

The Mathematics Vision Project

“The most necessary task of civilization is to teach people how to think. It should be the primary purpose of our public schools . . . The trouble with our way of educating is that it does not give elasticity to the mind. It casts the brain into a mold. It insists that the child must accept. It does not encourage original thought or reasoning, and it lays more stress on memory than observation.” Thomas A. Edison

The Mathematics Vision Project (MVP) was created as a resource to teachers who desire to implement the Common Core State Standards (CCSS) using a task-based approach that leads to skill and efficiency in mathematics by first developing understanding. The MVP approach is neither purely constructivist nor purely traditional. Rather, the approach takes seriously the Standards of Mathematical Practice and develops these practices through experiential learning in mathematics. Students engage in mathematical problem solving, guided by skilled teachers, with the desired outcome that students will achieve mathematics proficiency as defined in Adding It Up—conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition. (*Adding It Up*, p. 5) The authors have taken on the challenge made by the National Research Council to create a curriculum where students do not learn solely by either “internalizing what a teacher or book says or, on the other hand, solely by inventing mathematics on their own” (*Adding It Up*, p. 11) In this way, all the strands are developed in a balanced way and students achieve proficiency.

The Mathematics Vision Project is committed to helping educators implement the Common Core State Standards (CCSS) as part of a continuum of mathematics instruction addressing conceptual, procedural, and representational thinking; depth of knowledge; and assessment. The CCSS provide a coherent trajectory of mathematical content that students should be learning as they progress from kindergarten to 12th grade. This trajectory was developed from “research-based learning progressions detailing what is known today about how students’ mathematical knowledge, skill, and understanding develop over time.” (CCSS, p.4) The Standards are not just a checklist of sequential content that should be taught beginning in grade school and brought to a close in high school. In order to bring the vision of the Standards to life, instructional practice must change. The MVP method embraces a different way for teachers to organize instruction to deepen student learning of mathematics.

The *MVP classroom experience* begins by confronting students with an engaging problem and then allows them to grapple with solving it. As students’ ideas emerge, take form, and are shared, the teacher orchestrates the student discussions and explorations towards a focused mathematical goal. As conjectures are made and explored, teachers use formative assessment to guide students as they embrace effective strategies for analyzing and solving problems. Students justify their own thinking while clarifying, describing, comparing, and questioning the thinking of others leading to refined thinking and mathematical fluency.

What begin as ideas become concepts which lead to formal, traditional mathematical definitions and properties. Strategies become algorithms that lead to procedures supporting efficiency and consistency. Representations become tools of communication which are formalized as mathematical models. This is how students learn mathematics. They learn by doing mathematics. They learn by verbalizing the way they see the mathematical ideas connect and by listening to how their peers perceived the problem. This process describes the Continuum of Mathematical Understanding and it informs how teaching should be conducted within the classroom.

Each module in the **MVP** educational program has been carefully designed and sequenced with rich mathematical tasks that have been formulated to generate and develop the mathematical concepts within the core. Careful attention has been placed upon the way mathematical knowledge emerges. Some tasks are developmental tasks while others are for solidifying or practicing the concepts. The tasks also encourage students to notice relationships and make connections between the concepts. In this way, students perceive mathematics as a coherent whole.

While the *classroom experience* begins by improving students' reasoning and sense-making skills, it does not conclude until mathematical understanding becomes procedural skill as evidenced through application. Hence, the *Ready, Set, Go!* homework assignments are focused on students practicing procedural skills and organizing principles to add structure to the ideas developed during the *classroom experience*. As in any discipline, practice is the refining element that brings fluency and agility to the skills of the participant. Together the *classroom experience* and the *Ready, Set, Go!* homework assignments present a balanced combination of procedure and understanding for the student practitioner.

The Mathematics Vision Project has produced the first high school textbook to outline the steps a practicing teacher can take to faithfully implement the **Integrated Pathway Secondary Mathematics 1** core standards. The modules have been carefully crafted and sequenced to allow the specific mathematical ideas identified in the core to surface and then flourish into rich mathematical knowledge and skill for all students. The textbook for **Integrated Pathway Secondary Mathematics 1** assumes that students enrolled in the course have been properly prepared. The *Getting Ready* module may be used in the classroom to review content that should have been mastered in previous course work but is also necessary for success with the new material. The *Ready, Set, Go!* homework assignments have been designed to continue to spiral a review of content. Combined, the *classroom experience* and the *Ready, Set, Go!* homework assignments offer a powerful blend of new learning and maintained proficiency.

For more information about the Learning Cycle follow the link.

<http://edutech.csun.edu/trd/sites/edutech.csun.edu.rtcweb/files/CM1%20Article.doc>.

For more information about the Mathematics Vision Project visit.

www.mathematicsvisionproject.com