



The Inquiry Project



inquiryproject.terc.edu

Curriculum
Research
Assessment
Professional Development

What is the Inquiry Project?

The [Inquiry Project](#) establishes a firm foundation for developing students' ideas about matter, a key idea in science. The project is founded on a learning progression for matter and material and brings together **research** about children's science ideas, **curriculum**, **assessment**, and **professional development**. Unique characteristics of the work are its integration of mathematics and science, and its focus on evidence-based reasoning through investigation and discussion.



Curriculum Sequence for Matter

Grade 3

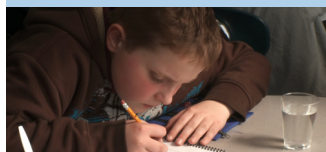
What are Things in My World Made Of? How Much Is There?

Grade 4

"What's Under Our Feet?" Investigating Earth Materials

Grade 5

Water Transformations: What Changes and What Stays the Same?



The Inquiry Curriculum

helps Grades 3-5 students to build a sound understanding of matter and material in which the physical quantities of **weight**, **volume**, and **density** are inter-related and for which students recognize solids, liquids, and gases as distinct forms of matter. All learning experiences are guided by the view that students' understanding of the atomic molecular theory must rest on foundations built during the early school years. Research suggests that these understandings are achieved through deep and broad reconceptualizations of children's physical, mathematical, epistemological, and symbolic knowledge (Smith et al., op. cit.; Wiser & Smith, 2008). This stance is consistent with the new NRC K-12 Science Framework that calls for systematically coordinating the development of core ideas, practices, and crosscutting concepts (National Research Council 2011.)

The Inquiry Research A longitudinal study was conducted to compare the learning of Grade 3-5 children who used the Inquiry Curriculum with those who did not. This informed further refinement of the curriculum and learning progression and showed that children who had the Inquiry Curriculum made more progress in moving from perception-based to model-mediated understandings of materials and matter (Doubler, et al. 2011; Smith, Wiser, & Carraher 2010; Smith, Wiser & Doubler 2011.) See the Research section of the Inquiry site (inquiryproject.terc.edu)

Formative Assessment Opportunities

Embedded assessment opportunities provide ongoing information about students' ideas and help to inform next steps in the learning for both teachers and students.



Professional Development Professional development is comprised of Implementation Workshops that introduce teachers to the curriculum and embedded assessment opportunities, and *Talk Science*, professional development designed to help teachers lead productive science discussions (See *Talk Science* at inquiryproject.terc.edu.)

For information about the project email: inquiryproject@terc.edu

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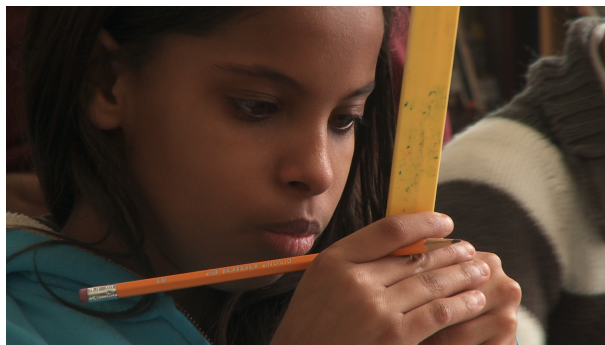
A Partnership Between Teachers, TERC and Tufts University



Tufts

What understanding do students develop and why is this important?

In Inquiry Project classrooms, students work collaboratively with their classmates and teachers to build scientific explanations about objects and materials in the world around them. A carefully sequenced curriculum supports students in progressively deepening their understanding of **matter, material, weight, volume, and density** through investigation and discussion. The curriculum is informed by a longitudinal research study and a well-founded conceptual framework, *A Learning Progression for Matter and Material* (Smith, Wisser, Anderson, & Karajcik 2006; Mosher 2011; Wisser, Smith, & Doubler in press) that takes seriously students existing ideas as critical to their learning.



The Measurement of Matter

Students learn to measure weight and volume using a variety of methods and use their measurements as evidence to support explanations. They begin to understand that all matter (in solid, liquid, or gaseous form) has weight and volume. With a firm grasp of the measurement of weight and volume, students are able to build mental models of matter and density that later help them understand the particulate nature of matter.



Conservation and Transformation

The Inquiry Project helps students deepen their understanding of matter and materials through investigations of what changes and what stays the same when matter changes state, is reshaped, divided, heated, and mixed. In these investigations students need to isolate variables that are important to their investigations and control their experimentation to measure these variables. They use their measurements and their emerging models of matter to understand that some quantities, such as the total mass of a system, do not change.



Scale

Students build an intuitive sense of scale of space (volume) and weight that will later assist them in developing a particulate model of matter. Moving from macroscopic to microscopic thinking requires the ability to construct mental models about things and processes we cannot observe. Students who gain a strong understanding of quantities of volume, weight, and density through observation, measurement, and modeling are poised to understand quantities and phenomena at a scale that they cannot observe.

