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The Vermont Framework for Proficiency: Mathematics Literacy

Purpose

The literacy statement in this document was used to create an overarching Proficiency-Based Graduation Requirement for Mathematics that guided the development of Critical Proficiencies and Priority Performance Indicators. The Common Core State Standards in Mathematics and associated resources from the Council of Chief State School Officers in conjunction with the Organization for Economic Cooperation and Development's Program for International Student Assessment Mathematics Framework were the main resources utilized in the crafting of the following literacy statement for mathematics.

Mathematics Literacy

Mathematical literacy is the ability to reason quantitatively about shapes and patterns to analyze and solve real-world and hypothetical problems. Mathematically literate individuals use equations, data, tables, and graphs to validate hypotheses and model situations that individuals encounter in their everyday lives. They recognize and comprehend mathematical language, including expressions, variables, equations, and symbols, and use this language to effectively communicate ideas and understanding. Mathematically literate individuals reason abstractly and quantitatively, make mathematical models, attend to precision, make sense of problems, and persevere in solving them.

Mathematics Connections to the Vermont Portrait of a Graduate

In addition to learning the concepts of mathematics, a student can also address the attributes of the Vermont PoG through the study of mathematics. Below is a version of a PoG that depicts how a student in the study of mathematics will meet the six attributes described in the Vermont PoG. The information contained was largely inspired by the performance indicators of the Vermont PoG's attributes and also from the Equitable Mathematics Teaching Practices found in the book Catalyzing Change published by the National Council of Teachers of Mathematics.

Contact Information:

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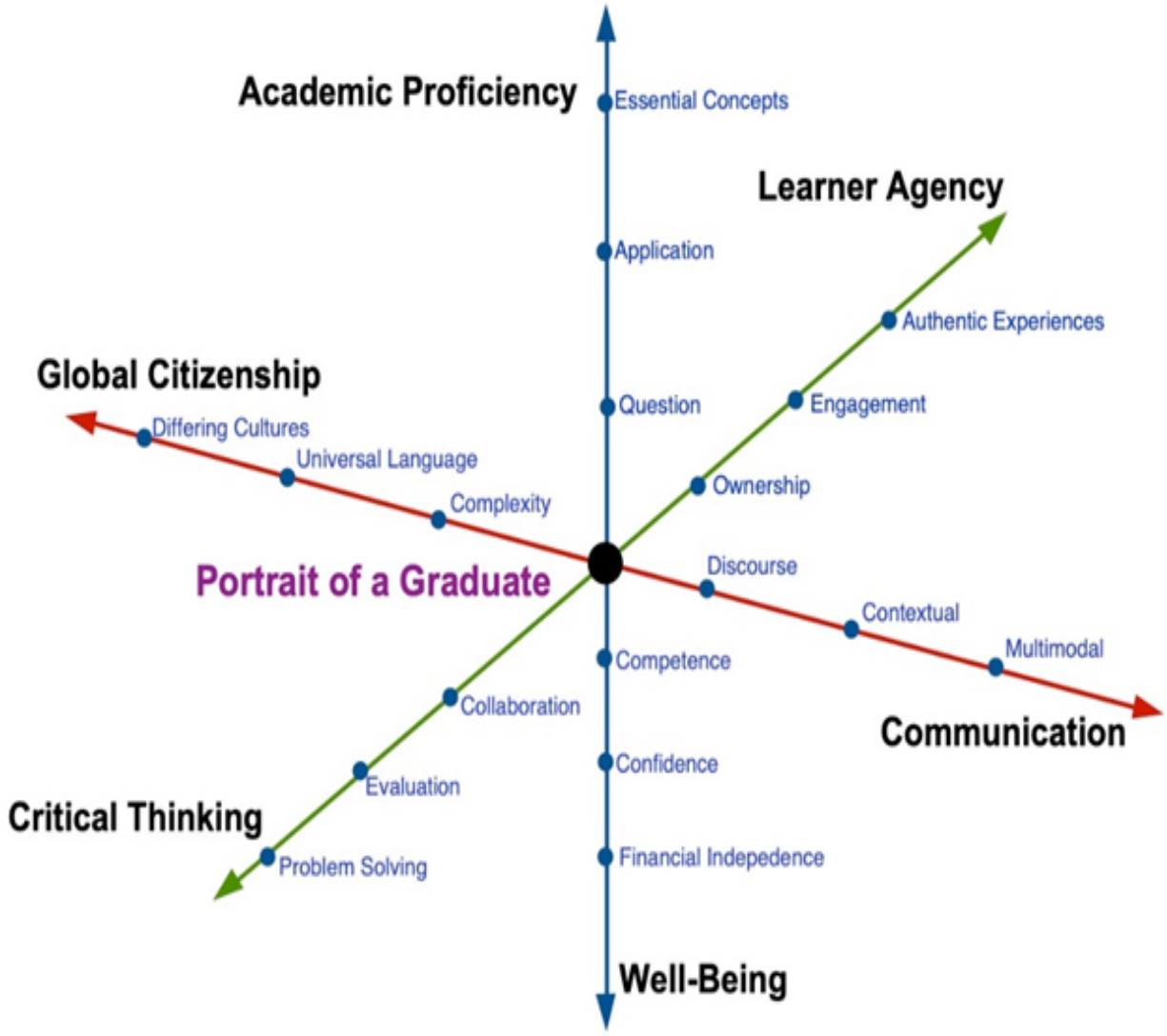

Learner Agency = Ownership + High Expectations + Authentic Experiences

Students become life-long learners when they develop **ownership** of their learning. While practicing modeling, reasoning, and problem-solving skills during **authentic experiences**, students shape their own mathematical identity and begin to hold themselves to **high expectations**. Creating unique mathematical representations and solutions positions students to become competent in using and applying mathematics to real world scenarios and defending their own decision-making through the use of data.

Global Citizenship = Universal Language + Complexity + Differing Cultures

To be global citizens, students must be able to use mathematics for communicating and modeling natural phenomena, locally and globally. Mathematics is considered a **universal language** as the structure of mathematical language is the same internationally. However,

understanding the **complexities** of how others learn math is critical for bridging culture gaps since the way mathematical ideas are represented is different in other countries. Students engaging in relevant tasks from **differing cultures** interact with diverse ideas and concepts that break down biases, misperceptions and hierarchical status in the learning of mathematical practices and concepts.

Academic Proficiency = Essential Concepts + Application + Questions

Students that understand the **essential concepts** of mathematics can connect knowledge and skills fluently in order to solve real-world problems. The **application** of these concepts to new and unique situations builds a student's capacity to effectively ask **questions** and engage in mathematical discussions and problem solving in life after graduation.

Communication = Discourse + Multimodal + Context

To gain a deeper understanding of mathematics and use mathematical skills to make sense of their world, students must communicate through **discourse** among peers using **multimodal** forms of media in their modeling of mathematics, while understanding the perspectives of others by analyzing their arguments and approaches to solving a problem. Students need to question purposefully in order to convey their learning, revise their own thinking, and develop a positive mathematical identity allowing them to present their solutions in **context** and in a respectful manner.

Critical Thinking = Problem Solving + Evaluation + Collaboration

As students analyze mathematical information and undertake innovative, real-world **problem solving**, they develop the necessary reasoning skills to engage in more complex and demanding situations. Making student thinking public through presentation, both independently and in **collaboration** with their peers, validates their ideas as worthy of **evaluation** and exploration, and builds a positive mathematical identity. This encourages analysis of unknown situations to understand how components work independently and together, allowing the unknown to become known.

Well-Being = Confidence + Competence + Financial Independence

Connecting conceptual understandings with procedural fluency positions a student to build **confidence** in their ability to know and do math. Students that can navigate economic situations -- personal, local and global -- and engage in responsible mathematic decision-making show their **competence** with mathematics and financial literacy, which in turn can result in improved outcomes such as **financial independence**.