.</p>	<p><b>3.5.3-5.G</b> Describe the helpful and harmful effects of technology.</p>	<p><b>3.5.6-8.E</b> Consider the impacts of a proposed or existing technology and devise strategies for reducing, reusing, and recycling waste caused by its creation.</p>	<p><b>3.5.9-12.D</b> Critique whether existing or proposed technologies use resources sustainably.</p>
	<p><b>3.5.K-2.F</b> Investigate the use of technologies in the home and community.</p>	<p><b>3.5.3-5.H</b> Determine factors that influence changes in a society's technological systems or infrastructure.</p>	<p><b>3.5.6-8.F</b> Analyze examples of technologies that have changed the way people think, interact, live, and communicate.</p>	<p><b>3.5.9-12.E</b> Evaluate how technology and engineering advancements alter human health and capabilities.</p>
	<p><b>3.5.K-2.G</b> Explain the tools and techniques that people use to help them do things.</p>	<p><b>3.5.3-5.I</b> Design solutions by safely using tools, materials, and skills.</p>	Intentionally Blank	Intentionally Blank
	<p><b>3.5.K-2.H</b> Explain the needs and wants of individuals and societies.</p>	<p><b>3.5.3-5.J</b> Explain how technologies are developed or adapted when individual or societal needs and wants change.</p>	<p><b>3.5.6-8.G</b> Analyze how an invention or innovation was influenced by the context and circumstances in which it is developed.</p>	<p><b>3.5.9-12.F</b> Evaluate a technological innovation that arose from a specific society's unique need or want.</p>
	<p><b>3.5.K-2.I</b> Compare simple technologies to evaluate their impacts.</p>	<p><b>3.5.3-5.K</b> Judge technologies to determine the best one to use to complete a given task or meet a need.</p>	<p><b>3.5.6-8.H</b> Evaluate trade-offs based on various perspectives as part of a decision process that recognizes the need for careful compromises among competing factors.</p>	<p><b>3.5.9-12.G</b> Evaluate a technological innovation that was met with societal resistance impacting its development.</p>
	<p><b>3.5.K-2.J</b> Design new technologies that could improve their daily lives.</p>	Intentionally Blank	<p><b>3.5.6-8.I</b> Examine the ways that technology can have both positive and negative effects at the same time.</p>	<p><b>3.5.9-12.H</b> Evaluate ways that technology and engineering can impact individuals, society, and the environment.</p> <p><b>3.5.9-12.I (ETS)</b> Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.</p>

# Timeline to Implementation

All districts are expected to have the new standards fully implemented by **July 1, 2025**.



**Questions?**