



Bulletin

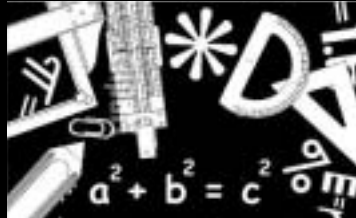
Parents Learning About Children's Education

The Massachusetts Statewide Parent Information & Resource Center (PIRC)

Available online in English, Spanish, and Portuguese at www.pplace.org



Parents, your involvement matters... IN MATH, TOO! Part 2



Parents¹ who visit their children's math classes today may be surprised at what they see and hear! Some exciting changes are occurring in the way that math is being taught. These changes are guided by current research about how children learn. The No Child Left Behind Act (NCLB) of 2001, the main federal education law, also plays a part in these classroom changes. NCLB says that schools must use teaching methods that research has shown to be effective. While extensive scientific research on math instruction is in the early stages, a lot has already been learned. This article highlights some of these new approaches that research has shown to be effective in helping students learn math.

This issue of the **Bulletin** is the second in a two-part series focused on mathematics. The first part, Volume 5, Issues 3 & 4, suggests practical ways families can support their children's math learning at home. Find it on our website at www.pplace.org, or call Parents' PLACE if you would like us to send you a free copy.

Not long ago, math class often meant spending hours repeating addition facts ($3 + 2$) and multiplication tables (2×3) until students learned them by heart. Memorizing basic math facts is still very important. The difference today is that students are learning to memorize with understanding. Students must still learn basic math facts and how to compute. But now teachers use more and better ways to teach math ideas as well. Following are some practices based on recent research that parents might notice on their visits to the math classroom.

High Expectations for All:

The teachers and the whole school send the message that all students can learn math. Many studies show

that teachers' beliefs about children and math have a great influence on student learning. Research has also shown that with good instruction all students can learn math. Schools with high expectations for all students build students' confidence in their ability to learn math. They encourage all students to take challenging courses and give them strong support to succeed. This means that students with special promise in math receive appropriate opportunities to follow their interests. Students with special learning needs in math receive support both from their classroom teachers and from special education staff.

High expectations are important at every grade level. For example:

- In elementary and middle school, while learning basic arithmetic

(addition, subtraction, multiplication, and division), students should also begin to learn why these rules work. Learning the logic behind the rules helps develop a deeper understanding of math. Research says that students can learn how to solve math problems even if they have not mastered all their math facts yet. Studies also suggest that students with strong understanding early on use the rules and skills better later on.

Children begin to prepare for algebra even before kindergarten by learning to notice patterns in language, and in real-life events or objects around them. A pattern is something that repeats over and over again. Sorting blocks by shape, working puzzles, and noticing repetition in a song or story help young children learn about patterns. Later, they build on this knowledge to see how numbers are related and then to learn complex number patterns.

- Algebra is a gateway to higher math. It begins the shift from concrete, individual problem solving to abstract understanding. All students should study algebra. *The Massachusetts Curriculum Frameworks* for math includes Algebra as one of the basic learning themes that is addressed from

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¹ In the *Bulletin*, "parents" means a child's primary caregivers, whether they are parents, grandparents, legal guardians, or other adult.

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What to Look for in School

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Kindergarten through grade 12. The foundation for success in algebra is laid early on.

- A strong algebra course in or around 8th grade enables students to take more advanced courses all through high school. High schools with high expectations encourage students to take four years of strong math classes (such as Geometry, Algebra II, and Pre-calculus). Most colleges today require that students have a strong math background and look for these courses on high school transcripts.

An Array of Teaching Methods:

Research shows that children learn best when more than one approach is used. A good math program:

- **Uses teaching methods and materials that engage children to be “active learners.”** Active learning happens when students take part in the learning process. Rather than just learn rules, they investigate and explore on their own and with their peers, make guesses and test them out. “Hands-on” experience is another way for students to be active learners. Working with blocks, buttons, coins, or other things they can touch and move around gives students concrete ways to solve math problems. These things are called “manipulatives,” and have been proven effective for all grades. Proper use of calculators and computers also increases student learning.
- **Gives students time to work together in small groups.** When students talk through their ideas and work together toward solutions, they begin to really understand—and get used to using—the language of math.

- **Follows individual and group work with whole-class discussions.** When children hear what other students did to solve a problem, and when they share their own ideas out loud, it strengthens their understanding.
- **Goes beyond the math classroom.** Math shows up in every subject, from art and drama to geography and science. Students in a drama club, for example, use math to measure and construct scenery. Art requires measurement for mixing colors and geometry for working with shapes. Using math in all subjects will help students feel at ease with numbers and see how math can be useful in many ways. Outside the school walls, teachers, parents, and others can help pupils see the real-life uses of math. A field trip to visit professionals in math-related careers (i.e., engineers, carpenters, etc.) or an after-school math club can help build important links to real life. Research has shown that making these links greatly increases learning.

Professional Development:

Knowledge about what works in math instruction is constantly growing. Strong schools support teachers by giving them ways to keep up to date with research. Families can be important partners by working with the school to make sure that teachers are offered this support.

Parent Involvement:

It’s undeniable. Both children and schools benefit when parents are involved in their children education. Many schools have improved student math achievement by inviting families to be partners. When schools help families understand how a strong math program can benefit their children, families can help their sons and daughters take math seriously. Parents who understand and support the math program can also become important advocates for high-quality math instruction.

Research has shown that students’ interests are sparked and their understanding is strengthened when school math is relevant to their daily lives. When schools share ideas for at-home math activities, they help families build these important links and reinforce learning. There are many ways teachers can spread the word to parents. In addition to parent-teacher conferences, notes home, or phone calls to keep families informed, many schools hold special “math nights,” contests, or other fun events to bring parents and students together with school math staff.

The Big Picture:

A good math program helps children see the big picture of math:

- Good teachers make sure students learn the *ideas* behind the skills. Understanding the ideas begins with a strong grasp of the *vocabulary* and *language* of math. When a child looks at a math problem, she² should not only know *what* to do to solve it, but *why* she is taking those steps. And she should be able to communicate this knowledge using a “math vocabulary.”
- Seeing the big picture means seeing math in other subjects, like history. A strong math program will help kids notice and explore these connections. For example, a class might do a unit on mathematics in ancient Egypt. Or it might study the math behind the catapults used during the Middle Ages.
- The big picture also means seeing math in “everyday” life. So, just as parents can do at home, teachers at school can show how math skills are needed for grocery shopping, home repairs, home finances, and so on.

² In writing the *Bulletins*, we sometimes refer to a child as a “she” and other times as a “he.” We are doing this to make the articles easier to read, but every point we are making refers equally to male and female children.



Workshops for Families

To schedule a free workshop, please call
Rosie Hunter, 877-471-0980, x142

Parents Are Powerful

A workshop to promote family involvement in education (in English, Spanish or Portuguese)

For families and community members interested in getting more involved, but unsure about how to begin. This workshop gives an overview of research on family involvement and its benefits for kids and schools, an overview of standards-based education reform, and practical suggestions for how to support your children's success and advocate for quality education.

Parents Are Powerful in American Schools

(in Spanish or Portuguese)

For families new to the U.S., this workshop introduces American schools. It suggests ways families can help their children succeed in school as they adjust to the new culture and language. It gives the information in "Parents are Powerful" as well as information on the American school system (enrollment, the grading system, report cards, standards-based education) and the rights of immigrants and students who are English-Language Learners.



How to Help Your Child Learn in 500 Words or Less

"Parents are Powerful in American Schools" for English Language Learners (in English)

This workshop for beginning English-language learners covers the information in "Parents are Powerful in American Schools" using an English vocabulary of 500 words or less.

Families and Schools Together

For parents and community members already involved in their schools to explore additional ways to support children's learning and achievement. This workshop covers standards-based education (including curriculum frameworks, teaching strategies, and MCAS), and suggests ways families can partner with schools.

MCAS: High stakes and high standards for students and schools (in English, Spanish or Portuguese)

For parents who want to supplement the school's efforts, this workshop explains MCAS, the statewide testing system.

No Child Left Behind (NCLB): What's in it for Families (in English)

This workshop covers the major provisions of NCLB (the main law governing public education) as they relate to accountability for students and schools and expanded options for parents.

Principles for School Mathematics

The National Council of Teachers of Mathematics gives six main principles for school mathematics.

- **Equity.** Excellence in mathematics education requires equity—high expectations and strong support for all students.
- **Curriculum.** A curriculum is more than a collection of activities: it must be coherent, focused on important mathematics, and well articulated across the grades.
- **Teaching.** Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well.
- **Learning.** Students must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge.
- **Assessment.** Assessment should support the learning of important mathematics and furnish useful information to both teachers and students.
- **Technology.** Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.

From *Principles and Standards for School Mathematics*, National Council of Teachers of Mathematics. (2000).

Resources

Helping Children Learn

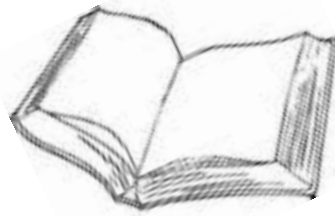
Mathematics. Kilpatrick, J. and J. Swafford (Eds). National Research Council (NRC). (2002). Washington, DC: National Academy Press. Read for free or purchase for \$10 at <http://books.nap.edu/catalog/10434.html>.

This book examines school mathematics during a critical period in a child's education—from pre-K through eighth grade. While stressing the need for students to learn computation skills, the authors also emphasize the need to give attention to algebra, geometry, probability, and statistics in the early grades. The book lists things that parents can do to help their kids learn math.

Mathematics Curriculum

Frameworks. Massachusetts Department of Education. (2000). Download them for free from www.doe.mass.edu/frameworks/current.html. Print copies may be purchased from the State House Book Store for \$6, plus \$3.50 shipping. To order call (617) 727-2834 or, from Western Mass, (314) 784-1376.

This book lists the math standards that Massachusetts students are



expected to master at each grade level. The annual math MCAS questions are based on these standards.

Principles and Standards for School

Mathematics. National Council of Teachers of Mathematics (NCTM). (2000). Purchase for \$52.95 or read online (using a 90-day free trial) at www.nctm.org/standards, or call NCTM at (800) 235-7566. The authors also permit Parents' PLACE to photocopy limited portions of the book for educational purposes. Readers interested in a specific grade level may call Parents' PLACE for a copy of that section.

This crucial 402-page book has set the standards for math instruction that have been adopted by states across the country. It explains the standards in general and then in specific detail across four grade bands—pre-K to 2, 3 to 5, 6 to 8, and 9 through 12. The accompanying CD offers a searchable version of the book, along with interactive math tools.

WEBSITES

Eisenhower National Clearinghouse for Mathematics and Science Education. Sponsored by the U.S. Department of Education, this online information source has thousands of classroom-ready lessons and activities, links to other sites, and other valuable resources. Access it at www.enc.org.

FREE. Sponsored by the U.S. Department of Education, this website (updated monthly) lists teaching and learning resources supported by federal organizations and agencies. Its mathematics section has over 50 free resources. Access it at www.ed.gov/free.

The What Works Clearinghouse. Established by the U.S. Department of Education, this website provides the public with a central source of research-based evidence of what works in education. Access it at www.w-w-c.org.

For a copy of any of the free resources, please contact Parents' PLACE toll free at (877) 471-0980. Also, be sure to check the Parents' PLACE website (www.pplace.org) for a list of valuable online math resources.



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