Aurora Public Schools P-20 Science Theory of Action Framework

Guiding Principles

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

- Children are born investigators. This **natural desire to actively participate** in science is the foundation for all science learning inside and outside of classrooms.
- ALL students are capable of learning science and making sense of the natural world at complex levels.
- Scientific understanding develops over time along a learning progression that integrates core content ideas, science and engineering practices and cross cutting concepts.
- Science is not just a body of knowledge that reflects current understanding of the world: it is also a set of practices used to establish, extend and refine that knowledge.

How People Learn

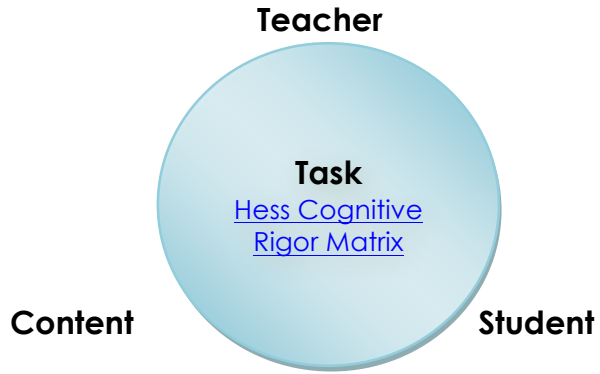
- Students come to the classroom with preconceptions about how the world works. When initial understandings are not engaged, students fail to grasp the new concepts and information that are taught.
- To develop competence in an area of inquiry, students must:
  - Have a deep foundation of factual knowledge
  - Understand facts and ideas in the context of a conceptual framework
  - Organize knowledge in ways that facilitate retrieval and application
- A "metacognitive" approach to instruction helps students learn to take control of their own learning by helping them define learning goals and independently monitor their learning towards those goals.

Theory of Action

Instructional Core

If we strengthen the instructional core, then our student achievement data will not be predictable by race, class, language, gender, and other social factors.
We will do this by working to ensure that every child receives the supports and opportunities to engage cognitively rigors science experiences that integrate, content, science and engineering practices and the cross cutting concepts.

- Adopted from the equity definition from Elena Aguilar



*For students to come to understand science, they must be able to **explain their thinking** and **develop arguments** for their findings. In order to become lifelong learners who are capable of reading and writing about scientific issues, making educated decisions and participating in a democratic society, students must be able to **read and understand the writing of others**, **evaluate its worth**, and **share the results of their own research and experience through writing**.*
-NSTA , 2008

Role of the Task Hess Cognitive Rigor Matrix Depth of Knowledge

Role of the Teacher

Teachers are the most powerful, long-lasting influences on student learning.

Foundational Constructs

Structures Rituals and Routines
Teaching and Learning Cycle
Conditions of Learning

Daily Planning	• Planning Template – Workshop Wheel • Orchestrating Productive Task based discussions in Science
5 E Investigation Instructional Plan Engage , Explore, Explain, Evaluate, Elaborate	
Science, Literacy and Math Connections	• Science Notebooking • Content Connections • Standards of Mathematical Practice
Support for Language Learners	• WIDA Can Do Descriptors

Role of the Content

Science is one of the four main content areas. The standards and evidence outcomes are aligned vertically and take into account that students cannot fully demonstrate understanding of scientific ideas without engaging in the practices of inquiry and the discourse by which such ideas are developed and refined. At the same time, they cannot learn or show competence in practices except in the context of content.
– adapted from National Science Frameworks

Standards
Colorado Academic Standards
Focus, Coherence, Rigor

Assessment
CMAS,
Common Formative Assessments

Instructional Resources
NSF, Research-Based Resources
Elementary
FOSS – Full Option Science System
Middle School
PBIS – Problem Based Inquiry Science
High School
9th - Active Physics
10th – Active Chemistry
11th - Biology

Role of the Students

The goal of science is to construct explanations for the causes of phenomena. Students are expected to construct their own explanations, as well as apply standard explanations they learn about through investigations and readings.

K-12 Continuum of Science and Engineering Practices

Students have explicit practice with and are proficient at:

- Asking questions and defining problems
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Engaging in argument from evidence

Constructing Explanation and Designing Solutions

ALL WHILE
Obtaining, evaluating and communicating information

Supports Structures for Teachers and Administrators

Lab Classrooms Unit/Kit/Resource Trainings Individual Coaching Team Planning Common Formative Assessment Development PLC Support
Literacy and math connections