

Improving Math Performance

What do you think is the single most important factor in dramatically improving students' math performance in your school?

Themes in curriculum content and standards:

- Alignment with state frameworks
- Coherent, focused, demanding program
- Connections to real world
- Year-to-year continuity
- Building on prior skills and knowledge
- Use of manipulatives for concept development

Regardless of their specific mathematics programs, **No Child Left Behind - Blue Ribbon Schools** use many similar instructional techniques. All emphasize alignment of the school's mathematics curriculum with state standards and conduct frequent benchmark assessments to determine student mastery of the standards. All strive to allot sufficient time for math instruction each day to ensure that all students reach high levels of achievement. Assessment is formative and ongoing, and students who experience difficulty mastering math concepts receive immediate intervention and additional instructional time. Many schools use manipulatives to help students understand math concepts. Mastery of computation is balanced with problem solving, applying mathematics, and making real world connections. As in all Blue Ribbon Schools, quality teachers, parent involvement, and a coherent progression from grade to grade are key to student success. School comments about improved student math performance are organized below by topic—curriculum, teaching, student support, and assessment—with illustrations from survey responses.



A. Curriculum content and standards

Blue Ribbon Schools use coherent, focused, and demanding mathematics curriculum that reflect the logical and sequential nature of mathematics. Students move from mastering basic computational skills and number concepts to more complex ideas and mathematical reasoning, including problem solving. Schools expect students to know math concepts and be able to apply them in a variety of settings. All teaching is aligned with district and state standards in mathematics.

Louisa May Alcott Elementary School

Riverside, CA

“We present a balance between conceptual understanding, basic computational and procedural skills, and problem solving. Students are intellectually engaged in learning by reasoning, predicting, evaluating, concluding, and solving problems, skills that are fundamental for life-long learning. Other key strategies include:

- A relentless focus on the California mathematics content standards.
- Use of a district pacing guide to ensure all key concepts are taught during the year.
- Reteaching students who do not learn after the initial instruction.”



Mountain View Academy ***Greeley, CO***

“Each lesson is organized around multiple skills or topics, rather than around a single skill or topic. Each skill or topic is addressed for only five to ten minutes in any given day's lesson, but it is revisited day after day for many lessons. . . [which] promotes mastery rather than teaching for exposure. Strands make sequencing and

cumulative introduction of skills feasible, and topics can be treated in depth. Concepts are arranged in a logical scope and sequence, so that several topics can appear in one lesson. This permits pre-skills to be taught before being integrated into more complex mathematical concepts.”

**Orleans Elementary School
Orleans, MA**

“The adoption of the Massachusetts Mathematics Curriculum Frameworks required teachers to shift learning mathematics from the process of absorbing facts and practicing procedures to the process of developing one's knowledge of facts and procedures in relation to a set of important, underlying mathematical ideas.”



Joseph K. Lumsden Bahweting P.S.A. School

Sault Saint Marie, MI

“The single most important factor in our math performance is the stressing of the foundation of each mathematical concept. All concepts are first taught with manipulatives such as counters of various types, Cuisenaire rods, base ten Blocks, fraction strips, and the like. This teaches the students exactly what they are calculating and why. The algorithm is taught only after the foundation is laid with manipulatives. Also, concepts are taught in a sequence that enables skill scaffolding for learners.”

David Crockett Elementary School

Baytown, TX

“Crockett staff realizes that student achievement that is measured in grades 3, 4, & 5 is not just the responsibility of those grades. Not only are grades pre-K-fifth vertically aligned in reading, but this is also consistent in the math curriculum. Teachers follow the suggested lesson design provided by the math department which begins daily with a calendar math lesson, a problem-solving lesson, and computation. Math facts are also part of this lesson with emphasis on practicing the facts in ways other than just pencil and paper timed drills. Utilizing and building on these effective strategies each year engages the student and teacher in a high level of learning.”

Kashmere Gardens Elementary School

Houston, TX

“The single most important factor is scaffolding new concepts with prior knowledge during each lesson presentation thus building a cohesive mental picture. The stage must be set in order for new learning concepts, ideas, and information to take place. When prior knowledge is connected to new information, students are better prepared to comprehend new knowledge.”

Mount Airy Elementary School

Gretna, VA

“A combination of Silver Burdett/Ginn and SAXON Math programs . . . provide an incremental developmental and continual review of concepts/skills. . . . The skill lessons and exercises increase in complexity with each lesson, affording sufficient time for students to become acquainted and comfortable with the skill, therefore making the application of the skill deliberate and uncomplicated.”

Newport High School

Bellevue, WA

“Four years ago Newport implemented the Core Plus integrated math curricula. Instead of . . . [watching and hearing] how to compute math problems, students now work collaboratively in small groups to problem solve. Students are now forced to think deeply about their learning and to be prepared to defend and explain responses.”

Barton Elementary School

Milwaukee, WI

“Mathematics: Explorations and Applications [is a] well-rounded, highly researched math program that aligns well with state standards and the state testing. There are multiple components of MEA that address different standards. There are thinking stories that . . . require deep mathematical thinking related to real life scenarios. Daily problem solving questions also address mathematical thinking for all purposes. Mental math develops automatic recall of mathematical equations, mastery of which are critical to higher level functions. Games develop the strategic thinking and number sense.”

Holy Name of Jesus School

Indialantic, FL

“The most important factor is the involvement of a high quality teacher who will ascertain that students master a concept before moving on, work with struggling students, and provide a strong foundation in basic facts.”

***Lyon Elementary School
Glenview, IL***

“The district has established a consistent program for mathematics for all of the schools utilizing the University of Chicago School Mathematics program. The district was involved in the original pilot of this instructional approach and has been using the program for over ten



years. Our teachers are well trained in its instructional strategies and how to implementation daily lessons. They also understand the need to supplement the program in certain areas, as well as the value of the hands on learning components. Finally, the ‘Home Links’ program allows for a connection between school and home, so that the parents are involved and have an understanding of the program.”

Williams Middle School

Longmeadow, MA

“For the last three years, coordinators have led teacher efforts to map their math curriculum, using the Heidi Hayes Jacobs model. During the summers and professional development days, coordinators and teaching teams have worked to align individual teacher curriculum maps with the state frameworks by identifying gaps and weaknesses or repetitions and redundancies across the grade levels. Readjustments in curriculum were made to cover all framework topics. All district teachers were involved in developing consensus district maps for each curriculum.”

Eugene Field Accelerated School

St. Joseph, MO

“We at Eugene Field attribute our high math scores to rigorous, hands-on instruction that involves higher order thinking skills. Students are taught that a planned procedure is helpful in solving a problem and that process is emphasized in each math topic and unit. Students are required to communicate—first orally and later in writing—the process that was used or the reasoning used to arrive at the correct answer. Math games and manipulatives are used to enhance instruction and application of concepts.”

Mt. Pleasant Academy Elementary School

Mt. Pleasant, SC

“Good teachers use direct instruction to model the learning, require and provide for time on task, have high expectations, and do not give up on any child.”

Steenrod Elementary School

Wheeling, WV

“The teachers provide opportunities to apply problem-solving skills to relevant, everyday experiences. Manipulatives, computers, and calculators are part of math instruction at all levels to assure understanding of concepts, and daily math drills provide practice in mathematical communication and use of algorithms. Integration with other curricular areas is managed through thematic units and projects. Students use a variety of measuring, estimating, graphing, and problem-solving techniques. All teachers are aware that the concepts in math are like a set of stairs--one cannot reach the top by skipping too many steps.”

C. Student support

Blue Ribbon Schools support their students in mathematics instruction through a variety of techniques, including keeping parents informed about student performance and involved in their children's educations.

Themes in student support:

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- Early intervention
- Frequent parent-teacher conferences
- Home strategies
- Extended day programs
- Tutoring
- Summer workshops

Forest Park Elementary School

Fremont, CA

"The school uses multiple measures for data analysis to determine areas of mathematical competencies in need of emphasis for identified students. There is a lot of collaboration and discussion about identified students in order to determine the best avenues for effecting progress. The school also intervenes as early as possible and makes every attempt to involve parents in every aspect of the student's educational process."

Village Christian Schools

Sun Valley, CA

"We did a grade-by-grade item analysis of the standardized test score data [and] identified areas of strength and weakness. We designed specific instructional interventions and adopted new curricula to address those areas of weakness. Each year, we continue to identify areas where continued growth is needed and modify the instructional program to produce that growth. A key strategy in improving scores was to target the lowest performing students (stanines 1-3) and to build interventions for these students. The major intervention was to develop a peer tutoring program that would help lower performing students build foundational skills in math."

Sumner Academy of Arts and Sciences

Kansas City, KS

"The math department has designed several interventions to assist students who are struggling with math. They provide summer workshops to incoming students free of charge, they provide tutoring periods during activity periods, and they meet with students regularly before school, after school and on Saturdays. This year they have begun a new class which requires struggling students to have 90 minutes of math instruction every day."

Benjamin Franklin High School

New Orleans, LA

“Mathematics teachers articulate the curriculum across grade levels, using frequent assessments to ensure that students are building the necessary foundation for higher-level mathematics. Keenly aware of student data, mathematics teachers address evident student weaknesses, build into their courses time for tutoring students during the school day, and staff a Saturday program for students who need to work on their mathematics skills.”

Summit Park Elementary School

Baltimore, MD

“We offer advanced, compacted math curricula for students who demonstrate readiness. Grade level students all participate in rigorous programs with high expectations. Teachers regroup students based on their needs for each unit. Teachers work in teams to evaluate students' work and their own instructional effectiveness.”

Granville Middle School

Granville, OH

“The students at Granville Middle School are permitted to advance to upper levels of math at their own pace. Many of those students need some extra support from teachers because they are in class with high school pupils. At the same time, it is necessary to support struggling students with individual help. The math department holds individual help sessions for students called ‘Monday math help.’ The Math Counts program, which has become so popular that it has almost turned into a club, participates in daily morning math help sessions. These are open to all students regardless of ability, and therefore draw students who may be struggling as well as those who are advanced.”

W. W. Scarborough Elementary School

Houston, TX

“Our biggest leap in math achievement came from careful analysis of disaggregated test data. We were then able to devise focused tutoring through Math Camps during the day and at before- and after-school tutorials. Careful data analysis gave us a focus so that we could help more students be successful.”

Franklin Elementary School

Tacoma, WA

“Some of our intermediate teachers hold math curriculum nights to help parents better understand the curriculum and homework. We extended the day for at-risk and English as a second language students to help them understand math exemplars and develop strategies in solving story problems. We increased our support staff time in the area of math for grades 4 and 5. There is cross-grade tutoring. High school students from a local private school come to tutor our students in skills they lacked.”



D. Importance of assessment

Formative, continuous assessment guides mathematics instruction. It informs instructional planning at the specific level of individual student needs and, more broadly, suggests where a given teacher might improve a lesson.

Themes in assessment:

- Diagnostic screening
- Individual instruction based on assessment
- Teaching guided by assessment
- Performance assessment
- Ongoing assessment

William Howard Taft Elementary School

Boise, ID

“Continuous classroom assessment which is focused on specific benchmarks is the one factor which allows us to:

- Provide K parents with specific activities to meet the needs of their child(ren)
- Schedule students in small and large groups in order to meet their needs
- Provide paraprofessionals with specific skills/concepts to work with individual students
- Move students in and out of flexible small groups based on their attainment of specific skills/concepts on a daily/weekly basis
- Focus our horizontal and vertical collaborative team meetings on specific data which then drives our classroom instruction.”

Dirksen Primary School

Pekin, IL

“Math district criterion-based assessments were also developed for each grade level to be taken in the Fall, Winter, and Spring. These formative tests, along with individual student portfolios, help staff and students monitor learning progress in meeting and exceeding the district/state learning expectations. See <http://www.pekin.net/pekin108/curr/math/math.html>.”

Lone Dell Elementary School

Arnold, MO

“Math instruction is provided through an individualized approach to instruction utilizing performance tasks that are monitored through various assessments, including our district's quarterly assessments. We focus on the results of the standardized testing as well as our own quarterly assessments to redirect and focus on strengths and weaknesses to our instruction. Each year may require modifications to our instructional practices depending on the needs of the incoming students.”

Robert Seaman Elementary School

Jericho, NY

“A process of continuous diagnosis and customized instruction based upon benchmarking, coordinated by a lead Mathematics teacher, [is] supported by small group non-redundant instructional support.”

Northwest Elementary Schoo

Smithfield, OH

“[We] use weekly review sheets and [break] down the strands of the proficiency test, zeroing in on the weakest areas of concern and providing many supplemental teaching materials for the classroom.”

Walsingham Academy Lower School

Williamsburg, VA

“[We] develop learning plans by department and grade based on the strengths and weaknesses discovered on the previous year's tests. We review our curriculum and teaching strategies, and new strategies are implemented if necessary. Data from student progress in the classroom is reviewed in regularly scheduled math meetings. Math teachers met with math teachers in the grade above them and grade below them to align curriculum and developed a math mastery reporting instrument to be used for all students. Parents are apprised of their students' performance on standardized tests, and conferences are scheduled to explain scores and develop home strategies when appropriate.”

Kenova Elementary School

Kenova, WV

“Math performance at our school has been dramatically improved by doing an item analysis of our test results from the previous year and gearing our instruction toward improving in weak areas. Mid year we assess our students again and once again focus our efforts toward areas that need further instruction. “