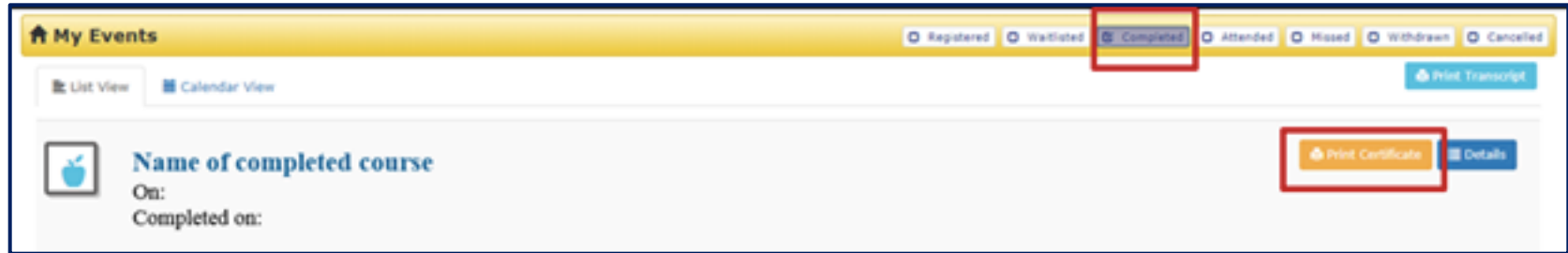


WELCOME!

Please review this information while we wait for all to join!

Attendance, Resources & PD Clock Hours

- **You must stay on the whole time- 1 hour- to receive credit**
- **YOU print your certificate through ADE Connect- please wait 24-48 hours of webinar before printing certificates**



- **AFTER WEBINAR- you will receive PDF of presentation and resource page**



A Look at Arizona's New Science Standards

Webinar Goals:

- Explain the instructional shifts represented by Arizona's 2018 Science Standards.
- Discuss the implementation timeline.
- Define 3-Dimensional science instruction.
- Learn how to identify the 3-dimensions in the standard
- Q&A time



Scan me

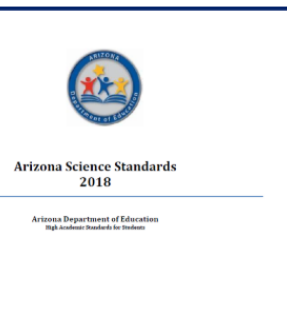
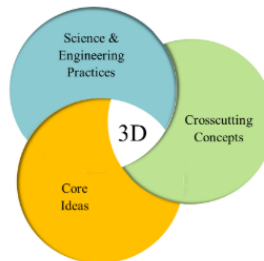
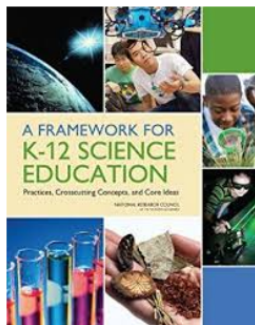
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#K12AZPD

#K12Standards



A Look at Arizona's New Science Standards



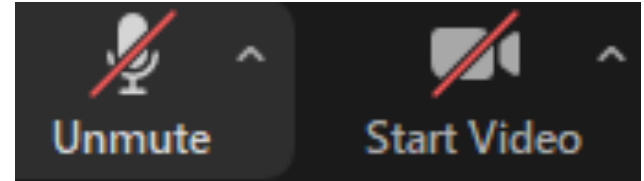
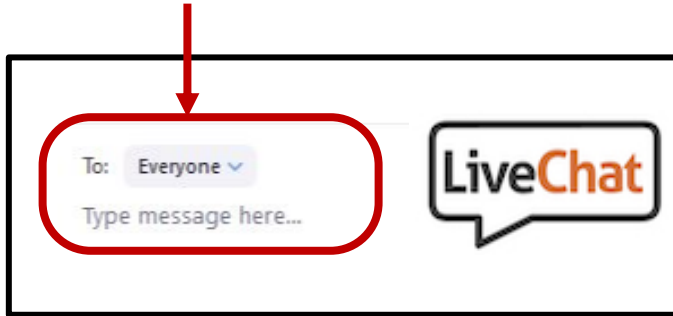
Hi!

I'm Rebecca Garelli

ADE K-12 Science & STEM Specialist



Webinar Norms:



INTRODUCE YOURSELF



1. What is your current position or job title?
2. Have you had a chance to look at the new Arizona State Science Standards?

Objectives:

Introduction to the 2018 Science Standards

Educators will be able to:

- explain the instructional shifts represented by Arizona's 2018 Science Standards.
- discuss the implementation timeline.
- define 3-Dimensional science instruction.



Objectives:

Introduction to the 2018 Science Standards

Educators will be able to:

- explain the instructional shifts represented by Arizona's 2018 Science Standards.
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What instructional shifts NEW AZ Science

What would you see less of?

What would you see more of?



What are 3-5 items that resonate with you?

A New Vision for Science Education

Implications of the Vision of the Framework for K-12
Science Education and the Arizona Science Standards

SCIENCE EDUCATION WILL INVOLVE LESS:	SCIENCE EDUCATION WILL INVOLVE MORE:
Rote memorization of facts and terminology	Facts and terminology learned as needed while developing explanations and designing solutions supported by evidence-based arguments and reasoning.
Learning of ideas disconnected from questions about phenomena	Systems thinking and modeling to explain phenomena and to give a context for the ideas to be learned
Teachers providing information to the whole class	Students conducting investigations, solving problems, and engaging in discussions with teachers' guidance
Teachers posing questions with only one right answer	Students discussing open-ended questions that focus on the strength of the evidence used to generate claims
Students reading textbooks and answering questions at the end of the chapter	Students reading multiple sources, including science-related magazine and journal articles and web-based resources; students developing summaries of information.
Pre-planned outcome for "cookbook" laboratories or hands-on activities	Multiple investigations driven by students' questions with a range of possible outcomes that collectively lead to a deep understanding of established core scientific ideas
Worksheets	Student writing of journals, reports, posters, and media presentations that explain and argue
Oversimplification of activities for students who are perceived to be less able to do science and engineering	Provision of supports so that all students can engage in sophisticated science and engineering practices



Less of this..... More of this.....

In a science classroom you would see **less** of.....

In a science classroom you would see more of.....



Objectives:

Introduction to the 2018 Science Standards

Educators will be able to:

- explain the instructional shifts represented by Arizona's 2018 Science Standards.
- discuss the implementation timeline.
- define 3-Dimensional science instruction.



Science Standards Resources

NEW STANDARDS (2018)

(Adopted October 2018)

[Complete Standards document](#) | [PDF](#)

NEW STANDARDS SUPPORT MATERIALS

▶ Grades K-2

▶ Grades 3-5

▶ Grades 6-8

▶ High School

▶ Planning Tools *NEW

▶ Administrator Tool Kit *NEW

▶ Vertical Progressions

▶ Distribution of Core Ideas

PROFESSIONAL DEVELOPMENT VIDEOS

▶ Recorded Webinars

▶ Science Standards Videos

▶ Timeline and Resources

Science Resources

i SCI Revision Info

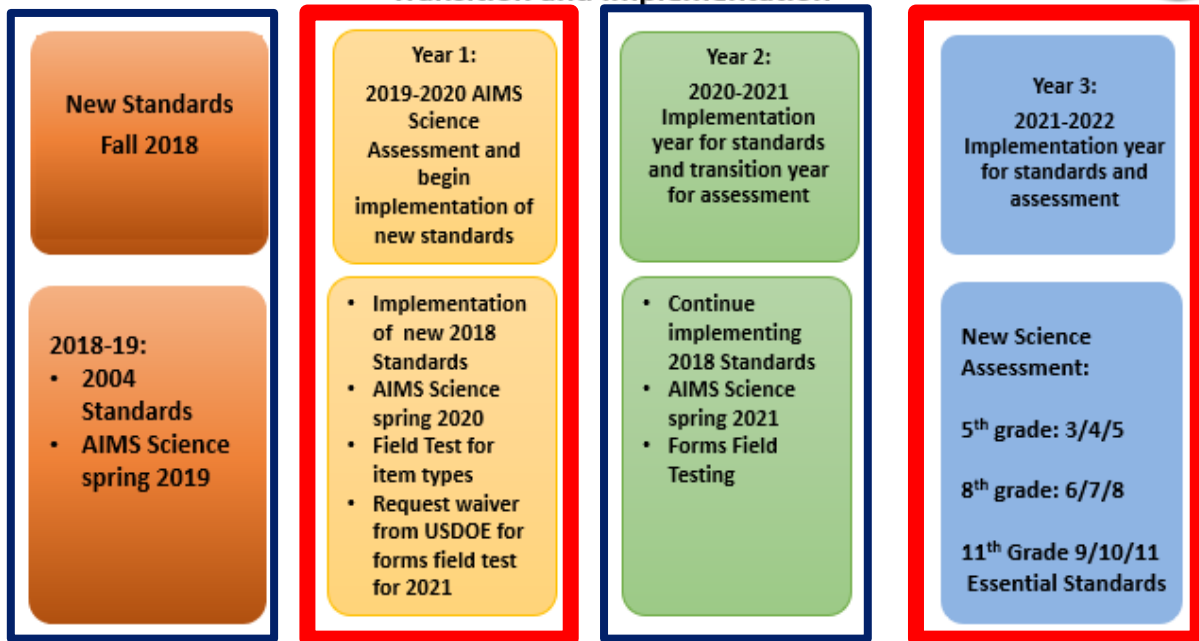
👥 SCI Prof. Dev. Opportunities

<https://www.azed.gov/standards-practices/k-12standards/standards-science/>





Arizona Science Standards and Assessment Transition and Implementation



ADE: Provides Phase 1 of guidance implementation
with documents and introductory webinars as professional development
(January- April, 2019)

Updated: 11/3/18

- Please note the timeline for implementation of the new science standards and science assessment is tentative. As the implementation process evolves, ADE will solicit input from various stakeholders and share information regarding updates as necessary.





SCIENCE STANDARDS

Transitional Implementation Plan



Implement

Continue to implement

Full implementation

2019-2020

2018 Science
Standards

Kindergarten, First,
Second, **★Third, ★Sixth**
and **★Ninth**

2020-2021

2018 Science
Standards

Phase in
★Fourth, ★Seventh and
★Tenth

2021-2022

2018 Science
Standards

ALL grade
levels

★ It is suggested that **all grades should be at full implementation in the 2019-2020** school year. If a transitional implementation plan is necessary, a suggested plan is listed above.



How Does It All Work?

Standards

What a student needs to know, understand, and be able to do by the end of each grade. Standards build across grade levels in a progression of increasing understanding and through a range of cognitive demand levels. Standards are adopted at the state level by the State Board of Education.

Curriculum

The resources used for teaching and learning the standards. Curricula are adopted at a local level by districts and schools.

Instruction

The methods used by teachers to teach their students. Instructional techniques are employed by individual teachers in response to the needs of the students in their classes to help them progress through the curriculum in order to master the standards.



Try to explain the difference in 9 words or less.



The New Arizona Science Standards

Standards versus Performance Objectives

Content Standards

Standards are what students need to know, understand, and be able to do by the end of each grade level. Standards build across grade levels in a progression of increasing understanding and through a range of cognitive demand levels.

Performance Objectives

Performance Objectives are incremental steps toward mastery of individual content standards. Performance Objectives are knowledge and skills that a student must demonstrate at each grade level. Performance objectives do not imply a progression of learning and, because they are discrete skills, reach a limited level of cognitive demand.



Standards	Performance Objectives
<ul style="list-style-type: none"> • Broad and overarching • Higher depth of knowledge • Open-ended questions • Evidence-based, connected answers • Deep and connected learning • Reoccurring • Spiral • Multiple opportunities for assessment 	<ul style="list-style-type: none"> • Small scope • Lower depth of knowledge • Teacher-generated questions • Limited Answers • Shallow knowledge • One-and-done • Linear • Single opportunity for assessment



**What stands out to you as a big difference between a standard and a performance objective?
What are the implications?**

Compare the 2004 Science Standards to the 2018 Standards

Concept 3: Energy and Magnetism

Investigate different forms of energy.

PO 1. Demonstrate that electricity flowing in circuits can produce light, heat, sound, and magnetic effects.

PO 2. Construct series and parallel electric circuits.

PO 3. Explain the purpose of conductors and insulators in various practical applications.

PO 4. Investigate the characteristics of magnets (e.g., opposite poles attract, like poles repel, the force between two magnet poles depends on the distance between them).

PO 5. State cause and effect relationships between magnets and circuitry.

Physical Science Standards

4.P4U1.1

Develop and use a model to demonstrate how a system transfers energy from one object to another even when the objects are not touching.

4.P4U1.2

Develop and use a model that explains how energy is moved from place to place through electric currents.

4.P2U1.3

Develop and use a model to demonstrate magnetic forces.

4.P4U3.4

Engage in argument from evidence on the use and impact of renewable and nonrenewable resources to generate electricity.

Objectives:

Introduction to the 2018 Science Standards

Educators will be able to:

- explain the instructional shifts represented by Arizona's 2018 Science Standards.
- discuss the implementation timeline.
- define 3-Dimensional science instruction.

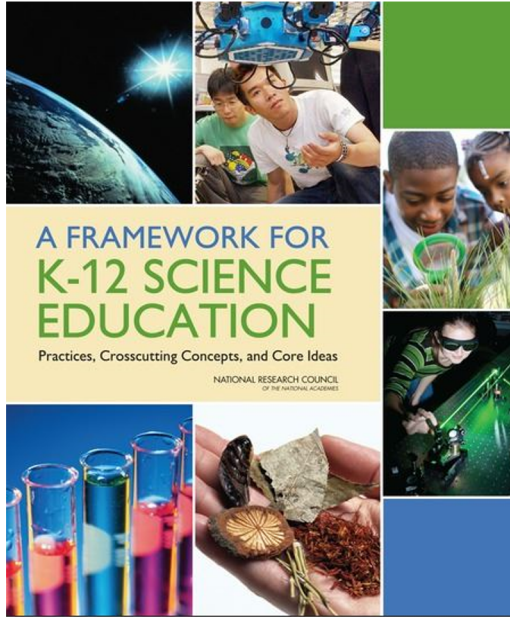


Attendance and PD Clock Hours

- **You must stay on the whole time- 1 hour, take attendance at end**
- **You print your certificate through ADE Connect AFTER I take attendance and put into the system within 24-48 hours of webinar**



NGSS



AzSS



Working with
Big Ideas
of Science Education

Edited by Wynne Harlen

with Derek Bell, Rosa Devlin, Hubert Dyrni,
Guillermo Fernández de la Garza, Reme Lema,
Robin Miller, Michael Reiss, Patricia Rowell and Wei Yu

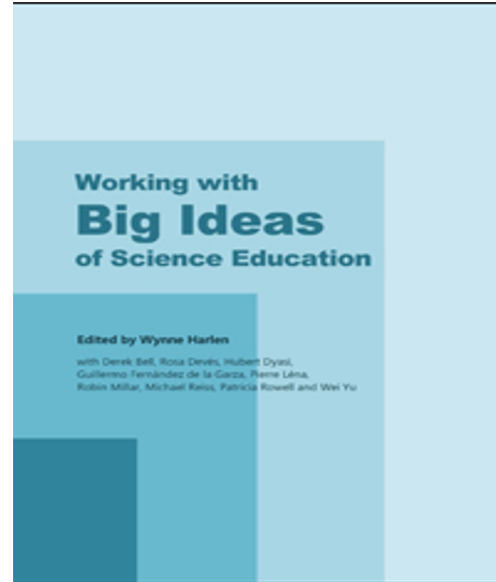
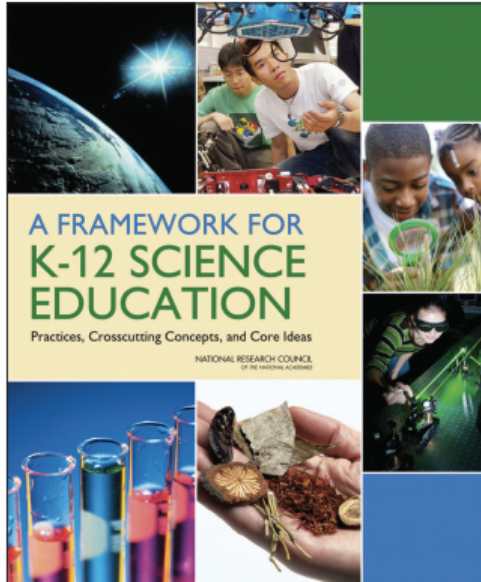
AzSS



Arizona Science Standards (AzSS)



What Is 3-Dimensional Science Instruction?



FREE DOWNLOADS! I WILL ALSO SEND TO YOU 😊



What Is 3- Dimensional Science Instruction?

A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas



3

Dimension 1 SCIENTIFIC AND ENGINEERING PRACTICES

From its inception, one of the principal goals of science education is to cultivate students' scientific habits of mind, develop the capacity to engage in scientific inquiry, and teach them how to reason in context [1, 2]. There has always been a tension, however, between the emphasis placed on developing knowledge of the content and the unfortunate consequence of leaving students with naive conceptions of the nature of scientific inquiry [3] and the impression that science is a collection of isolated facts [4].

This chapter stresses the importance of developing student understanding of how science and engineering achieve their ends while also strengthening their capacity with related practices. As previously noted, we use the term "practices" instead of a term such as "skills," to stress that engaging in science requires coordination both of knowledge and skill simultaneously.

In the chapter's three major sections, we first articulate why science and engineering practices are important for K-12 students. We then describe in detail eight practices we consider essential for learning science and engineering in grades K-12 (see box 3-1). Finally, we conclude that these practices support a better understanding of how scientific knowledge is produced and how engineering solutions are developed. Such an understanding helps students become more critical consumers of scientific information.

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A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas



4

Dimension 2 CROSSCUTTING CONCEPTS

Some important themes pervade science, mathematics, and technology and appear in one form or another, whether we are looking at an ancient civilization, the human body, or a modern society. They are ideas that transcend disciplinary boundaries and prove fruitful in explanation, in theory, in observation, and in design.

—American Association for the Advancement of Science

In this chapter, we describe concepts that bridge disciplinary boundaries and have explanatory value throughout much of science and engineering. These concepts were selected for their value across the sciences and in engineering. These concepts help provide students with an organizational framework for connecting knowledge from the various disciplines into a coherent and scientifically based view of the world.

Although crosscutting concepts are fundamental to an understanding of science and engineering, students have often been expected to build such knowledge without any explicit instructional support. Hence the purpose of highlighting these concepts in Dimension 2 of the framework is to elevate their role in the development of standards, curricula, instruction, and assessments. These concepts should be common and familiar touchstones across the disciplines and grade levels. Reference to the concepts, as well as their emergence in multiple disciplinary contexts, can help students develop a cumulative, coherent, and usable understanding of science and engineering.

Although we do not specify grade band endpoints for the crosscutting concepts, we do lay out a hypothetical progression for each. Like all learning

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A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas



5

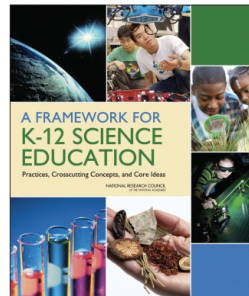
Dimension 3 DISCIPLINARY CORE IDEAS— PHYSICAL SCIENCES

Most systems or processes depend at some level on physical and chemical subprocesses that occur within them, whether the system in question is a star, Earth's atmosphere, a river, a bicycle, the human brain, or a living cell. Large-scale systems often have emergent properties that cannot be explained on the basis of atomic-scale processes; nevertheless, to understand the physical and chemical basis of a system, one must ultimately consider the structure of matter at the atomic and subatomic scales to discover how it influences the system's larger-scale structures, properties, and functions. Similarly, understanding a process at any scale requires awareness of the interactions occurring—in terms of the forces between objects, the related energy transfers, and their consequences. In this way, the physical sciences—physics and chemistry—underlie all natural and human-created phenomena, although other kinds of information transfers, such as those facilitated by the genetic code or communicated between organisms, may also be critical to understanding their behavior. An overarching goal for learning in the physical sciences, therefore, is to help students see that there are mechanisms of cause and effect in all systems and processes that can be understood through a common set of physical and chemical principles.

The committee developed four core ideas in the physical sciences—three of which parallel those identified in previous documents, including the *National Science Education Standards and Frameworks for Science Literacy* [1, 2]. The three core ideas are PS1: Matter and Its Interactions, PS2: Motion and Stability: Forces and Interactions, and PS3: Energy.

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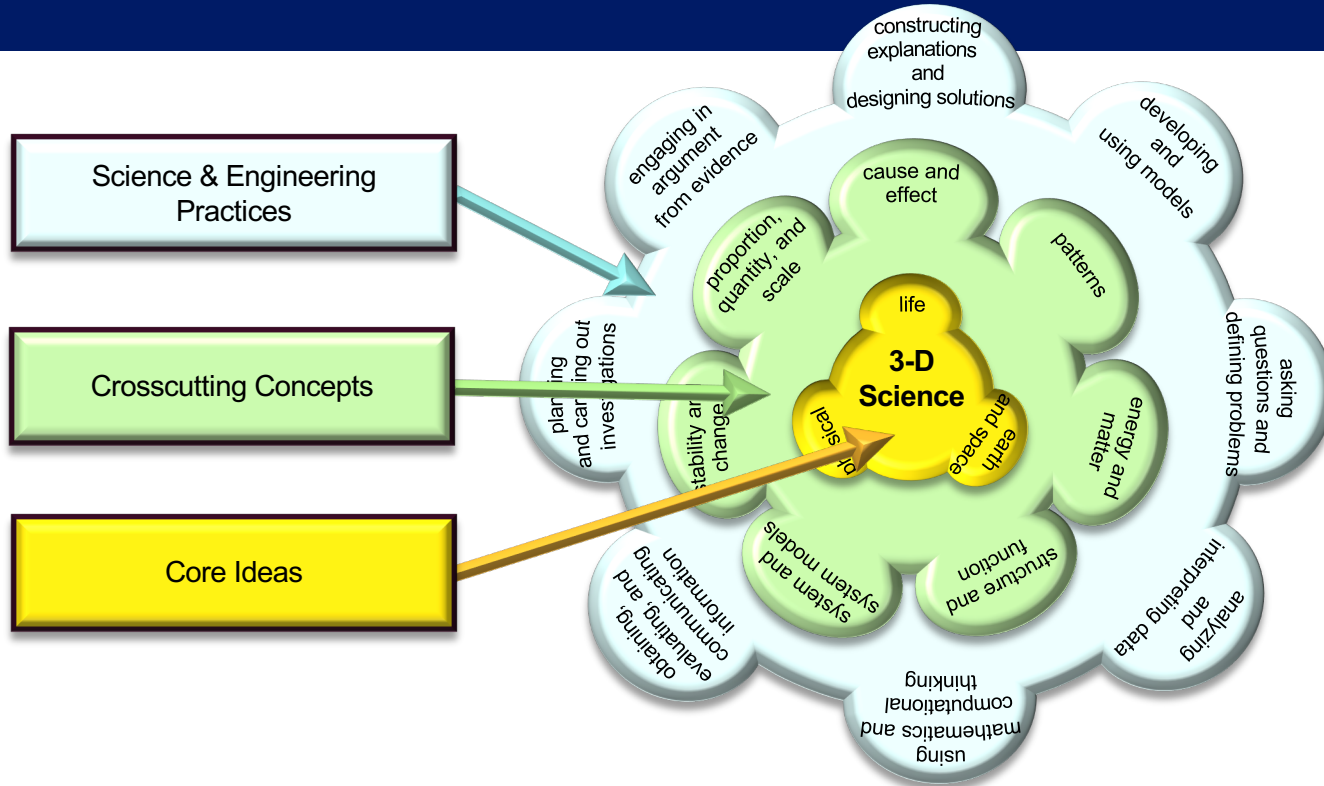
A FRAMEWORK FOR
K-12 SCIENCE
EDUCATION

Practices, Crosscutting Concepts, and Core Ideas

www.nap.edu/science

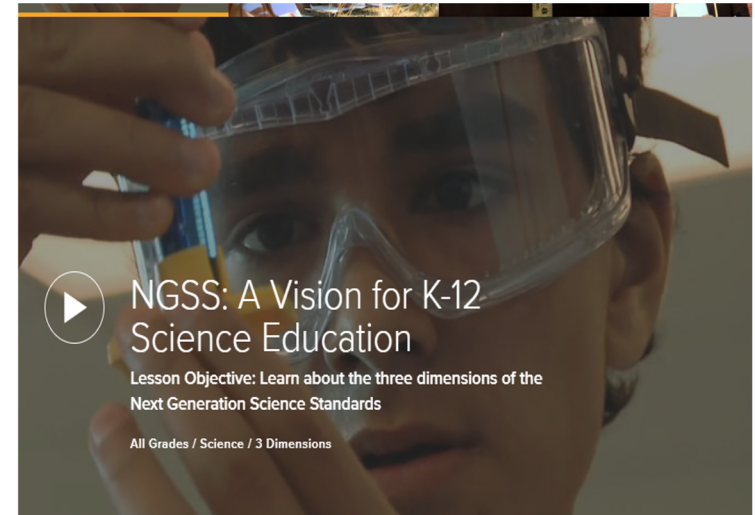


What is 3-Dimensional Science Instruction?



What Is 3-Dimensional Science Instruction

- How do the Arizona Science Standards represent a shift in science education?
- What do the teachers in this video learn from engaging with 3-dimensional science instruction?
- How do the three dimensions work together?



What Is 3-Dimensional Science Instruction?



1. How do the Arizona Science Standards represent a shift in science education?
2. What do the teachers in this video learn from engaging with 3-dimensional science instruction?
3. How do the three dimensions work together?

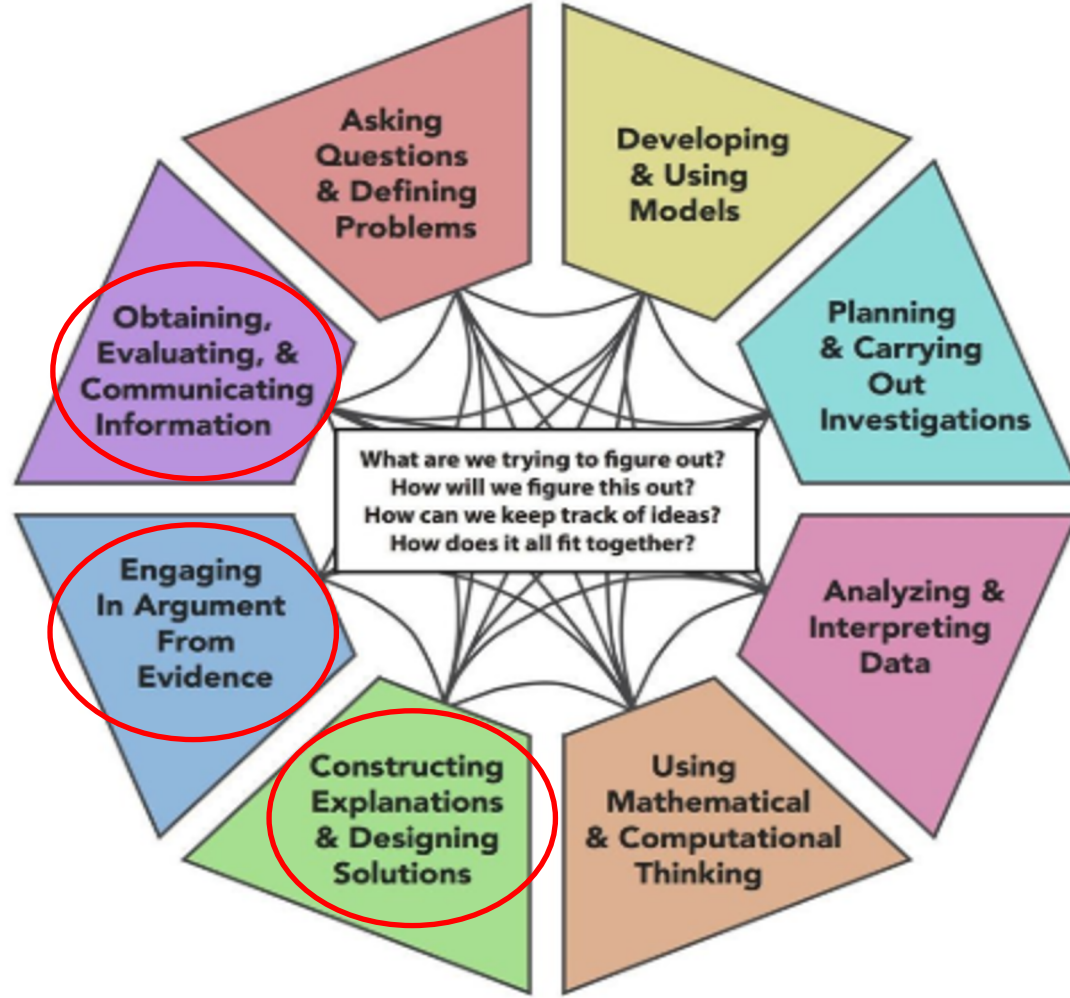
Science and Engineering Practices

Dimension 1 What we do

1. Asking Questions and Defining Problems
2. Developing and Using Models
3. Planning and Carrying Out Investigations
4. Analyzing and Interpreting Data
5. Using Mathematics and Computational Thinking
6. Constructing Explanations and Designing Solutions
7. Engaging in Argument from Evidence
8. Obtaining, Evaluating, and Communicating Information



Schwarz, C. V., Passmore, C. M., & Reiser, B. J. (2017). Moving beyond "knowing" science to making sense of the world. In C. V. Schwarz, C. M. Passmore & B. J. Reiser (Eds.), *Helping students make sense of the world through next generation science and engineering practices* (pp. 3-21). Arlington, VA: NSTA Press.



Dimension 2

How we think

Crosscutting Concepts

1. Patterns
2. Cause and effect
3. Structure and Function
4. Energy and Matter
5. Systems and System Models
6. Scale, Proportion and Quantity
7. Stability and Change





WEATHER

Cause &
Effect?

Scale,
Proportion,
Quantity?

Systems &
System
Models?

Patterns?

Energy &
Matter?

Stability &
Change?

Structure &
Function?

Dimension 3: Core Ideas for Knowing Science

What We Learn

Physical Science

- P1: All matter in the Universe is made of very small particles.
- P2: Objects can affect other objects at a distance.
- P3: Changing the movement of an object requires a net force to be acting on it.
- P4: The total amount of energy in a closed system is always the same but can be transferred from one energy store to another during an event.

Earth and Space

- E1: The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth's surface and its climate.
- E2: The Earth and our solar system are a very small part of one of many galaxies within the Universe.

Life Science

- L1: Organisms are organized on a cellular basis and have a finite life span.
- L2: Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms.
- L3: Genetic information is passed down from one generation of organisms to another.
- L4: The unity and diversity of organisms, living and extinct, is the result of evolution.



Dimension 3: Core Ideas for Using Science

●U1: Scientists explain phenomena using evidence obtained from observations and or scientific investigations. Evidence may lead to developing models and or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised.

●U2: The knowledge produced by science is used in engineering and technologies to solve problems and/or create products.

●U3: Applications of science often have both positive and negative ethical, social, economic, and/or political implications.



AzSS Snapshot: What You Should See Students “Doing,” “Thinking,” “Knowing,” and “Using” in Science

A Framework/Big Ideas for K-12 Science Instruction’s 3-Dimensions and AzSS Using Science

SEPs

Dimension 1: The Science and Engineering Practices

1. Asking questions and defining problems (p. 54)*
2. Developing and using models (p. 56)*
3. Planning and carrying out investigations (p. 59)*
4. Analyzing and interpreting data (p. 62)*
5. Using mathematics and computational thinking (p. 64)*
6. Constructing explanations and designing solutions (p. 67)*
7. Engaging in argument from evidence (p. 71)*
8. Obtaining, evaluating, and communicating information (p. 74)*

Dimension 2: The Crosscutting Concepts

1. Patterns (p. 85)*
2. Cause and effect (p. 87)*
3. Scale, proportion, and quantity (p. 90)*
4. Systems and system models (p. 93)*
5. Energy and matter (p. 96)*
6. Structure and function (p. 98)*
7. Stability and change (p. 98)*

CCCs

Dimension 3: The Core Ideas of Knowing Science and The Core Ideas of Using Science

The Core Ideas of Knowing Science

P: Physical Science (p. 105)*

P1: All matter in the Universe is made of very small particles. (p. 20)**

P2: Objects can affect other objects at a distance. (p. 21)**

P3: Changing the movement of an object requires a net force to be applied to it. (p. 22)**

P4: The total amount of energy in a closed system is always the same but can be transferred from one energy store to another during an event. (p. 23)**

E: Earth and Space Science (p. 171)*

E1: The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth's surface and climate. (p. 24)**

E2: The Earth and our solar system are a very small part of one of many galaxies within the Universe. (p. 25)**

L: Life Science (p. 142)*

L1: Organisms are organized on a cellular basis and have a finite life span. (p. 26)**

L2: Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms. (p. 27)**

L3: Genetic information is passed down from one generation of organisms to another. (p. 28)**

L4: The unity and diversity of organisms, living and extinct, is the result of

The Core Ideas of Using Science

U1: Scientists explain phenomena using evidence obtained from observations and or scientific investigations. Evidence may lead to developing models and or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised. (p. 30 & 31)**

U2: The knowledge produced by science is used in engineering and technologies to solve problems and/or create products. (p. 32)**

U3: Applications of science often have ethical, social, economic, and/or political implications. (p. 23)**

Arizona
Science
Standards
unique
Using
Science
(CIs)



The Coding – How To Read It And How It's Useful

Earth and Space Standards

K E1U1 3

Observe, record, and ask questions about temperature, precipitation, and other weather data to identify patterns or changes in local weather.

Grade 2

Standard
number 4

2.E1U1.4

Standard
addresses core
ideas E1 and U1

2.E1U1.4. Observe, describe, and predict how wind and water change the shape of the land resulting in a variety of landforms.

Earth and Space Standards

2 E1U1 1

Observe, describe, and predict how wind and water change the shape of the land resulting in a variety of landforms.

AzSS Snapshot: What You Should See Students “Doing,” “Thinking,” “Knowing,” and “Using” in Science

A Framework/Big Ideas for K-12 Science Instruction's 3-Dimensions and AzSS Using Science

Dimension 1: The Science and Engineering Practices

DO

1. Asking questions and defining problems (p. 54)*
2. Developing and using models (p. 56)*
3. Planning and carrying out investigations (p. 59)*
4. Analyzing and interpreting data (p. 61)*
5. Using mathematics and computational thinking (p. 64)*
6. Constructing explanations and designing solutions (p. 67)*
7. Engaging in argument from evidence (p. 71)*
8. Obtaining, evaluating, and communicating information (p. 74)*

Dimension 2: The Crosscutting Concepts

THINK

1. Patterns (p. 85)*
2. Cause and effect (p. 87)*
3. Scale, proportion, and quantity (p. 89)*
4. Systems and system models (p. 91)*
5. Energy and matter (p. 94)*
6. Structure and function (p. 96)*
7. Stability and change (p. 98)*

Dimension 3: The Core Ideas of Knowing Science and The Core Ideas of Using Science

The Core Ideas of Knowing Science

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KNOW

The Core Ideas of Using Science

USE

U1: Scientists explain phenomena using evidence obtained from observations and or scientific investigations. Evidence may lead to developing models and theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised. (p. 30 & 31)**

U2: The knowledge produced by science is used in engineering and technologies to solve problems and/or create products. (p. 32)**

U3: Applications of science often have ethical, social, economic, and/or political implications. (p. 23)**

Grade 2

Standard number 4

2.E1U1.4

Standard addresses core ideas E1 and U1

2.E1U1.4. Observe, describe, and predict how wind and water change the shape of the land resulting in a variety of landforms.

Reading
a Standard

Knowing Science

Using Science

Breaking the Standard Apart

- Physical Sciences: Students develop an understanding of how Earth's resources can be transformed into different forms of energy. Students develop a better understanding of electricity and magnetism.

Physical Science Standards

Learning Progressions, Key Terms, and

4.P4U1.1

Develop and use a model to demonstrate how a system transfers energy from one object to another even when the objects are not touching

Energy is present whenever there are moving objects. When objects collide, energy can be transferred by changing their motion. In such collisions, the surrounding air, as a result, the air gets

4.P4U1.2

Develop and use a model that explains how energy is moved from place to place through electric currents.

If a substance could be divided into smaller and smaller parts, it would be made of very, very small particles called **particles**. These particles are not in motion. The particles of a particular substance are not static. The particles at which they move is experienced as motion. The differences between substances in the solid state are in terms of the speed and range of the movement of particles and the strength of the attraction between neighboring particles. All materials, anywhere in the universe, living and non-living, are made of a very large number of basic 'building blocks' called **atoms**, of which there are about 100 different kinds. The properties of different materials can be explained in terms of the behavior of the atoms and groups of atoms of which they are made. 2 (p. 20)

4.P2U1.3

Develop and use a model to demonstrate magnetic forces.

Crosscutting Concepts

SEP

Core Idea

Working with
Big Ideas
of Science Education

Edited by Wynne Harlen

with Derek Bell, Rosa Dávila, Hubert Dyrni,
Guillermo Fernández de la Garza, Pierre Léna,
Robert Miller, Michael Reiss, Patricia Rowell and Wei Yu

form for practical use—for example, the stored energy of water behind a dam is

Physical Sciences: Students develop an understanding of how Earth's resources can be transformed into different forms of energy. Students develop a better understanding of electricity and magnetism




Physical Science Standards	Crosscutting Concepts & Background Information for Educators
<p>4.P4U1.1</p> <p><u>Develop and use a model</u> to demonstrate how a system transfers energy from one object to another even when the objects are not touching.</p>	<p>Crosscutting Concepts: Patterns, Cause and Effect, Scale, Proportion and Quantity; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change⁴</p> <p>Background Information: Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. Light also transfers energy from place to place. For example, energy radiated from the sun is transferred to Earth by light. When this light is absorbed, it warms Earth's land, air, and water and facilitates plant growth. Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy (e.g., moving water driving a spinning turbine which generates electric currents). ⁴(p. 125) The faster a given object is moving, the more energy it possesses. Energy can be moved from place to place by moving objects or through sound or light. (Boundary: At this grade level, no attempt is made to give a precise or complete definition of energy.)⁴(p.122) For example, energy radiated from the sun is transferred to Earth by light. When this light is absorbed, it warms Earth's land, air, and water and facilitates plant growth.⁴(p.125) The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use—for example, the stored energy of water behind a dam is released so that it flows downhill and drives a turbine generator to produce electricity. Food and fuel also release energy when they are digested or burned. When machines or animals "use" energy (e.g., to move around), most often the energy is transferred to heat the surrounding environment. The energy released by burning fuel or digesting food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (Boundary: The fact that plants capture energy from sunlight is introduced at this grade level, but details of photosynthesis are not.) It is important to be able to concentrate energy so that it is available for use where and when it is needed. For example, batteries are physically transportable energy storage devices, whereas electricity generated by power plants is transferred from place to place through distribution systems. ⁴(p. 129)</p>
<p>4.P4U1.2</p> <p><u>Develop and use a model</u> that explains how energy is moved from place to place through electric currents.</p>	
<p>4.P2U1.3</p> <p><u>Develop and use a model</u> to demonstrate magnetic forces.</p>	
<p>4.P4U3.4</p> <p><u>Engage in argument from evidence</u> on the use and impact of renewable and nonrenewable resources to generate electricity.</p>	

NEW



How does it work?

Essential and Plus Standards for High School

Space – Earth and the Solar System		Learning Progressions, Key Terms and Crosscutting Concepts
	Earth and Space Science Essential Standards HS Essential Standards are intended for ALL students to learn across 3 credits of high school science courses and are on the state assessment.	Planetary motions around the sun can be predicted using Kepler's three empirical laws , which can be explained based on Newton's theory of gravity . These orbits may also change somewhat due to the gravitational effects from, or collisions with, other bodies. ^{‡ (p. 175)}
	Essential <u>HS.E2U1.16</u> Construct an explanation of how gravitational forces impact the evolution of planetary motion, structure, surfaces, atmospheres, moons, and rings.	
	Earth and Space Science Plus (+) Standards HS+ are designed for students taking a high school earth and space (E) or honors earth and space.	
	Plus <u>HS+E.E2U1.9</u>  Analyze and interpret data showing how gravitational forces are influenced by mass, and the distance between objects.	
	Plus <u>HS+E.E2U1.10</u>  Use mathematics and computational thinking to explain the movement of planets and objects in the solar system.	Crosscutting Concepts: Patterns; Cause and effect; Scale, Proportion and Quantity; Systems and System Models; Energy and Matter; Stability and change; Structure and function [‡]

Essential vs. Plus Standards for High School

High School **Essential** Standards

- Intended for all student to have learned by the end of three credits of high school science courses
- May be assessed on the state science assessment
- Goal to prepare students for adult science literacy

High School **Plus** Standards

- Supporting standards designed to be used with the essential standards
- For students taking a specific course in physics, chemistry, earth/space, and/or biology to prepare students for college-level courses
- May be assessed by districts but not by state



K-2 Band: 2.P1U1.2 Plan and carry out investigations to gather evidence to support an explanation on how heating or cooling can cause a phase change in matter.

6-8 Band: 6.P1U1.1 Analyze and interpret data to show that changes in states of matter are caused by different rates of movement of atoms in solids, liquids, and gases (Kinetic Theory).

Plus HS+C.P1U1.3 Analyze and interpret data to develop and support an explanation for the relationships between kinetic molecular theory and gas laws. (Note: The plus standards are used to create a high school chemistry class, they are not honors only)

Crosscutting Concepts:

1. Patterns
2. Cause and effect
3. Structure and Function
4. Energy and Matter
5. Systems and System Models
6. Scale, Proportion and Quantity
7. Stability and Change

LiveChat

Pick one grade band and see if you can identify:

1. Science & Engineering Practice (SEP)
2. Core Idea for Knowing (Life, Physical, Earth)
3. Core Idea for Using (U1, U2, U3)
4. Crosscutting Concept (CCC)



Cause & Effect

K-2 Band: 2.P1U1.2 Plan and carry out investigations to gather evidence to support an explanation on how heating or cooling can cause a phase change in matter.

6-8 Band: 6.P1U1.1 Analyze and interpret data to show that changes in states of matter are caused by different rates of movement of atoms in solids, liquids, and gases (Kinetic Theory).

Cause & Effect
Energy & Matter
Patterns

Cause & Effect

Plus HS+C.P1U1.3 Analyze and interpret data to develop and support an explanation for the relationships between kinetic molecular theory and gas laws.

(Note: The plus standards are used to create a high school chemistry class, they are not honors only)

Stability & Change
Systems & System
Models



Knowing Science	Knowing Science	K	1	2	3	4	5	6	7	8	HS
P1 Physical Science	All matter in the Universe is made of very small particles.										
P2: Physical Science	Objects can affect other objects at a distance.										
P3: Physical Science	Changing the movement of an object requires a net force to be acting on it.										
P4: Physical Science	The total amount of energy in a closed system is always the same but can be transferred from one energy store to another during an event.										

Knowing Science	Knowing Science	K	1	2	3	4	5	6	7	8	HS
E1 Earth & Space Science	E1: The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth's surface and its climate.										
E2: Earth & Space Science	E2: The Earth and our solar system are a very small part of one of many galaxies within the Universe.										

Knowing Science	Knowing Science	K	1	2	3	4	5	6	7	8	HS
L1 Life Science	Organisms are organized on a cellular basis and have a finite life span.										
L2: Life Science	Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms.										
L3: Life Science	Genetic information is passed down from one generation of organisms to another.										
L4: Life Science	The unity and diversity of organisms, living and extinct, is the result of evolution.										

Almost done!

Two Emails

1. From EMS with a survey-
MUST be filled out to
receive PD Clock hours

2. From ME☺ with
resources and this
presentation & upcoming
PD opportunities

Title	Date	Time	Cost	Type
Crosscutting Concepts: 1 of the 3 Dimensions of the AZ Science Standards	6/4/2020	9:00am – 10:00am	FREE	W
STEM Series: Meet Computer Science Standards with Code.org	6/4/2020	4:00pm – 5:00pm	FREE	W
Science & Engineering Practices: 1 of the 3 Dimensions of the AZ Science Standards	6/5/2020	9:00am – 10:00am	FREE	W
5-E Instructional Model & Science Notebooks	6/9/2020	4:00pm – 5:00pm	FREE	W
#SciencingAndEngineering with @TheSTEMAZingPro and @RobotGeneral5- Session 2	6/10/2020	4:00pm – 5:00pm	FREE	W
STEM Series: Meet Computer Science Standards with Code.org	6/11/2020	4:00pm – 5:00pm	FREE	W
Phenomena-Based 3-D Instruction	6/16/2020	4:00pm – 5:00pm	FREE	W
#SciencingAndEngineering with @TheSTEMAZingPro and @RobotGeneral5- Session 3	7/1/2020	4:00pm – 5:00pm	FREE	W
#SciencingAndEngineering with @TheSTEMAZingPro and @RobotGeneral5- Session 4	7/22/2020	4:00pm – 5:00pm	FREE	W
#SciencingAndEngineering with @TheSTEMAZingPro and @RobotGeneral5- Session 5- Early Childhood	8/12/2020	4:00pm – 5:00pm	FREE	W



Thanks!

Any questions?

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