Introduction: 2018 Idaho Science Content and Performance Standards

Background

For three years, a dedicated committee of Idaho educators, community members, administrators, and scientists collaborated to create the K-12 Idaho Science Content and Performance Standards. The standards were formally adopted in February, 2018. The committee's purposeful intent created standards that address what an educated citizen should know, understand, and do when applying scientific thinking and make informed decisions.

Science Literacy

Science is a body of knowledge, a way of thinking, and a process for understanding the natural world. Engineering applies the fields of science, technology, and mathematics to produce solutions to real-world problems. The process of developing scientific knowledge includes continuous questioning, testing, and refining ideas through the interpretation of empirical evidence. Scientific literacy is essential for making informed choices on personal, local, regional, and global scales.

Science Learning

Students learn science by actively participating in it. This includes gathering information through observations, sense-making, and communicating with others. Science is a dynamic endeavor that allows learners to become active participants by forming their own ideas and engaging in scientific practice.

Science learning is personal, engaging and for everyone. Science allows members of any community or society to solve problems and improve our world. All students have the capacity to learn and practice science at a high level. Quality science learning must be accessible to every student, regardless of grade level, geographic setting, gender, economic status, or cultural background. All students, in all grades and classes, need authentic, developmentally appropriate science instruction guided by well-trained and well-informed instructors.

Multiple Components of Science

Science includes a variety of practices, themes, and knowledge. Together, these components represent how science makes sense of phenomenon in the natural and man-made world. They are most meaningful when learned together.

Science and Engineering Practices (SEPs): Scientists and engineers actively participate in their work. Engaging in the practices of science allows students to understand how scientific knowledge develops**.** Beyond making hypotheses and testing them with experiments, scientists engage in sense making, designing, modeling, constructing, communicating, and collaborating. The practices not only describe the variety of activities necessary to do science, they also indicate how scientific thinking relates to other subject areas.

Crosscutting Concepts (CCCs): Crosscutting concepts include the broad overarching themes that unite the various science disciplines. They provide an organizational framework to build a connected, clear, and usable understanding of science and engineering. Understanding crosscutting concepts enables learners to make connections among different subjects and to utilize science in diverse settings.

Supporting Content: Supporting Content represents the fundamental and explanatory knowledge of specific subject areas within science. These core ideas represent the traditional understanding of science knowledge and specific subject matter. These core ideas are organized within physical, life, and earth sciences.

Broader Context

Although the content covered by the Idaho Science Content and Performance Standards represent a substantial amount of scientific material, they do not represent every single scientific concept. Rather, they seek to address and engage students in an appropriate progression, recognizing how knowledge is obtained, how it is used, and where it fits in a broader perspective, leading to continued use and application over a lifetime of learning. Accordingly, it is imperative that each elementary teacher and secondary science teacher fulfill their role in guiding students through all of the components of science, working towards a complete student education with no instructive gaps. Additionally, it is recognized that science does not happen in an independent content silo. Rather, the science practices compliment the skills and practices of other content areas, especially crossing over as students use reasoning and evidence to justify claims in all disciplines.

Anatomy of an Idaho Science Content and Performance Standard

Each standard includes a Science and Engineering Practice and Crosscutting Concept within the context of a Supporting Content topic. The original standards booklet explicitly identifies the Supporting Content, but not the Science and Engineering Practice or Crosscutting Concept. For clarity, this instructional support document identifies the Science and Engineering Practice, Crosscutting Concept *and* Supporting Content.

Connections to Phenomenon and the Science ISAT

The science assessments start with a *phenomena*, an observation of the natural or manmade world that generates wonder, initiates questioning, and engages students in all three components of the standards. It is vital that students have exposure to learning experiences that model this pattern of using all three science learning components in harmony to investigate and explain phenomena.

Science and Engineering Practices

- **Asking questions or defining problems:** Students engage in asking testable questions and defining problems to understand and explain phenomena.
- **Developing and using models:** Students develop physical, conceptual, and other models to represent relationships, explain mechanisms, and predict outcomes.
- **Planning and carrying out investigations:** Students plan and conduct scientific investigations in order to test, revise, or develop explanations.
- **Analyzing and interpreting data:** Students analyze various types of data in order to create valid interpretations or to assess claims/conclusions.
- **Using mathematics and computational thinking:** Students use fundamental tools in science to compute relationships and interpret results.
- **Constructing explanations and designing solutions:** Students construct explanations about the world and design solutions to problems using observations consistent with current evidence and scientific principles.
- **Engaging in argument from evidence:** Students support their explanations with reasoning and use evidence to defend their claims.
- **Obtaining, evaluating, and communicating information:** Students obtain, evaluate, and derive meaning from scientific information or evidence using appropriate scientific language.They communicate their findings clearly and persuasively in a variety of ways including written text, graphs, diagrams, charts, tables, or orally.

Crosscutting Concepts

- **Patterns:** Students observe patterns to organize and classify factors that influence relationships.
- **Cause and effect:** Students investigate and explain causal relationships in order to make tests and predictions.
- **Scale, proportion, and quantity:** Students compare the scale, proportions, and quantities of measurements within and between various systems.
- **Systems and system models:** Students use models to explain the parameters and relationships that describe complex systems.
- **Energy and matter:** Students describe cycling of matter and flow of energy through systems, including transfer, transformation, and conservation of energy and matter.
- **Structure and function:** Students relate the shape and structure of an object or living thing to its properties and functions.
- **Stability and change**: Students evaluate how and why a natural or constructed system can change or remain stable over time.

Supporting Content

Physical Sciences (PS):

Matter and Its Interactions

Motion and Stability: Forces and Interactions

Energy

Waves

Life Sciences (LS):

Molecules to Organisms

Ecosystems

Heredity

Biological Adaptation

Earth and Space Sciences: (ESS)

Earth's Place in the Universe

Earth's Systems

Earth and Human Activity