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The Vermont Framework for Proficiency: Science Literacy

Purpose

The literacy statement in this document was used to create an overarching Proficiency-Based Graduation Requirement for Science that guided the development of Critical Proficiencies and Priority Performance Indicators. This literacy statement was developed using research from the field and with alignment to the Vermont Portrait of a Graduate (PoG).

Science Literacy

Science literacy is understanding the practices and value of observing, inferring, measuring, classifying, collecting, and analyzing data. It is the capacity to communicate results and knowledge using a variety of means including writing, speaking, tables, charts, and graphs, and doing so in an audience-appropriate format. A scientifically literate individual knows how to ask, find, and/or determine answers to questions derived from curiosity or observed phenomena. They can describe, explain, and predict natural phenomena, and engage in social and civic discourse using valid scientific evidence to express positions about global, national, and local decisions. They can evaluate the quality of scientific information based on its source and methods used to generate it, and revise thinking based on new information.

Science Connections to the Vermont Portrait of a Graduate

The discipline of science is linked to the AOE's PoG through six learner attributes: Learner Agency, Academic Proficiency, Critical Thinking and Problem Solving, Communication, Global Citizenship and Student Well-being.

The following model crosswalks these attributes and their indicators with the NGSS and NGSS-based instructional practices to show how a strong science curriculum can serve as a vehicle for students to demonstrate proficiency.

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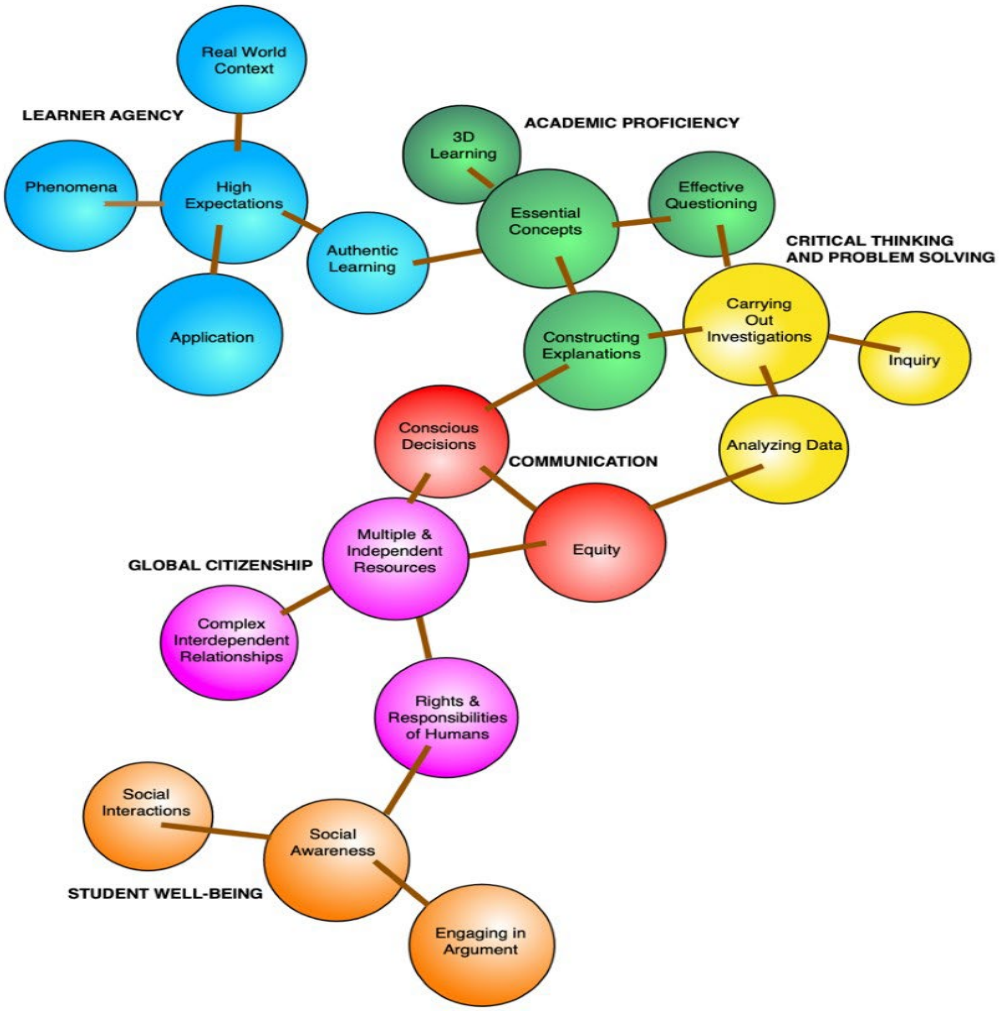

Learner Agency

Students become intrinsically motivated when they see the value of learning. As they investigate compelling, real-world phenomena, students apply obtained skills and knowledge to new and different contexts. Students that develop high expectations for themselves often learn to tackle challenging learning activities, produce high-quality work, and become lifelong learners.

Academic Proficiency

Students that engage in authentic, three-dimensional learning develop the ability to apply scientific practice and content knowledge to new contexts. The application of these scientific practices and concepts, coupled with 21st-century skills such as collaboration, innovation, and self-direction, help prepare students to formulate and refine probing questions to further their learning, evaluate multiple models, and aids in designing explanations and solutions that are consistent with scientific ideas, principles, and theories.

Critical Thinking and Problem Solving

When students use inquiry-based science that incorporates all three dimensions of the NGSS, they practice the use of evidence, logic and creativity when investigating and developing explanations about the natural world. Analysis of data collected from an investigation creates the evidence a student needs to answer their own questions and/or explain their thinking. The practices involved when students solve real-world problems and build explanations may challenge their preconceived notions and lead to new understandings about the world in which they live.

Communication

As students move into adulthood, they must evaluate and communicate important ideas from multiple viewpoints presented in different media. To be critical consumers of information and to develop the ability to recognize methodological flaws and sources of error, students need to discern between observation and inference. In order for students to make conscious decisions about their world, they will need to be able to evaluate the merit and validity of claims, methods, and designs.

Global Citizenship

The global economy is fueled by advances and breakthroughs in science, technology, and engineering. By engaging in scientific inquiry and practices, students will discover new knowledge, solve challenging problems, make conscious decisions, and generate innovation. It is important that they consider the rights and responsibilities of humans and the complex interdependent relationships, as well as consult multiple and independent resources as they maneuver through and grow in this globally competitive world.

Student-Well Being

Science is a social discipline at its core where scientists and engineers communicate with one another to refine ideas, gather feedback, refute claims and share findings. Students engaging in scientific discourse will encounter opposing viewpoints which will require them to share and clarify their own thinking, listen to others, deepen their own reasoning and, ultimately, collaborate with peers to come to a shared understanding of science phenomena and a better awareness of self.