

The Vermont Mathematics Partnership

Mathematicians and educators working together to help all children succeed in mathematics

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The Vermont Mathematics Partnership (VMP), established in 2002, is an extension of the University of Vermont's Vermont Mathematics Initiative (VMI), a highly successful, content-intensive graduate mathematics teacher leadership program. The project has deep roots in Vermont's mathematics education reform initiatives of the past 17 years which emphasize rigorous mathematics content, standards-based coherent curricula, instructional practices that promote mathematical proficiency, assessment practices that support instruction, program evaluation, and school accountability systems designed to improve student performance.

The purposes of VMP are:

- Enhance the performance of all K-12 students
- Improve mathematics instruction throughout Vermont and beyond
- Strengthen the systems that prepare and support teachers and school leaders
- Make significant contributions to the research and resources available to educators nationwide

VMP partners include seven Vermont school systems, the Vermont Department of Education, The Vermont Institutes (with over 10 years of experience as an NSF-supported Statewide Systemic Initiative program), and the University of Vermont's Vermont Mathematics Initiative.

VMP's major research, development and implementation phases are now complete. Our current focus is on publication of materials and support of 16 Noyce Fellows who are currently enrolled in the Vermont Mathematics Initiative.

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Student Achievement

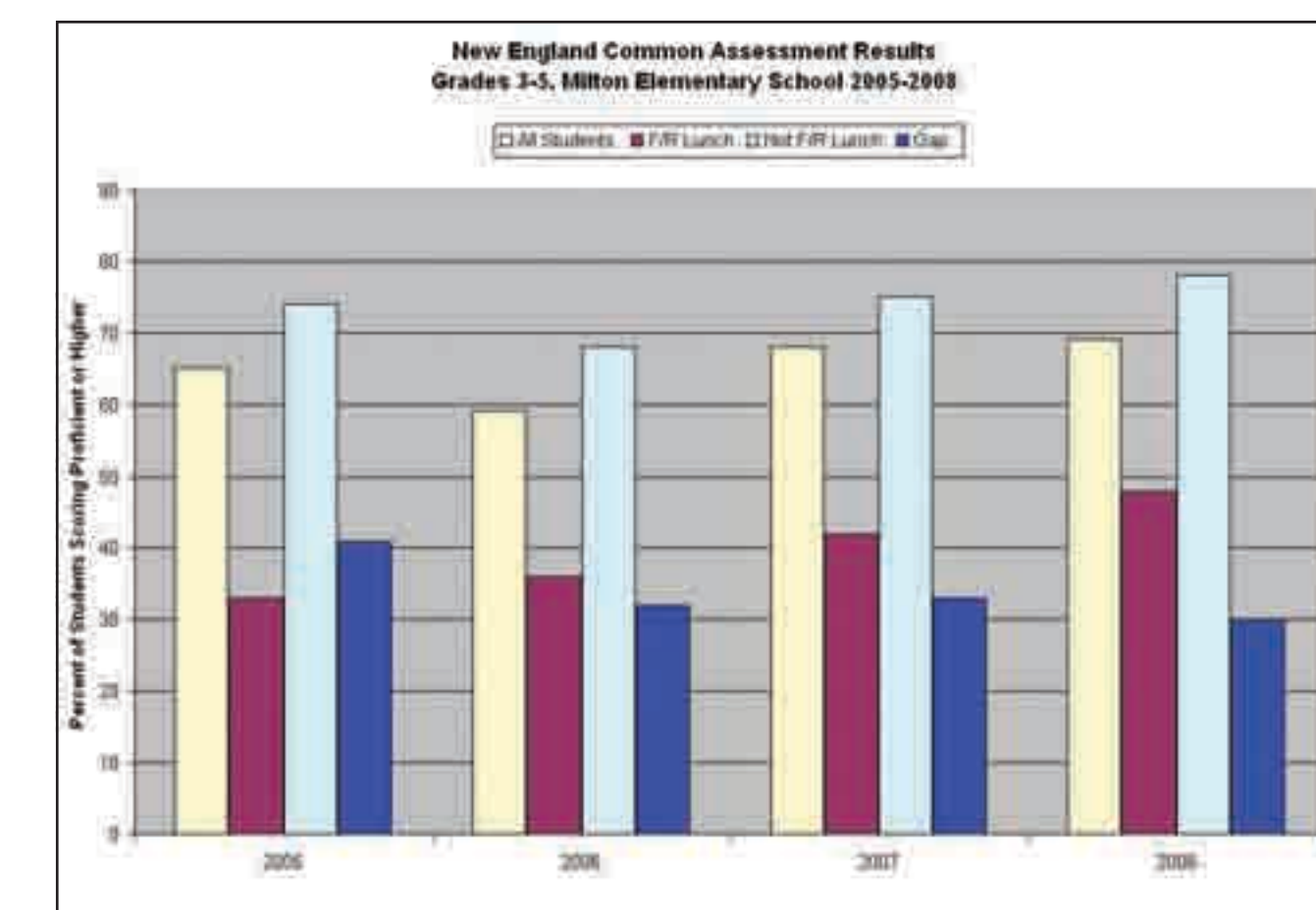
The 2009 evaluator's report found that on measures of existing cohorts for the past four years, students at VMP partner schools outperformed students at matched schools on 18 of 28 measures. In no case did control sites outperform partner sites in regards to the existing cohorts.

Performance of VMP Sites versus Matched Sites — Existing Cohorts

Site	Outperformed Matched Sites?	Significance
Site A	3 of 4 measures	All significant at p<.05 or lesser, favoring partner sites.
Site B	5 of 6 measures	
Site C	2 of 4 measures	
Site D	4 of 4 measures	
Site E	3 of 7 measures	
Site F	1 of 3 measures	
TOTAL	18 of 28 measures	

Closing Mathematics Achievement Gaps

At two VMP partner schools the percentage of students who qualify for free/reduced lunch rates and who are proficient on statewide mathematics assessments is growing over time. This is in contrast to the tendency for proportions of students in this subgroup who achieve proficiency on statewide mathematics assessments to remain fairly stable. This change is an important indication of the potential for long-range impacts of systemic improvements in partner schools. These two schools have high degrees of implementation of VMP strategies, including shared leadership, significant participation by math teachers in a wide range of professional development, and interventions to support students who demonstrate "holes" or misconceptions in their understanding of mathematics.

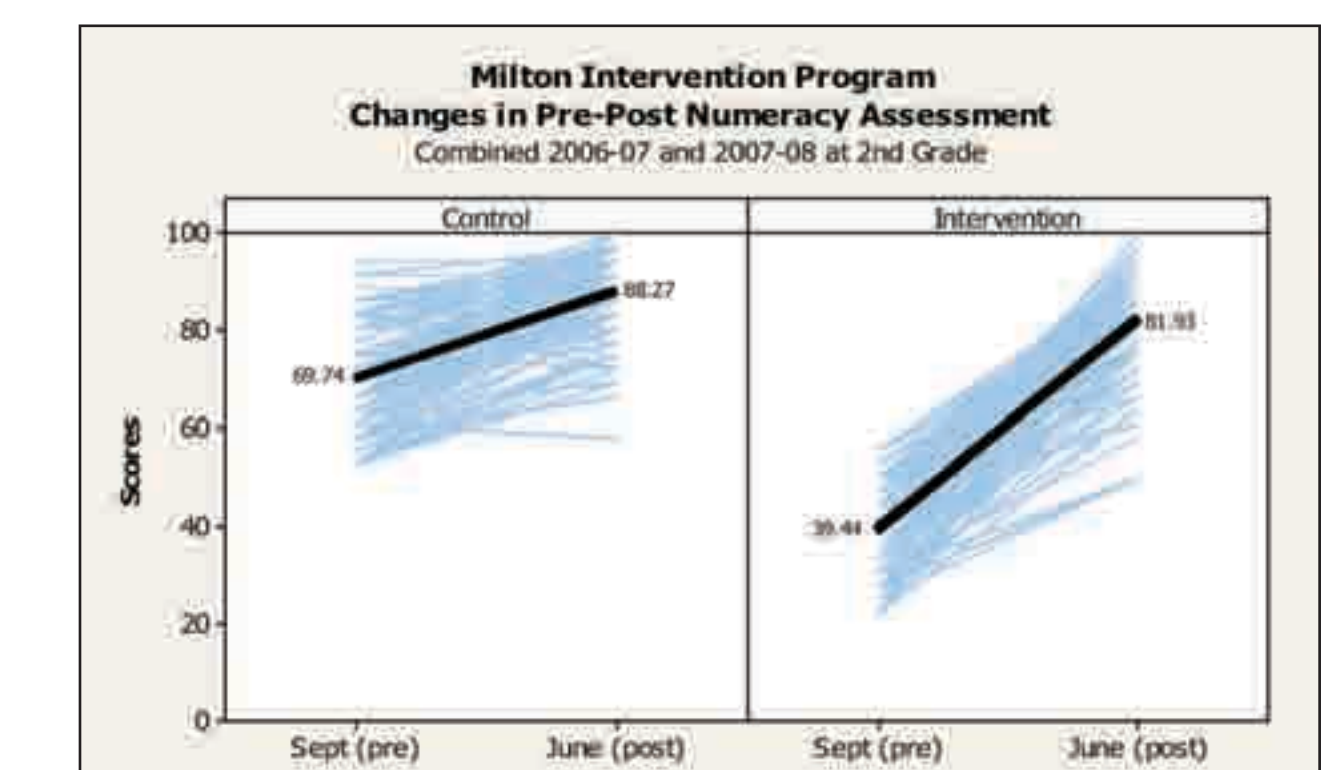


Milton Math Intervention Program

This program offers intensive, 8-week supplemental support in the school's math lab during the school day for students in 2nd-4th grades who are identified as not meeting achievement standards, but who demonstrate enough proficiency so that specialized instruction focused on numeracy skills can help to close gaps in understanding essential math concepts. To determine placement and measure intervention effect, all students at these grade levels take a numeracy pre-assessment at the start of the academic year and an equivalent post-assessment at the end of the year. Regression discontinuity analysis for 2006-07 and 2007-08 shows that the intervention had a statistically significant impact on post-test scores. Line plots show the reduction of the gap between mean pre- and post-scores for the intervention and control (non-intervention) groups. As shown in Figure 3, the two-year mean gap on the 2nd grade pre-score was 30.3%, reduced to only 6.3% at the post-test (Rosenfeld, 2009).

Impact of Milton Intervention Program on Student Mathematics Achievement

Scores are percentages of total points available. Each line represents one student. Dark lines represent the mean for each group.



Ongoing Assessment Project (OGAP)

OGAP is an intentional and systematic approach to mathematics formative assessment that involves:

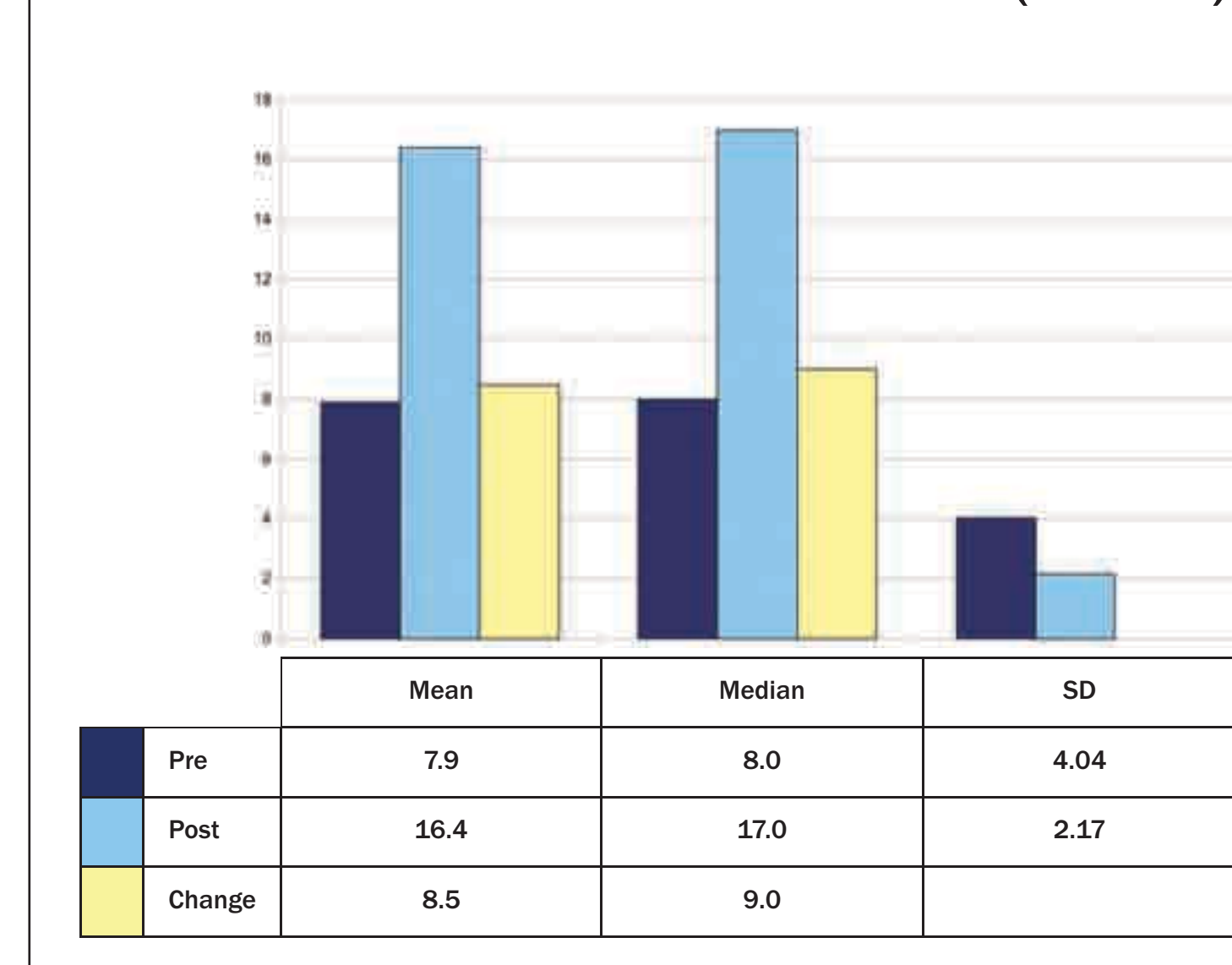
- Gathering information about pre-existing knowledge through the use of a pre-assessment;
- Analysis of pre-assessment to guide unit planning; and
- A continuous and intentional system of instructing, probing with instructionally embedded questions, analysis, and instructional modification.

VMP staff, teacher leaders, higher education faculty and assessment specialists have created tools, protocols and professional development to strengthen the capacity of K-8 teachers to conduct ongoing, day-to-day assessments of their students' understanding of key mathematics concepts in Number and Operations.

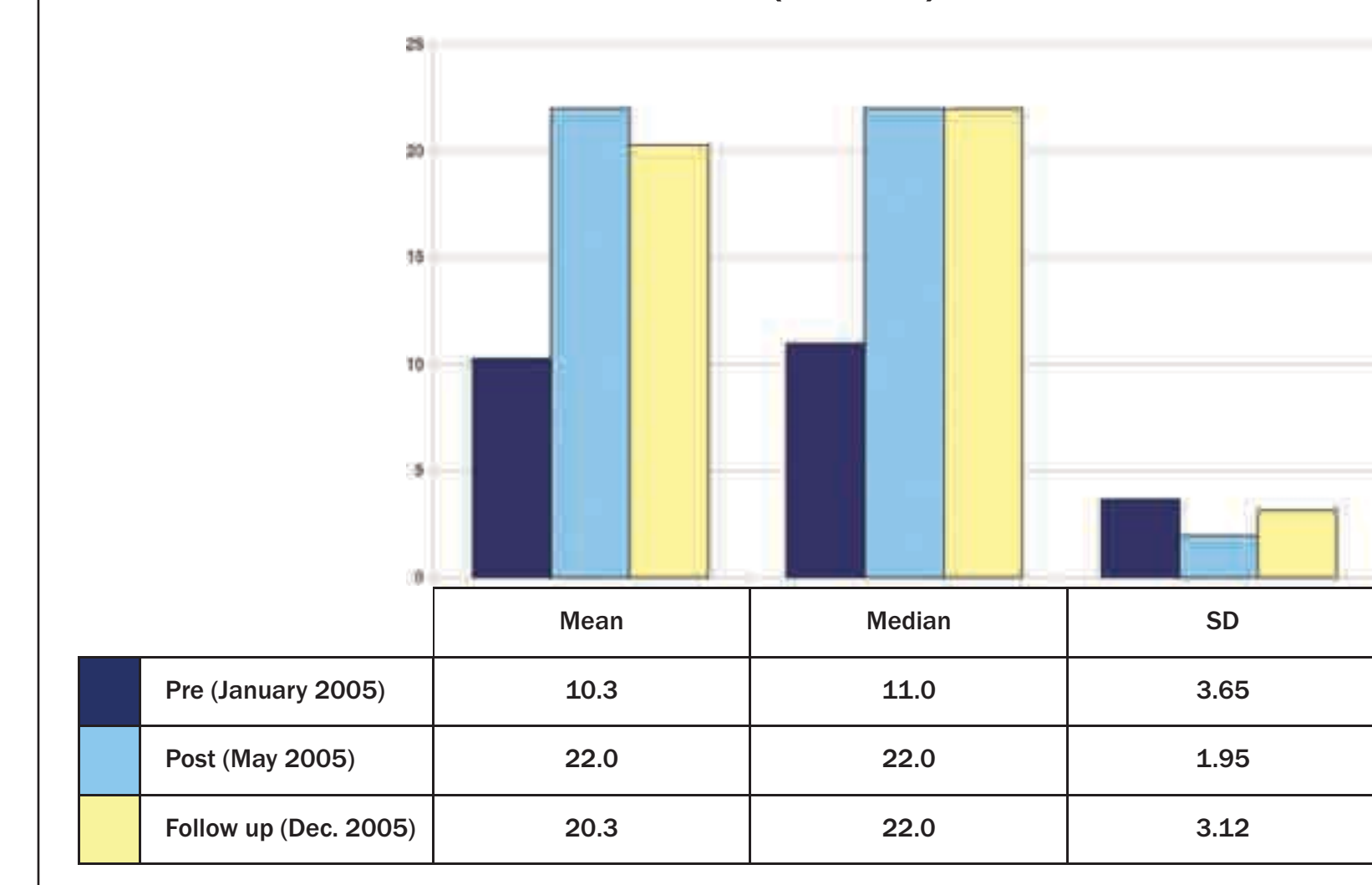
The development and implementation model is based on:

- Distillation of hundreds of research articles and synthesis of research into frameworks
- Interaction with over 300 educators (over 6000 students) in Vermont and Alabama with OGAP materials and resources (and numbers are growing)
- Analysis of teacher logs linked to student work archives
- Analysis of over 40,000 pieces of student work
- Analysis of teacher action research projects
- Surveys, interviews, feedback forms
- Advice from National Advisory Board

Grade 2 OGAP Pre and Post 2005 (n=267)



OGAP 2005 Grade 3 to Grade 4 Retention Study School B (n=41)



While the primary purpose of the 2005 Exploratory Study and data collection during the 2006 Scale-up was to inform development, a number of sub-studies were conducted about impact on student learning. Results of two sub-studies are presented above.

Recent Publications

Ashline, G. and Quinn, R. (2009). Using mathematically rich tasks to deepen pedagogical content knowledge of primary teachers. In B. Clarke, B. Grevholm and R. Millman (Eds.), *Tasks in primary mathematics teacher education: Purpose, use and exemplars* (Mathematics Teacher Education Volume 4) (pp. 197-214). New York, NY: Springer Science+Business Media LLC.

Petit, M., Laird R., and Marsden, E. (in press 2010). *A focus on fractions: Bringing research to the classroom*. New York, NY: Routledge Taylor Francis Group.

Silvis, L. (2008). Developing relational thinking: the game that makes the difference. *Connect*, 22(1), 22-25.