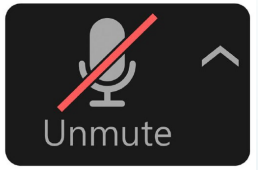
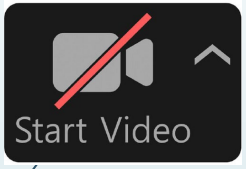
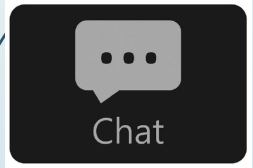
Zoom Tips



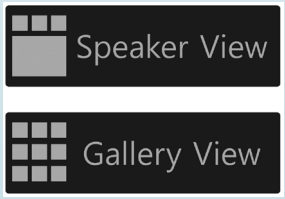
Everyone in the meeting is muted. Please remain muted unless you are in a breakout session or asked to share out.



Presenters love seeing their audience, so if you're comfortable, turn your camera on so they can see you nodding in understanding and encouragement. If you want to make sure to look your best, face a window or light source.



The chat box is a good place to engage with other participants and ask questions. Selecting this icon will open the chat window.



Speaker/Gallery View
Speaker view shows the active speaker. Gallery shows all participants. Make sure to take the time to find that button (at the top right corner of your screen) so you can switch between the views.

Science Standards for Alaska (SSAs)

Bjørn Wolter, Ph.D. & Deb Riddle

Alaska Department of Education & Early Development

January 27, 2021

Our Mission and Vision

OUR MISSION

An excellent education for every student every day.

DEED exists to provide **information**, **resources**, and **leadership** to support an excellent education for every student every day.

Alaska's Education Challenge

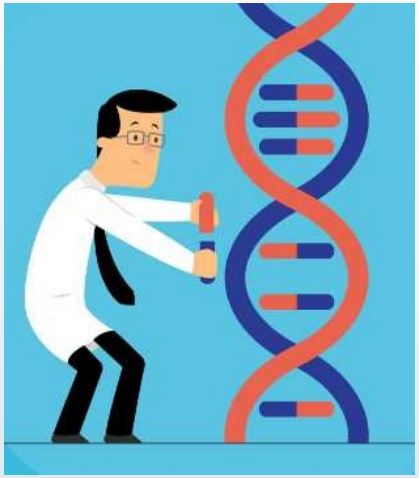
Agenda

- ✓ Introductions
- ✓ Why new standards?
- ✓ The Standards
- ✓ How to read the SSAs
- ✓ Major shifts
- ✓ Learning strategies
- ✓ Resources
- ✓ Upcoming webinars

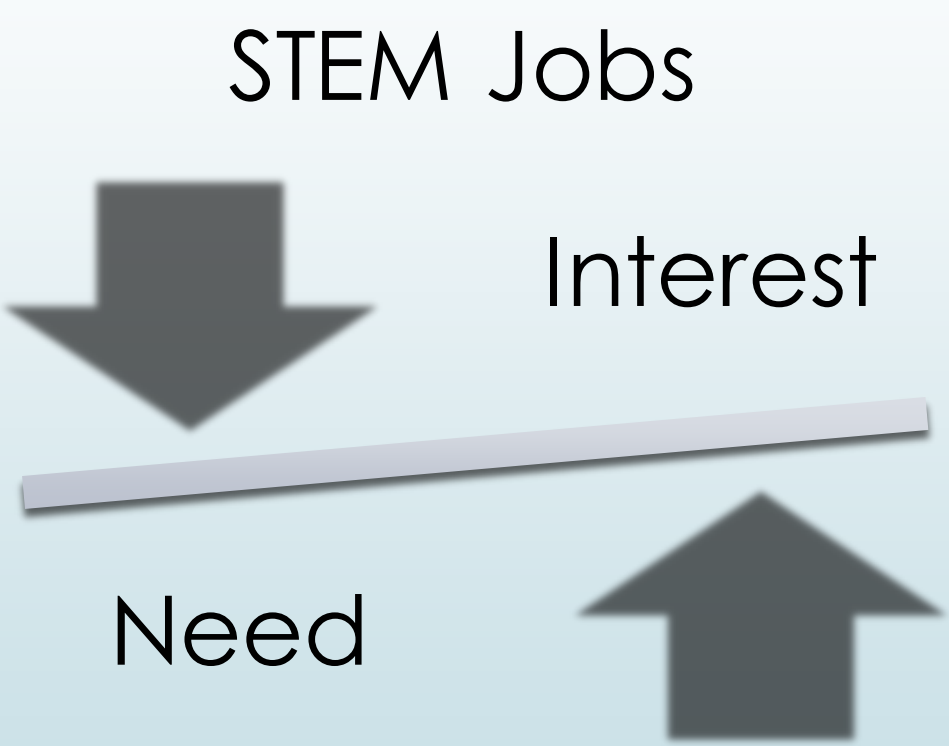
Introductions

Why did the state need new standards?

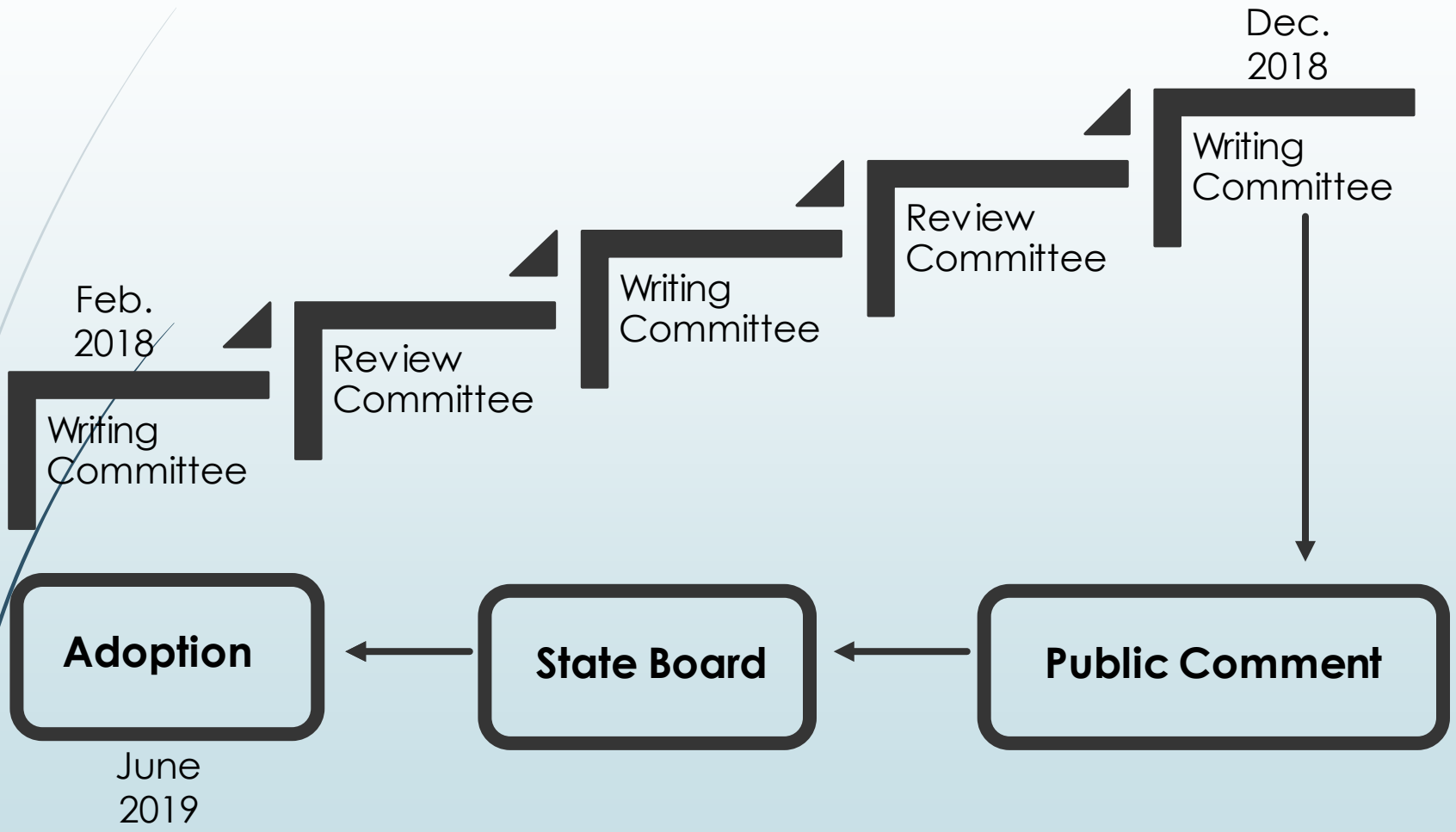
Why New Standards?



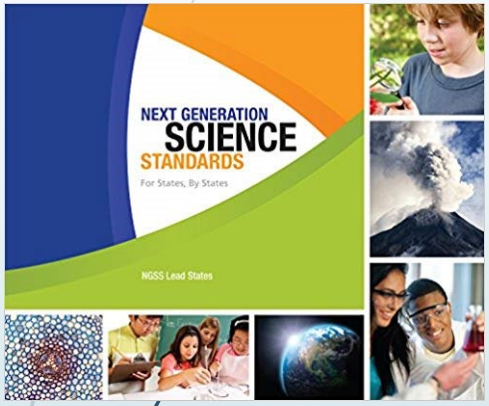
Need for New Standards?

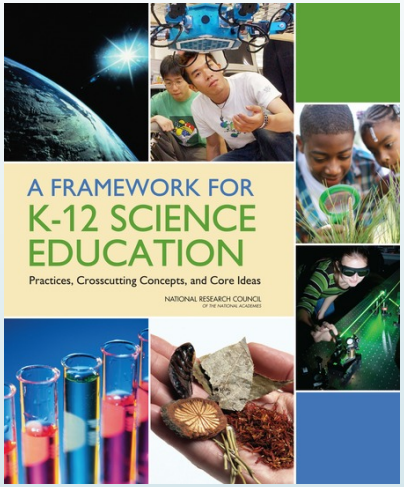


Development Process



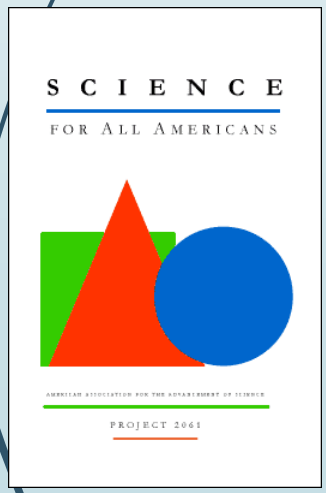
What standards were considered as examples?



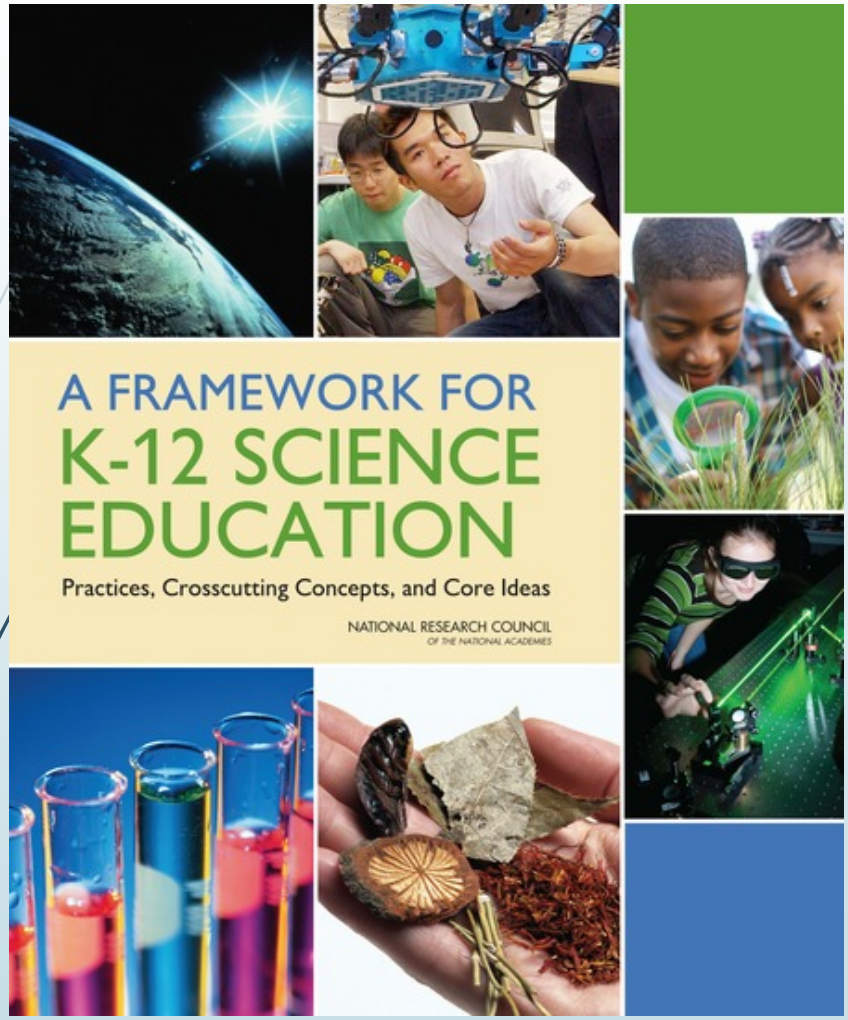


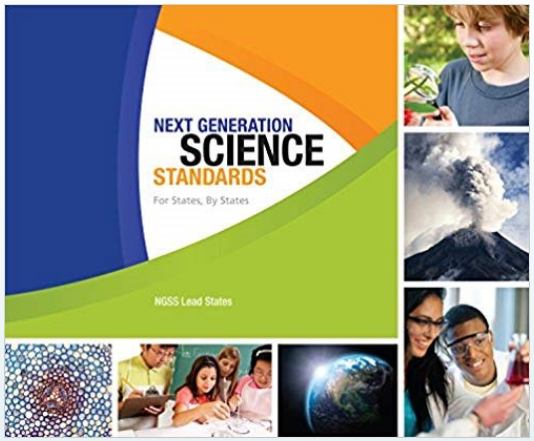
NAEP
NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS

PISA



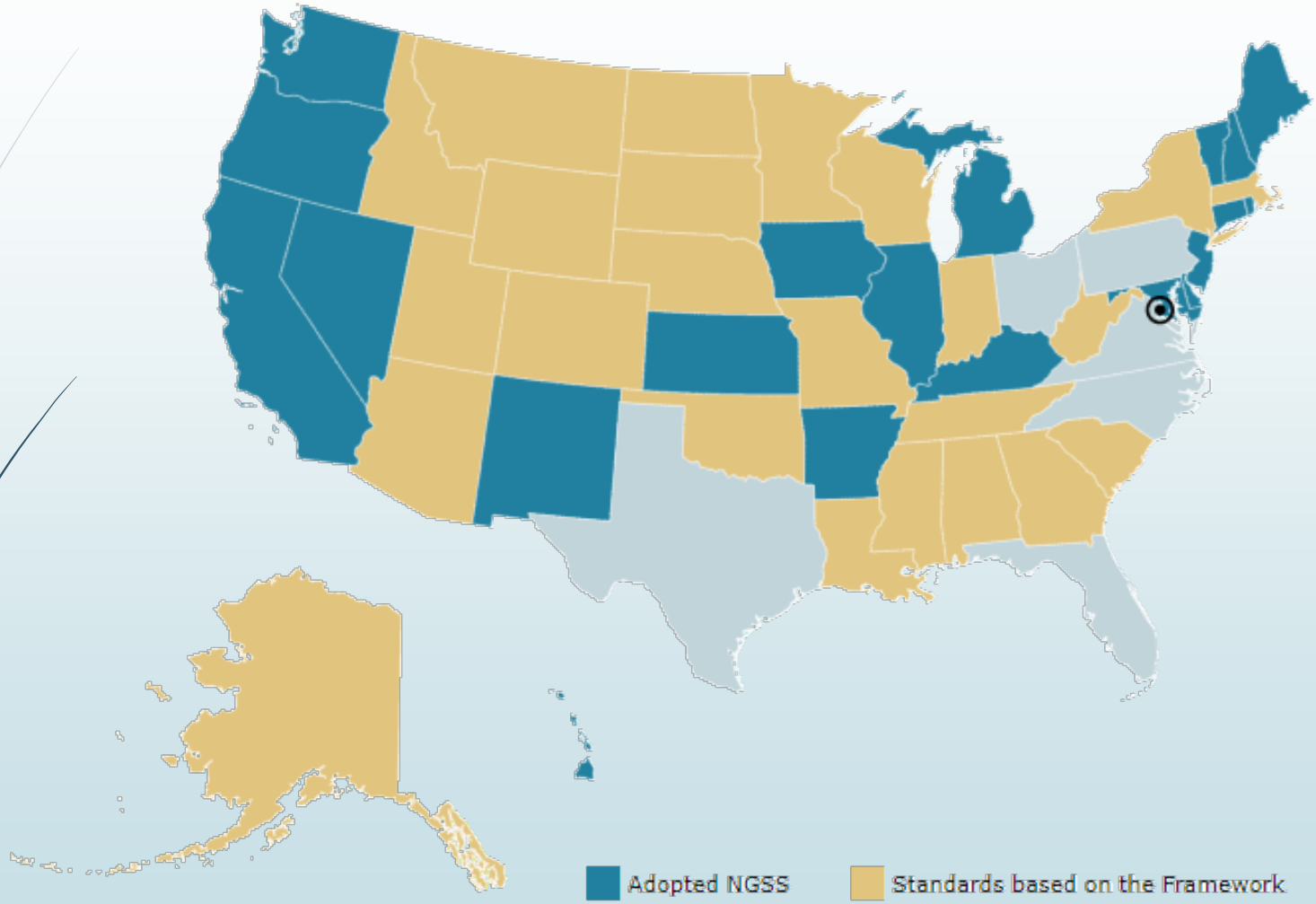
ACT®





DEPT. OF EDUCATION AND EARLY DEVELOPMENT

K-12 Science Standards for Alaska


Adopted NGSS
Standards based on the Framework

Misconceptions about science

Because scientific ideas are tentative and subject to change, they can't be trusted.

Scientific ideas are judged democratically based on popularity.

Scientists are judged on the basis of how many correct hypotheses they propose

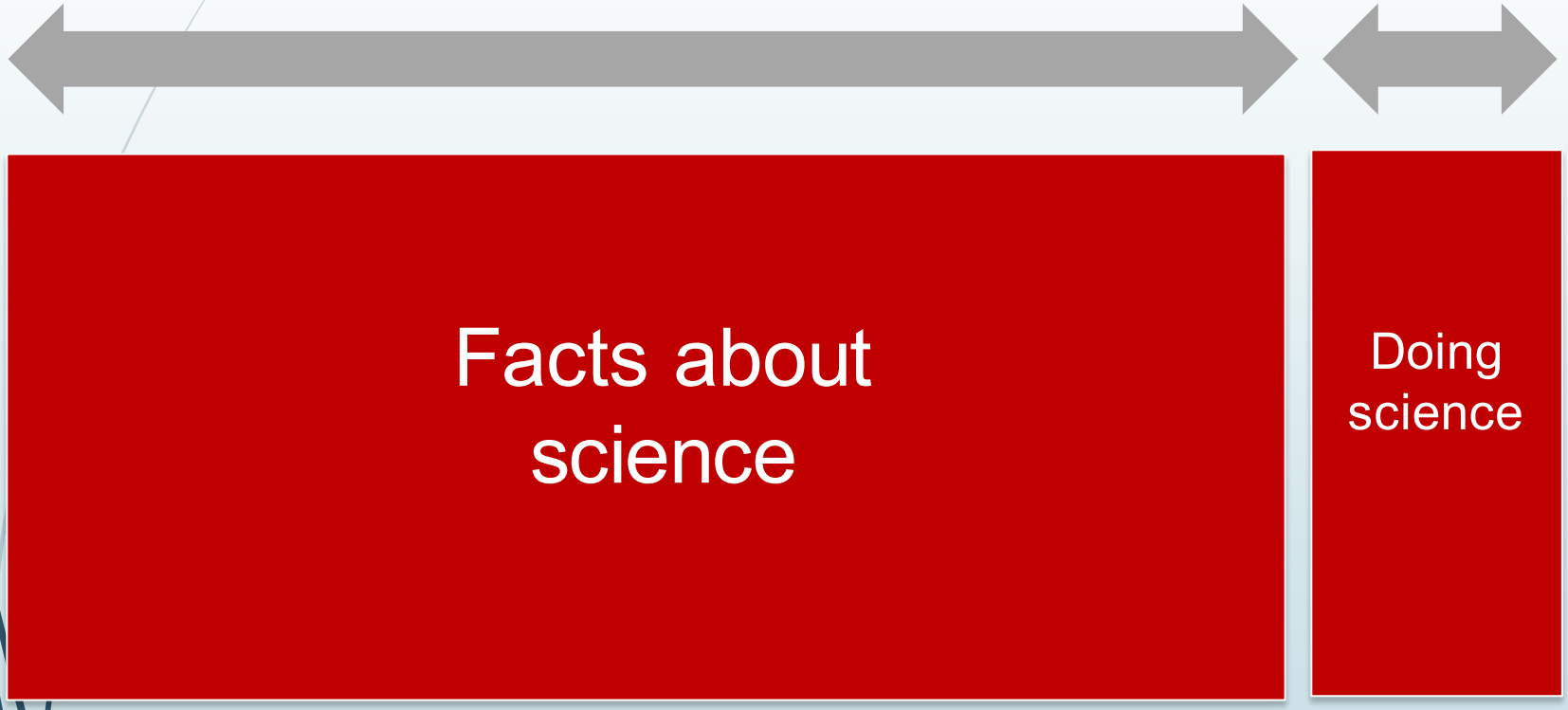
Science is a collection of facts.

Moving on from just facts

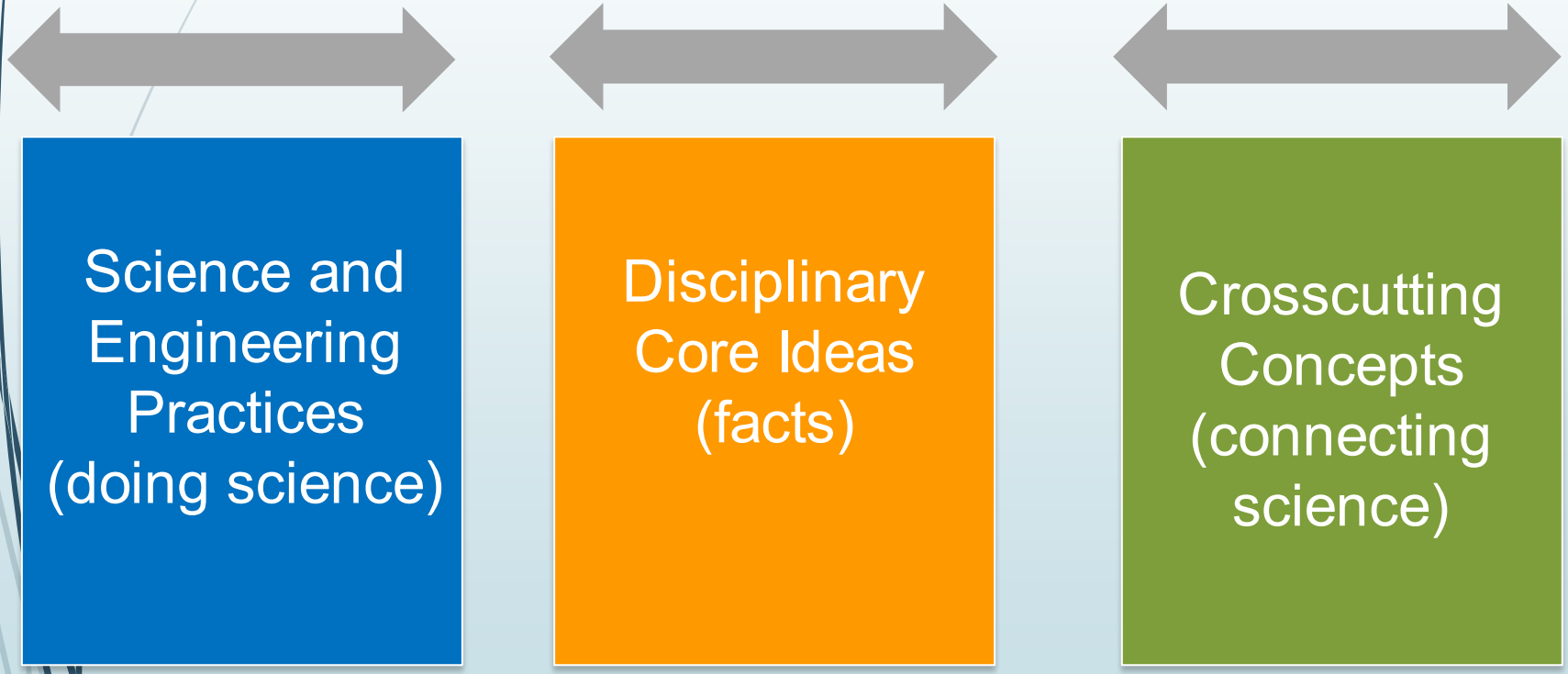
When instruction focuses on facts…

- Students don't build the skills needed for real science
- Students don't relate to science or scientists
- Students don't understand where science comes from

Old Alaska GLEs for Science



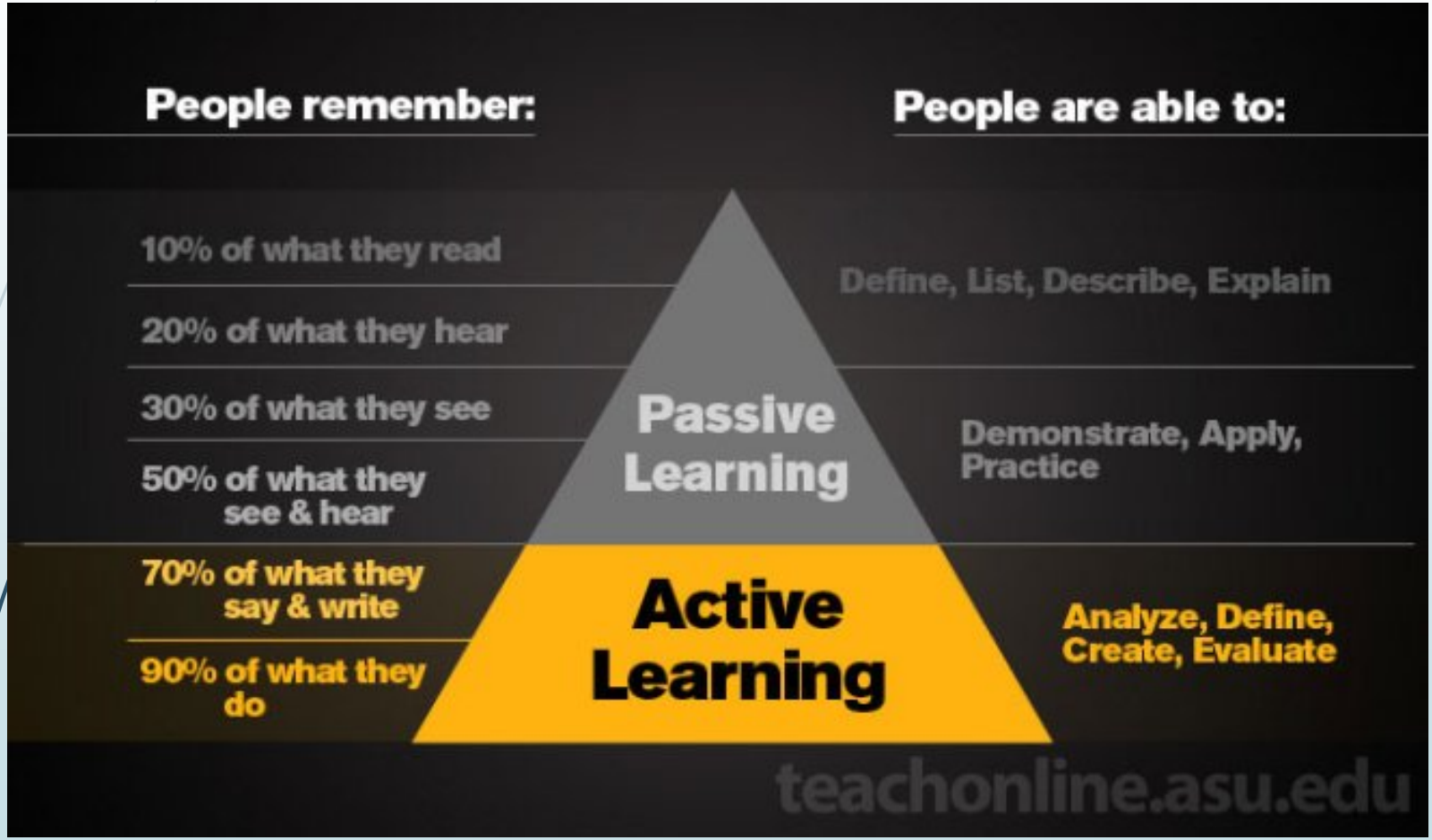
Organization of the SSAs



Active Learning

- Science is constructivist
  - Experiential
  - Students create own epistemology of the world within the bounds of evidence
- Benefits of active learning in science:
  - Provide opportunity for and promotes higher order thinking
  - Promotes interaction
  - Increases retention
  - Connects theory to application
  - Builds proficiency and self-esteem

Active Learning Pyramid



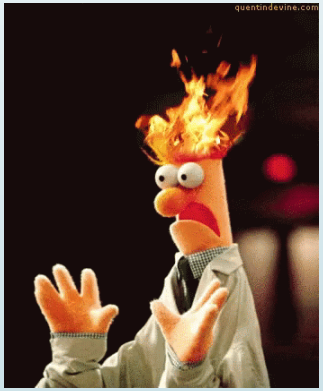
Brain Break!

1
Perfect

2
Pretty
Good

3
Average

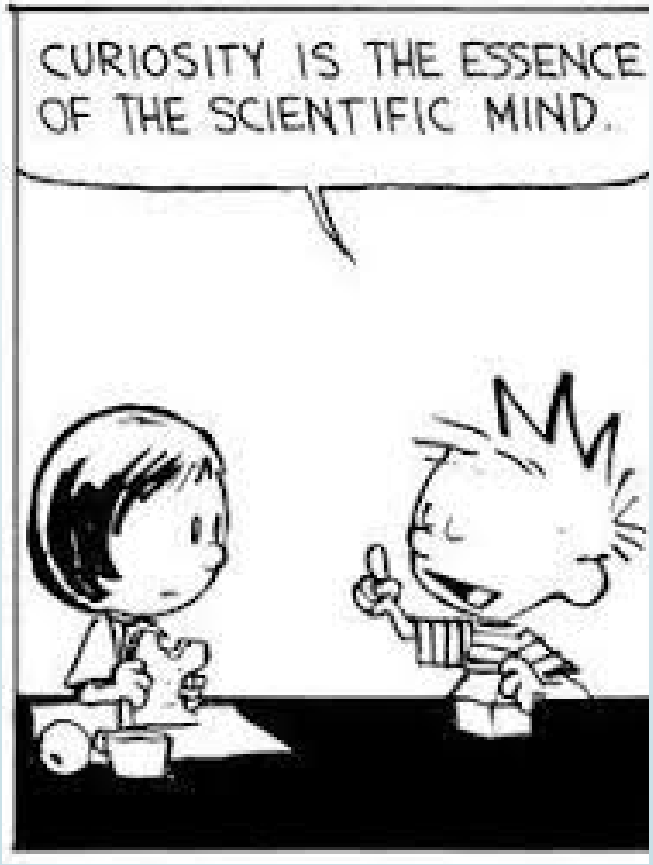
4
Some Issues



5
HELP!

The Standards

Goals of Science Education



How to Read the SSAs

How to Read the Standards..

MS-PS4-1 ❶

Students who demonstrate understanding:
Qualitatively and quantitatively describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

Clarification Statement: Examples can include waves modeled with a jump rope, slinky, water, seismic activity, and sound. ❷

Assessment Boundary: Assessment does not include electromagnetic waves and is limited to standard repeating waves. ❸

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education.*

Science and Engineering Practices ❹	Disciplinary Core Concepts	Crosscutting Concepts
Using Mathematics and Computational Thinking Use mathematical representations to describe and/or support scientific conclusions and design solutions. **Connections to Nature of Science ❺** **Scientific Knowledge is Based on Empirical Evidence** Science knowledge is based upon logical and conceptual connections between evidence and explanations.	**PS4.A: Wave Properties** A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude.	**Patterns** Graphs and charts can be used to identify patterns in data.

How to Read the Standards….

1. **MS-PS4-1** ← Performance Expectation

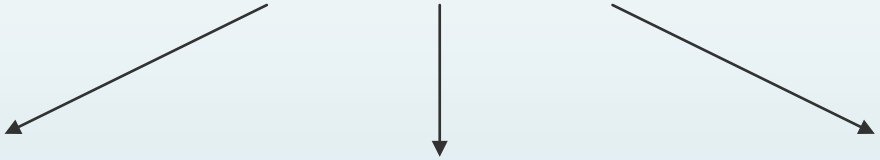
   Students who demonstrate understanding: Qualitatively and quantitatively describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

2. **Clarification Statement:** Examples can include waves modeled with a jump rope, slinky, water, seismic activity, and sound.

3. **Assessment Boundary:** Assessment does not include electromagnetic waves and is limited to standard repeating waves.

How to Read the Standards…

Foundational boxes

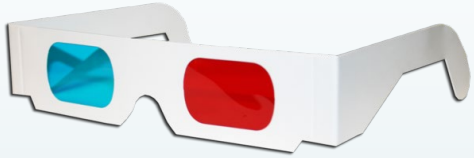


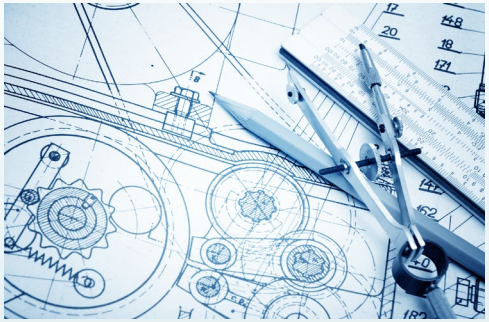
The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education.*

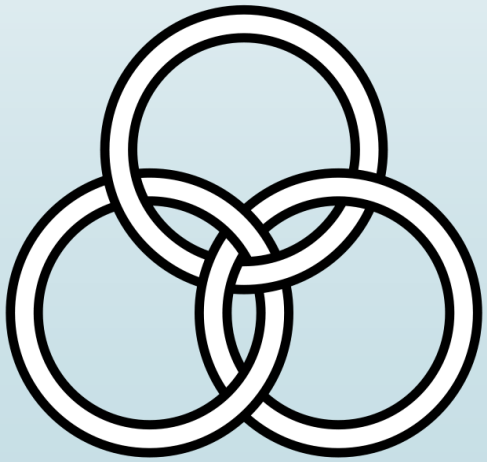
Science and Engineering Practices 4	Disciplinary Core Concepts	Crosscutting Concepts
Using Mathematics and Computational Thinking (Ctrl) Use mathematical representations to describe and/or support scientific conclusions and design solutions. **Connections to Nature of Science** 5 **Scientific Knowledge is Based on Empirical Evidence** Science knowledge is based upon logical and conceptual connections between evidence and explanations.	**PS4.A: Wave Properties** A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude.	**Patterns** Graphs and charts can be used to identify patterns in data.

Major Shifts in the SSAs

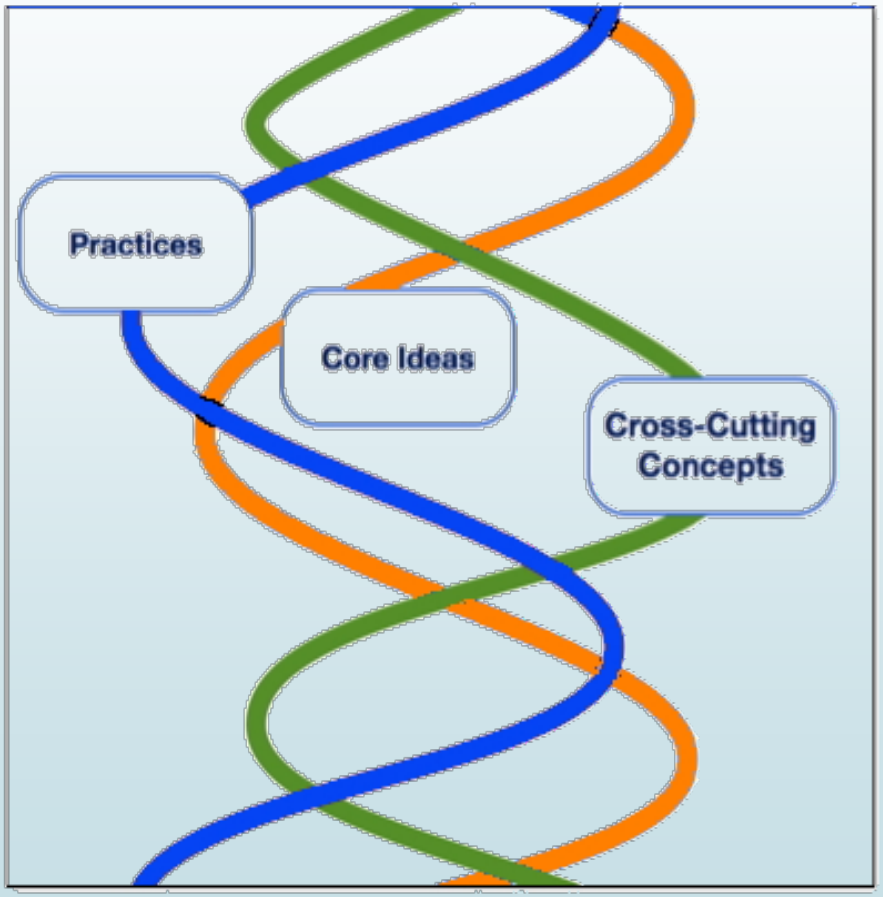
Five Major Shifts







Three-Dimensional Learning



Disciplinary Core Ideas

Life Science	Physical Science
LS1: From Molecules to Organisms: Structures and Processes LS2: Ecosystems: Interactions, Energy, and Dynamics LS3: Heredity: Inheritance and Variation of Traits LS4: Biological Evolution: Unity and Diversity	PS1: Matter and Its Interactions PS2: Motion and Stability: Forces and Interactions PS3: Energy PS4: Waves and Their Applications in Technologies for Information Transfer
Earth & Space Science	**Engineering & Technology**
ESS1: Earth's Place in the Universe ESS2: Earth's Systems ESS3: Earth and Human Activity	ETS1: Engineering Design ETS2: Links Among Engineering, Technology, Science, and Society

Crosscutting Concepts

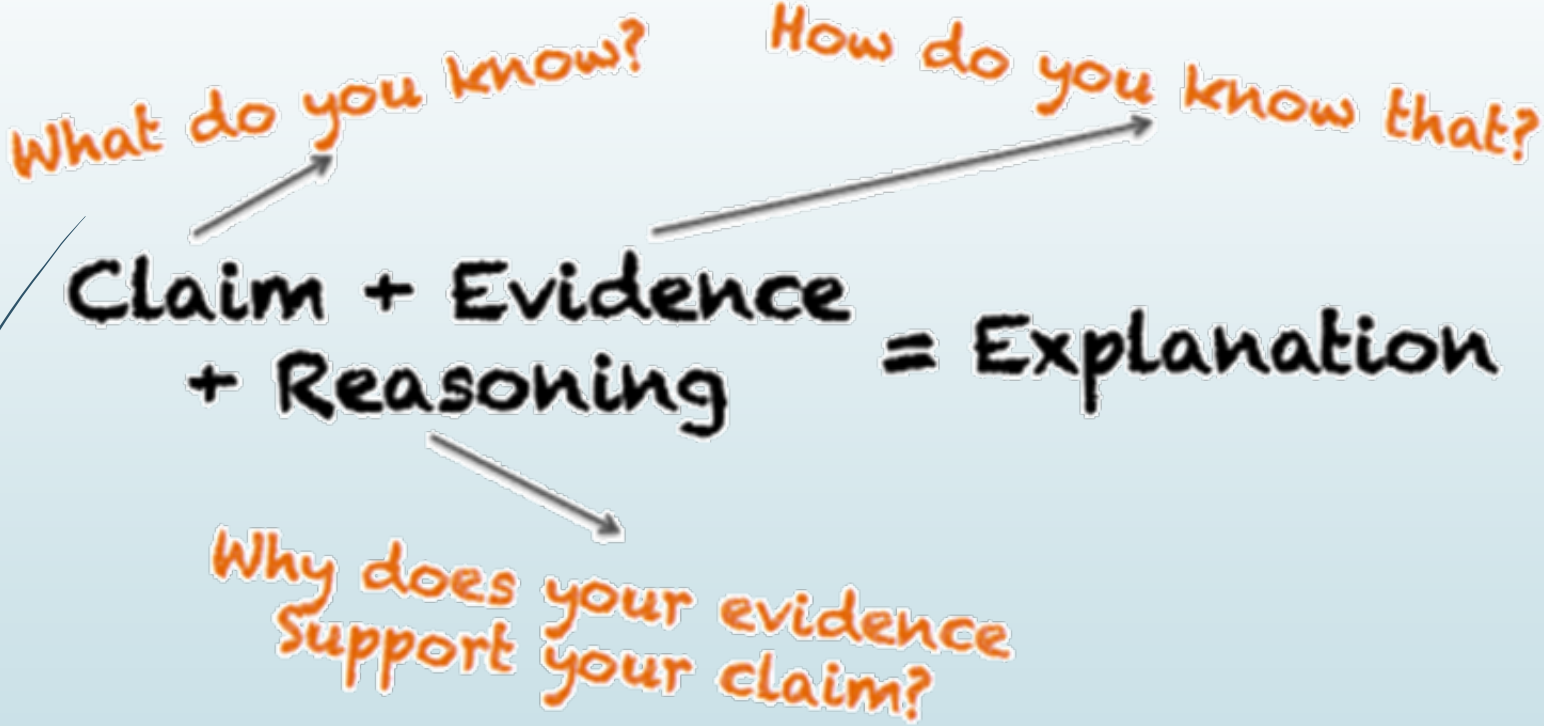
1. Patterns
2. Cause and effect: Mechanisms and explanation
3. Scale, proportion, and quantity
4. Systems and system models
5. Energy and matter: Flows, cycles, and conservation
6. Structure and function
7. Stability and change

Science and Engineering Practices (SEPs)

1. Asking questions (for science) and defining problems (for engineering)
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 (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information.

Learning Strategies

Engaging in Arguments Using Evidence



Argumentation

Argumentation Progression

Progression of argument

Greater sophistication

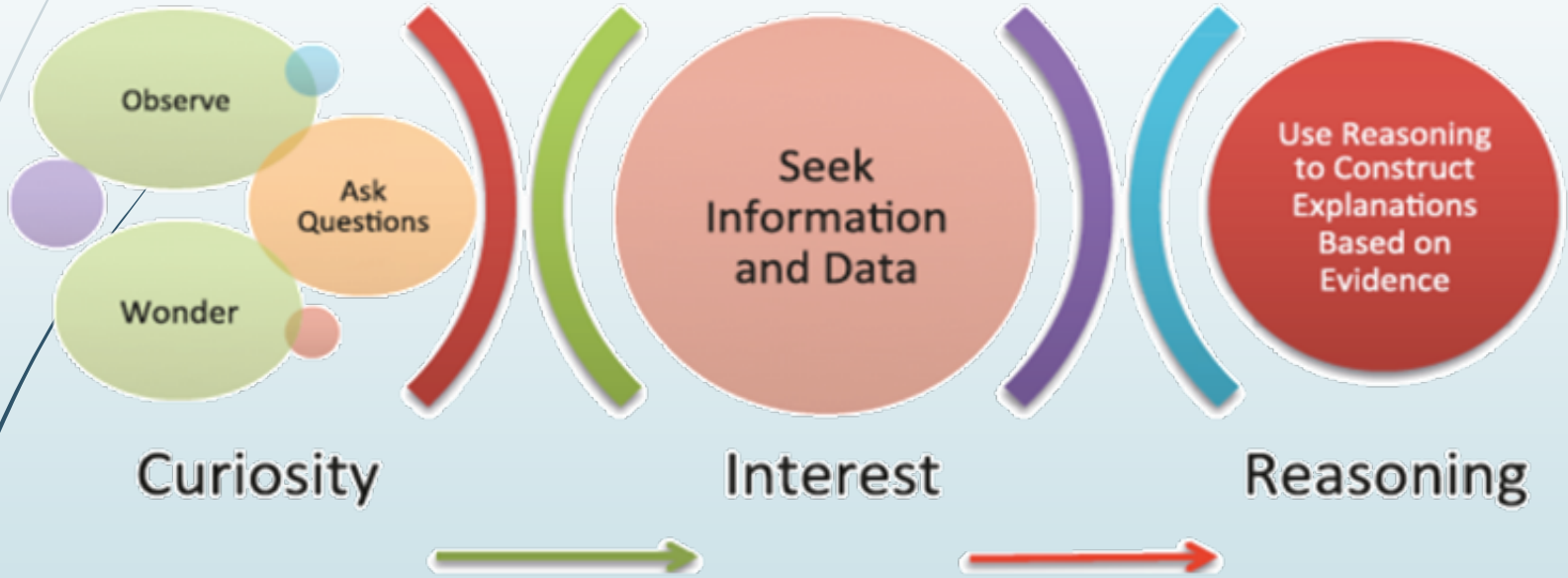
Grades K - 2	Grades 3 - 5	Middle School	High School
Make a claim and use evidence	Construct and support scientific arguments drawing on evidence, data, or a model. Consider other ideas.	Construct and present oral and written arguments supported by empirical evidence and reasoning to support or refute an explanation for a phenomenon.	Construct a counter-argument that is based in data and evidence that challenges another proposed argument.

Phenomena

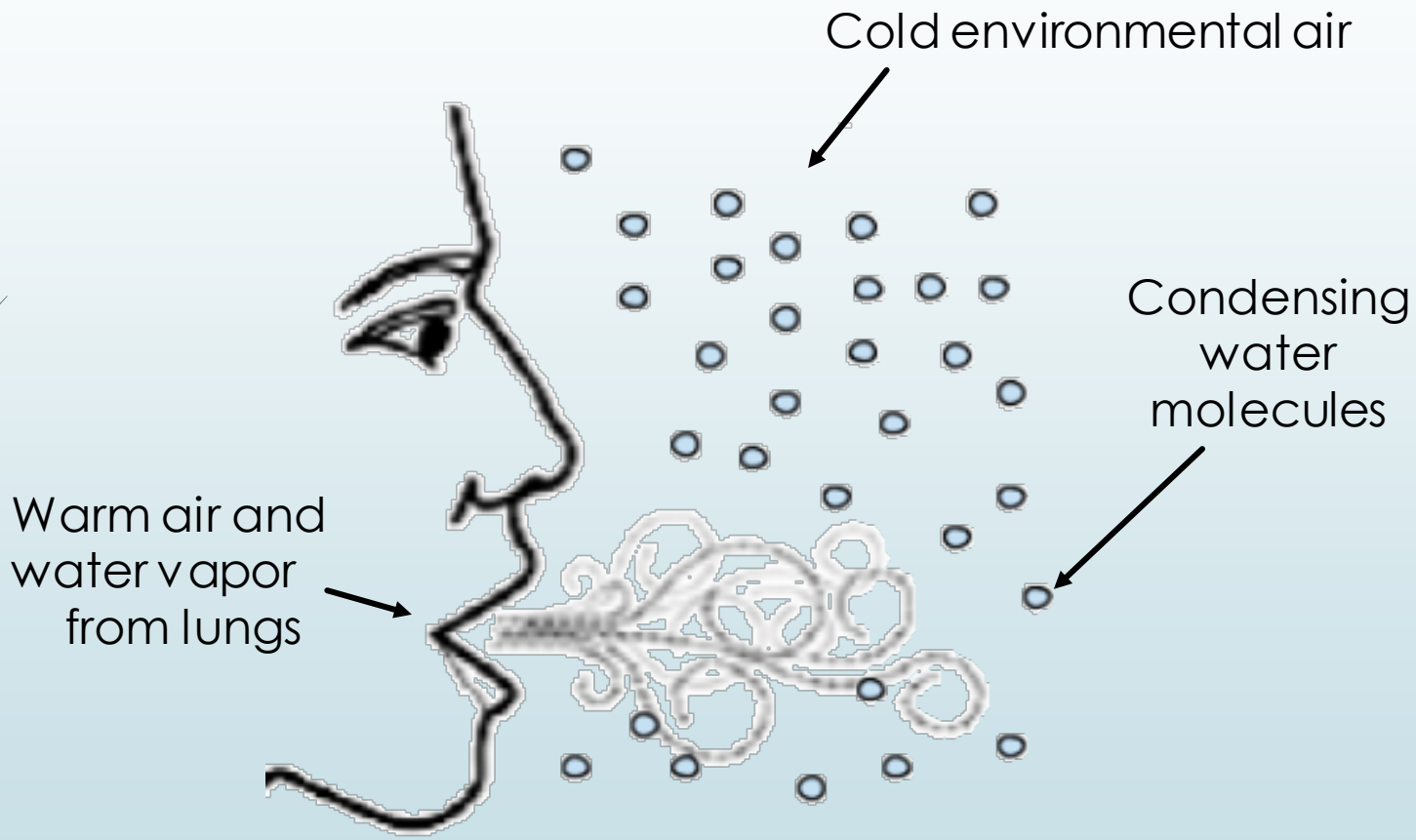
Phenomena Breath

Why can I see my breath when it is cold outside?

Developing and Using Models



Modelling a Phenomenon

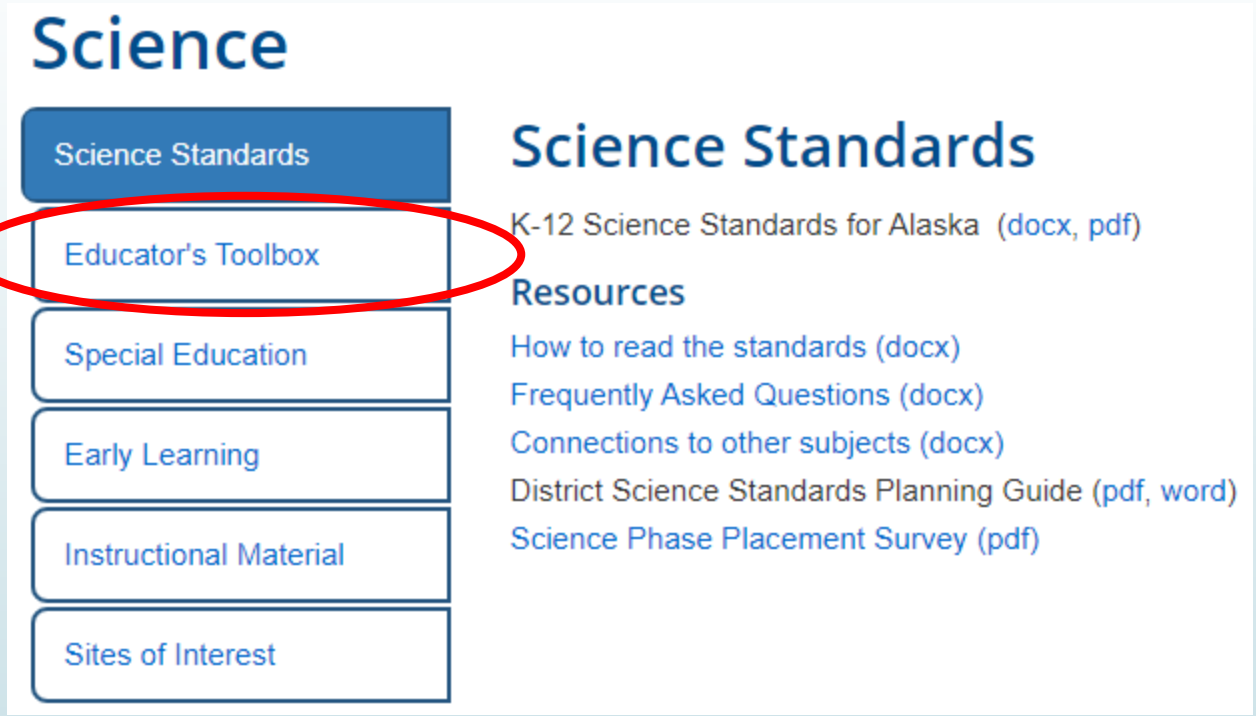


Pedagogical Changes

Cross-curricular Connections

Resources

Science Standards Webpage



https://education.alaska.gov/standards/science

Key Resources

Science Standards for Alaska (SSA) to Alaska ELA/Math Standards Connections

Alaska Science GLEs to Science Standards for Alaska Crosswalk

Teacher Primer for the Science Standards for Alaska

Where to Look for Lesson Plans

National Science Teachers Association

project WET
WATER EDUCATION TODAY

NEXT GENERATION SCIENCE STANDARDS
For States, By States

Project WILD

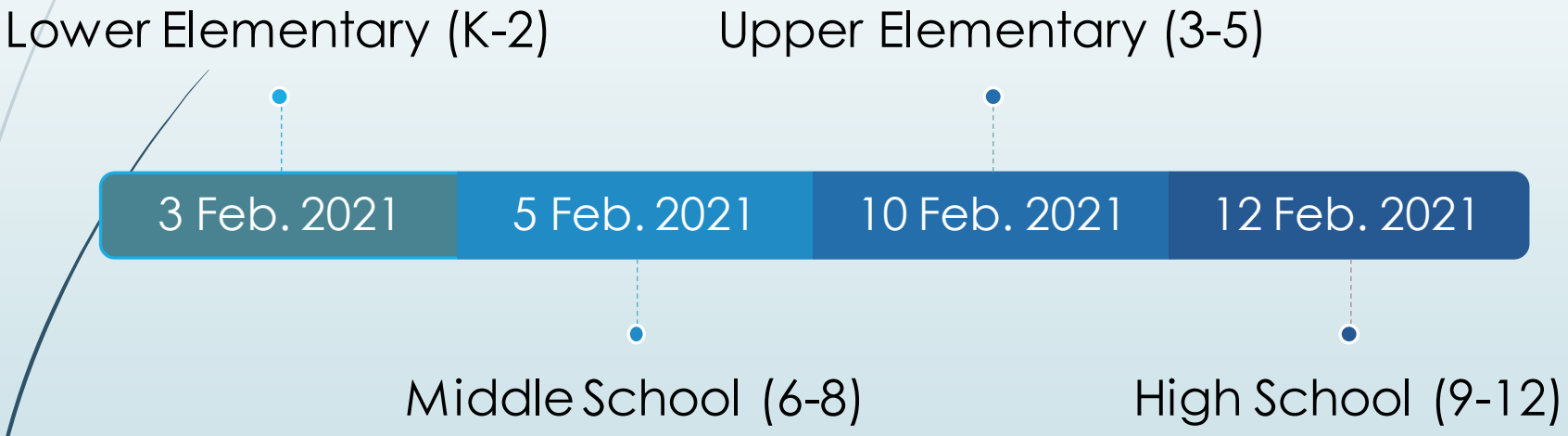
ALASKA DEPARTMENT OF FISH AND GAME

EDUCATION & EARLY DEVELOPMENT

Upcoming Webinars

Grade-span Specific Deep Dives

Grade-span Webinars



Alaska Science Teachers' Listserv

Dr. Bjørn Wolter

Program Manager

bjorn.wolter@alaska.gov

907-465-6542

Questions?