MILWAUKEE JOURNAL SENTINEL
(Milwaukee, WI)
Oct. 28, 2003, n.p.

Division Flares Up over Math

By Alan J. Borsuk
Milwaukee Journal Sentinel (KRT)

MILWAUKEE--Eight times four? Thirty-two. No argument.

How do you teach kids eight times four equals 32? How important is it to know that eight times four equals 32? Argument. In fact, one of the hottest issues in American education.

The overall unsatisfactory performance of American students in math is stirring up teachers, school boards, parents and education experts, and it's reshaping what goes on in uncounted classrooms and in the multimillion-dollar curriculum industry.

Almost everyone with an interest in the discussion agrees on two things: reaching adulthood with decent abilities in math--what some call "numeracy," the equivalent of literacy--is strongly associated with long-term success in life, and students across the United States are not doing very well. What is roiling the atmosphere around math is how to respond.

Given the importance of a future work force that can cope with what will be the everyday demands of both reading and math, the stakes in creating a culture in which people are comfortable using math are high.

In some places, such as California, the combativeness of the issue earned the name "math wars." In Wisconsin, the more accurate label would seem to be "math struggles."

What's going on here has reached the "war" level in only a few communities, and the issue hasn't been a matter of state policy primarily because, unlike many states, Wisconsin does not select textbooks on a statewide basis.

Nevertheless, big change is under way in almost every school in the state. A wave of revised curricula has moved into schools, many of them offering revamped methods of teaching that supporters say make math more meaningful and critics say leave many students without fundamental knowledge.

While curriculum attracts the most attention, some experts say the math struggle ought to focus more on how to improve the supply of teachers and the quality of teaching itself, especially in schools where students as a whole are doing poorly in math. Some say emphatically that the problem of weak performance in math has at least as much to do with weak teaching as with the materials being used.

Is progress being made?

While an elite cadre of kindergarten through 12th-grade students is doing math that leaves prior generations in the dust, while a few indicators suggest some improvement in the overall math ability of students here and across the country, and while the most fervent alarms about math education overstate matters, the bottom line appears to be this:

There is little evidence to suggest the results of the math-teaching system as a whole are getting much better, and a great deal of evidence to underscore concerns about the weak knowledge of a huge body of students when it comes to general math associated with good jobs and successful functioning in society.

In the Classroom Counting Cubes

A morning in June at Thoreau Elementary School on Milwaukee's far north side, a school that uses the recommended math reform curriculum in Milwaukee Public Schools, known widely as Investigations:

In a second-grade class, two teachers, Blondell Currie and Monica Kelsey-Brown, lead two dozen students through an exercise in which hundreds of cubes in eight different colors are distributed to students in groups of three or four. The students make charts based on how many cubes of each color each group has, and then put all the cubes together to tally classwide totals.

This is part of learning how to collect data, Currie tells the class. In the course of an hour, actual numbers are rarely mentioned and there are only a few instances of actual addition. When the class pools all its data, it comes up with a total that is wrong. Currie and Kelsey-Brown praise the way the students did the project. Kelsey-Brown said later that the session is good because "it allows their critical-thinking skills to process information."

In a fifth-grade class, teacher Beth Ann Schefelker, who won major national recognition last year for her work, asks students to divide 246 by 12 by creating a story problem. Two girls tell classmates their proposed method: Twelve sisters each had $20, so that gives them $240, with $6 left. You split up the $6 and you get 50 cents more for each sister. So the answer is $20.50.

One of Schefelker's students, Tylar Moore, said it's "kind of like a myth" that kids don't learn their math facts through Investigations, a program used in about two-thirds of Milwaukee elementary schools. Most of the kids in the class know that four times eight is 32, Tylar said, and if they don't know that off the top of their head, they know strategies for figuring it out, such as writing 8 four times on a piece of paper and adding the numbers up.

Schefelker said her class doesn't do a lot of work on basic math facts--what she calls "naked numbers"--but the math is embedded in the work they do, much of it in the form of problem-solving. She said learning math shouldn't be like training circus animals to do tricks. It should be like teaching people to live in nature.

A decade ago, it was reading wars. In broad terms, on one side were educators who favored "whole language," a way for children to learn how to read, in which the focus was on having kids delve into books and learn to recognize words as units. On the other side were educators who favored "phonics," an approach that stressed the need to teach children to recognize the sounds associated with letters and to "decode" words.

Overall, the phonics people scored more points, the new federal education law generally has given their approach more fuel, and almost no one argues now that phonics shouldn't be at least part of reading instruction. But some important points from the whole language side (the value of getting kids to read good books) became widely accepted.

The math battle is strikingly similar.

In place of whole language is what--depending on your point of view--is called reform math or constructivist math or the new-new math or, as critics would say, fuzzy math. The idea behind it is that students at all grades, including the youngest, should be taught to think their way through problems, constructing solutions they will understand and remember. Drills on basic facts and use of classic formulas to solve problems are generally de-emphasized.

In place of phonics is--again, depending on your view--traditionalist math, basics math--or drill-and-kill math, as critics might put it. The idea is that you must know the basics and the traditional methods of solving problems. For students to be successful at any grade, they need to get basic skills down and, rather than trying to learn things on their own, benefit from the wisdom of centuries of math scholarship.

The constructivists argue that the traditional approach leaves too many students behind, and those

students become adults who aren't shy about saying they were never good at math. They often ask: Does anyone ever say they just were never good at reading? Yet it's acceptable in the United States for someone to announce they are deficient in basic math skills. Something about conventional math teaching, the backers of math reform say, doesn't connect with far too many kids. The constructivists' approach to teaching is aimed at making that connection.

The basic skills advocates argue that the constructivist approach is not succeeding, at least not overall. Too many children are reaching upper grades without fundamental math skills, thanks to a curriculum that is too un-challenging, too much oriented toward making math likable or fun, and way too low on classic skills. Using effective curricula that still push those skills can work with all children, they argue.

The recommended math curricula in Milwaukee Public Schools are strongly constructivist at every grade level. But MPS schools have the option of making a different choice. Henry Kranendonk, the MPS math curriculum specialist, estimates that two-thirds to three-quarters of elementary schools are using some or all of the recommended curriculum, with about the same percentage for middle schools. However, the percentage of high schools using the preferred texts is relatively small.

In the suburban districts, it appears that the number of districts using constructivist curricula is fairly high, although there have been sharp disputes in some communities over curriculum choices. In Germantown, for example, community opposition last year knocked a text series called Mathland--which employs a strongly constructivist approach--out of the running for a new elementary school math program. The program being introduced this year, called Growing with Math, is also a reform program, and school officials have made a concerted effort to educate parents about it in hopes of minimizing opposition.

In the Classroom Choosing a Textbook

Mary Jo Meier, a first-grade teacher at Banting Elementary School in Waukesha, found herself in the spring trying out on her class new text-books that the Waukesha School District was considering for its elementary schools. All of the choices were distinctly constructivist, including the one--Mathland--that set off the California controversy.

Mathland was eliminated from consideration in Waukesha because its content was not viewed as challenging enough, said Paul Becher, the K-6 mathematics chairman for the Waukesha School District. The Investigations textbooks used in Milwaukee were ruled out as too cumbersome for teachers to use, in part because they had to wade through a multitude of materials to find the appropriate lessons to present, he said.

That left Everyday Mathematics, one of the most popular elementary constructivist programs, and Growing with Mathematics, a textbook published by Mathland's company but without that textbook's problems, Becher said.

Making the transition to the new math program won't be a huge leap, he said. The district's current math textbook--a Houghton-Mifflin series published in 1995--isn't strictly traditional, incorporating the problem-solving approach embraced by the new math programs.

But while the district students' problem-solving skills have gone up on recent standardized tests, their computational skills have remained the same, Becher said. He said, "We're looking to do more."

Regardless of what textbook series the school district eventually chooses--an event expected in time to put the book into place by September 2004--Meier said she will continue teaching her students math the way she thinks best.

"They need repetition. They need practice," Meier said. But she also brings a creative bent to her lessons, frequently using story problems. She wants her students to be eager "math thinkers."

In broad generalities, here are elements you'd find in instruction in a constructivist-oriented classroom: students sitting at tables or in clusters of desks, often working together on problems (with the process by which an answer is found as important as--or more important than--the answer itself); problems that emphasize real-life situations, such as buying things on sale or taking medicine or solving environmental problems; not much homework; much more emphasis on learning how to use statistics, data and probability, even in early grades, than a generation ago; and emphasis on making math relevant, even fun.

And in a more traditional classroom: students working at individual desks; exercises and drills that emphasize mastering the skills of addition, subtraction, multiplication, division and use of fractions; more teacher-directed class activity; problems that also use real-world examples, but also a lot of the classic styles of solving problems, for example using long division or formulas for algebra and geometry; and often, a fair amount of homework.

A key to the controversy was a 1989 publication of the National Council of Teachers of Mathematics that called for major changes in the way math is taught, so that less emphasis would be put on the traditional ways of doing problems on paper and learning the basics, and more emphasis on making math relevant and getting kids to think their way through problems.

Some reform advocates took the position to extremes in following years, even some supporters of the change now say. They downplayed learning basic math facts to such a degree that teachers in many schools saw major declines in fundamental skills.

In 2000, the math council issued a revised version of its principles that was widely taken to be a step back toward the middle.

"Learning the 'basics' is important," it said. "However, students who memorize facts or procedures without understanding often are not sure when or how to use what they know. In contrast, conceptual understanding enables students to deal with novel problems and settings. They can solve problems that they have not encountered before."

There has been much less research done on math education than on reading education, and there is not much consensus on what it shows. Advocates on each side point to studies and anecdotes that support their point of view.

Tom Loveless, director of the Brown Center on Education Policy at the Brookings Institution, told a U.S. Department of Education "summit meeting" on math education in February that only in a couple of instances–the ability of 13- and 17-year-olds to compute percentages–did students nationwide register gains in the 1990s.

Discussing the performance of 9-year-olds in addition, subtraction, multiplication and division of whole numbers, he said: "All four areas reversed direction in the 1990s, turning solid gains that were made in the 1980s into losses. Not only that, but the declines came from levels that weren't very high at the beginning of the 1990s–certainly not at a level that is acceptable for such fundamental material."

The U.S. Department of Education has put a priority on launching new research, and its results could influence policies in a few years the way reading research has led to federal money being used to support phonics-oriented teaching.

In the Classroom the Old-Fashioned Way

At Barton Elementary, not far from Thoreau Elementary on the far north side, Jeffrey Larson's fourth-grade students are working on multiplying 4,342 by 1,243 the traditional pencil-on-paper way, almost surely the way their grandparents learned it. They work individually, with several demonstrating their work on the blackboard. They come to agreement that the answer is 5,397,106.

"What helps this class is they really learned their multiplication facts in third grade," Larson said as the students do their work.

Being able to say that is one of the things the teachers at Barton sought when they shifted away from a more constructivist approach to teaching math. A couple of years ago, they concluded that Investigations was not working.

"We really tried, and the scores were horrendous," said Carol Stein, the Barton learning coordinator.

A search involving much of the school's staff was launched to pick a new curriculum. The winner was SRA Mathematics Explorations and Applications, which is more traditional than Investigations in its emphasis on skills.

Who's winning?

In California, the most prominent arena of the fight, reform curricula were put into place in the early 1990s, and, after test scores fell during the following years, controversy erupted. Reform opponents scored a major victory several years ago when the state adopted curricula that emphasize basic skills. Test scores have risen since then.

But nationwide, the advantage seems to be with the reform movement. The National Council of Teachers of Mathematics, the largest organization of math teachers, strongly backs such curricula, as does the National Science Foundation, which has made large grants to encourage implementing reform math.

That foundation, for example, announced Sept. 26 that it would provide $20 million over five years to support math improvement efforts in Milwaukee, with much of the emphasis on developing the quality of teaching in schools. Those involved say it won't go just to further the reform programs that the foundation has backed broadly.

Curricula that are reform-oriented are in wide use, although no precise count is kept.

"In California, the side that I'm on has the upper hand; in most other places, the other side does," said David Klein, a math professor at California State University, Northridge, who is associated with mathematicallycorrect.com, a Web site that has been popular among critics of reform math.

Klein said his hope is that the critics will prevail to the point of putting textbooks in classes across the U.S. "with good mathematical content that explain things clearly."

"My prediction, actually though, is different than that," he said. "This will just be another chapter in the history of education where there was a flare-up of parents and academics." The professional educators who back reform will prevail because "they get paid to do this every day," Klein said, but critics such as himself are doing it as volunteers.

A panel studying mathematics education for RAND, the well-known California-based research organization, said in a report in April: "The manner in which these debates have been conducted has hindered the improvement of mathematics education....The intense debates that filled the past decade have often impeded much-needed collective work on improvement. Moreover, they have been based more on ideology than on evidence."

The National Research Council, a non-profit organization affiliated with the National Academy of Sciences, asked in a 2002 report which side in the math wars is correct and answered:

Neither. Both are too narrow. When people advocate only one strand of proficiency, they lose sight of the overall goal. Such a narrow treatment of math may well be one reason for the poor performance of U.S. students in national and international assessments.

Math instruction cannot be effective if it is based on extreme positions. Students become more proficient when they understand the underlying concepts of math, and they understand the concepts more easily if they are skilled at computational procedures. U.S. students need more skill and more understanding along with the ability to apply concepts to solve problems, to reason logically and to see math as sensible, useful and doable. Anything less leads to knowledge that is fragile, disconnected and weak.

Johnny Lott, a University of Montana professor who is now president of the math teachers council, thinks a middle ground is emerging, somewhat like the one that has emerged from the reading wars, where there will be consensus that children need to learn basic math skills, but in a context of connecting their learning to practical life and getting them to think mathematically.

In the Classroom They Know the Drill

The 5-year-olds line up excitedly in their classroom at Brookfield Academy, an upscale private school, for their daily math drills. The problems come as fast as the child at the head of the line can answer them:

Twelve minus six. Four plus six. Thirteen minus eight. Eight minus six.

Get the questions right, run to put a star on your chart, go to the back of the line, and keep the drill going. Brookfield Academy uses a classic approach to education, and that includes getting these number facts down firmly at an early age.

A similar philosophy prevails at Humboldt Park Elementary School, not far from Milwaukee's Bay View neighborhood. One morning in the spring, a group of seven second-graders sat at a table, forming an arc around teacher Betty Misurek, who sat in the middle. They were working on adding and subtracting by 10s.

"Get ready," Misurek said, proceeding at a brisk pace through a set of problems: 40 + 10, 40 - 10, 70 - 10, 70 + 10, 30 + 10, 30 - 10. The students responded in unison to each problem, and then Misurek posed questions to individual students.

The school was not happy with the results it was getting with the reform curriculum recommended by Milwaukee Public Schools and felt too many students didn't know their basics. Now it uses an approach called direct instruction, relying heavily on drills and scripted materials for teachers.

Principal Kristi Cole said the staff is pleased with the results. "It's good teaching, and the students learn from this approach," she said. "It's how I was taught when I was younger."

The key figures in building a middle ground are likely to be teachers themselves, who are often picking and choosing from different curriculum styles or supplementing their school's curriculum with material from other programs to come up with schemes that work in their classrooms.

Roger Huberty, who has taught math for 33 years in Racine, Wis., said he has seen the percentage of students with middle-range ability in math shrink over the years, while that of students below grade level has grown.

"The best and the brightest are the same as they were 30 years ago," said Huberty, who teaches at Case High School in Racine. "But there are students who don't know their times tables."

Darlene Boyle, a veteran math teacher at Milwaukee's Bay View High School, said: "Math is sequential. It's like building a house. If the basement is really weak..."

Boyle and other teachers at the school bemoan how few students reach high school with the basic skills they need to do high-school-level math, including the "automaticity" of knowing things off the top of their head, such as four times eight equals 32.

George Andrews, a math professor at Penn State, said during a discussion sponsored by the National Science Foundation in 2002, "The only way I know to make the brain understand numbers is to do boring, repetitive practice with numbers, just like the only way I know to be a pretty good tennis player is to get out there on that court and just practice, practice, practice."

However, that's not enough, say people such as DeAnn Huinker, director of the Center for Mathematics and Science Education Research at the University of Wisconsin-Milwaukee. A supporter of the reform movement, Huinker said, "The public sees mathematics as adding, subtracting, multiplying and dividing." The old way of doing things was "get the answer, memorize the procedure, get it out."

"But now we want so much more," she said. "Mathematics involves geometry, statistics, probability–we have broadened the definition of mathematics."

Lott, head of the national math teachers council, gives two examples of how the world has changed in ways that the reform movement addresses. He said that more than 40 years ago, when he was in high school, he learned tables for trigonometry and logarithms that make no sense to teach at all in a world where the complex calculations involved can be done instantly by a calculator.

On the other hand, "I think it's safe to say that I never saw a probability problem and I never saw a statistics problem...in my pre-collegiate mathematics courses," and the world is awash in those subjects now.

Many reformers dismiss their critics as people who advocate "back to basics."

However, the Brookings Institution's Loveless told the math summit seven months ago:

"I don't want to go back to anything. I want to go forward on the basics.

" 'Back to basics' implies there was a golden age when everyone learned essential skills. That age has never existed. To ensure that every fourth-grader is proficient at whole number arithmetic means that we must go forward, not backward. We must go forward on basic skills if a more equitable school system is a national goal; we must go forward if American students are to be prepared for higher-level mathematics; we must go forward if young people are to master the skills correlated with middle-class employment as adults."

Milwaukee Journal Sentinel correspondents Sarah Carr, Anne Davis, Amy Hetzner and Jennie Tunkieicz contributed to this report.

Teachers Solving Problem at Source--with Students

By Jennie Tunkieicz
Milwaukee Journal Sentinel (KRT)

RACINE, Wis.--Roger Huberty trades banter with his trigonometry students as they wander into the classroom and pick up the day's work sheet on the way to their desks.

At Racine Case High School, Huberty is a popular teacher.

His classroom is always at capacity of about 35 students, and it's not unusual for students to be waiting for someone to drop out so they can drop in.

Students who have failed his class have sent him notes apologizing for their failure, concerned that they let him down.

It isn't because he's an easy teacher. His popularity has to do with how he teaches, not what he teaches.

"It's hard," one student moans to no one in particular, glancing at today's work sheet.

"You're in the last two weeks of a (grade) weighted course. It's supposed to be hard," Huberty responds, reminding the class about why they are there. "I promise that tomorrow will be harder."

While education pundits across the nation debate the overall unsatisfactory performance of American students in math, teachers such as Huberty direct their attention to affecting the situation at its source--in the classroom and at their students.

On this particular day, Huberty's class has been working on mathematical identities--negative angle identities, reciprocal identities, quotient identities, co-function identities.

Huberty goes right to the chalk board and engages the class to talk about what the notes they had taken days earlier--notes that would clue them in on how to solve these kinds of problems. A problem is written on the board and, at first, students seemed vexed.

In a whisper, he says, "Are you listening to the problem? Can you hear what it's saying?"

He calls on students to help him solve the problem, and suddenly they see the answer.

"It's the kind of problem that sneaks up on you and then 'Whoop, there it is!' and you say 'yippee!'"

Huberty says. "When you're in your room doing your homework, do your parents come in and say, 'Why are you saying, yippee?'"

The next problem is not as easy. The class appears to be stuck.

A thunderous "boom" shakes the classroom and students jump. It was the sound of Huberty's hand whacking the chalkboard.

"I just ran into a wall," Huberty says of the problem. "What can I do now? Stop, erase and start over."

After a little more discussion, the class is told to begin work on the work sheets. Huberty takes a seat at a table, and students immediately line up to take the seat next to him. The next 40 or so minutes are spent one-on-one with students, helping them through the difficult problems.

"This is dumb, dumb, dumb! I'm mad!" a female student tells Huberty.

"You're just saying it's dumb because you don't get it," he says.

In a calm, respectful manner, Huberty finds a way to be entertaining, but thought provoking. And, he finds a way to make her understand the problem.

"I got it, yeah!" she shouts.

The struggle in classrooms across Racine and the United States is for teachers to get students to say "ah-ha!," "yeah!" or "yippee!" when it comes to math.

In Dianne Herrick's first-grade classroom at Jerstad-Agerholm Elementary School, her method is to show students math.

On this particular day, the lesson is measuring.

"Clocks help us measure what?" Herrick asks.

"Time!" the first-graders shout in unison.

Earlier in the week they had learned about height by measuring. They found that Kiarra was the smallest student in class.

They are now making a ruler made out of paper clips. They'll get to take it home so they can measure things in their house.

She then tells half of the class to find things smaller than the paper clip ruler and the other half to find things bigger than the ruler.

"Mrs. Herrick, Mrs. Herrick," a boy shouts excitedly. "I found a crayon!"

More important to Mrs. Herrick, what all the students found was the message about measuring.

At Johnson Elementary School, for Sue Malone, a fourth-grade teacher, the day's math lesson centered around fractions. The subject matter can be dull, unless, of course, a method such as Malone's is employed--teaching fractions by using a game.

She calls this game Block Party. Students move across the board by adding and subtracting by decimals. They were immediately engaged.

For Huberty, who has taught math for 33 years in Racine, strengthening math skills is an important effort. He dismisses the argument from some that math is not important.

"People who are really good at math tend to be really good at everything," Huberty says.

And, Huberty believes, students actually like math--when it's taught correctly, meaning in a way

students can understand it.

"They like the objectivity of math. You can pour your heart out in an English essay and the teacher perceives it differently. In math, you can solve a problem a different way than mine and still get the right answer," Huberty said.

Like many people in the math wars across the United States, Huberty is concerned about the learning gap getting wider.

"There is a large number of students in high school who are below grade level. They don't even know their times tables," he said.

Much of it, he thinks, is socioeconomic. But, some of it is also a reflection of a disturbing mind-set--the same one shared by some math critics.

"A lot of kids don't think they need to know what four times eight is," Huberty said.

A Prime Parental Concern: Can Kids Compute Without a Calculator?

By Alan J. Borsuk
Milwaukee Journal Sentinel (KRT)

MILWAUKEE--Parent input on math education has generally been somewhat less fervent than input on controversies over reading education. Perhaps that is a reflection of how uncomfortable many parents themselves are with math.

But as some school districts around the state have found, parents do want to see their children master the basics of math, and they will sometimes react strongly if a child is bringing home math homework material done in such untraditional styles of "new math" that the parent can't understand what it is teaching.

As Janet Kenny, the middle school math department chairman at Brookfield Academy in Brookfield, Wis., says, "Parents don't want kids to have to figure out eight times four." They expect kids to know that.

She says too many schools give kids calculators to use for even basic functions. In her classes, calculator use is limited. When a class of eighth-graders is working on a problem that includes converting ¾ into decimal points, she tells students, "Don't you dare touch your calculators."

But calculators have changed the world of math, both allowing students to do fabulously complicated work with the push of a few buttons on a graphing calculator and allowing them to push 4, the multiplication key, 8, and the equals key to avoid getting such simple facts firmly in their head.

Although a proposal to make it state law that calculators be banned during standardized tests did not succeed a couple of years ago, it appears an increasing number of schools, even those with reform curricula, are trying to rein in student use of calculators to do basic math.

An example: In a third-grade class at Milwaukee's Barton School in the spring, teacher Kim Leitzke split the class in two and gave students a set of problems. One group was to do them using their "brain calculators" and the other using their hand-held calculators, and then they were to see who got them done first.

For the question 1,000 minus 1, the brain people were first. For 7,856 plus 1,947, the calculator was first. Use calculators for more complicated problems, Leitzke told the students, but a lot of the time, your brain is your best calculator.

Many teachers also fret that too few students have much of a sense of what's an appropriate answer to a math question and have too little common sense in answering questions. Many aim to include skills in "estimating" as part of their classes, with one role for estimates being to check whether an answer makes sense.

At Milwaukee's Bay View High School, teacher Darlene Boyle tells of a student whose answer to a problem dealing with how much it cost to fill up a truck's gas tank was $4,000. He said that's what his calculator came up with, so he assumed it was right--even though it didn't pass the test of common sense, even at today's prices.

At Fritsche Middle School, eighth-grade teacher Rosann Hollinger, a leader in Wisconsin math reform efforts, says that when she read the 1989 National Council of Teachers of Mathematics call for changing the way math was taught, she realized how strongly that applied to what she did. The barriers that kept so many kids--and adults--from understanding or relating to math could be broken down, she was convinced, and she thinks success in doing that has been building over the years.

In her classroom, students are expected to work their way through problems with guidance from their teacher, but not the same kind of firm teacher-led instruction historically seen in math classes.

"No one is saying they shouldn't know the facts," she says.

Math Facts

Milwaukee Journal Sentinel (KRT)

The Future

The new federal education law, known as No Child Left Behind, calls for all students in third through eighth grade to be tested every year in math, beginning two years from now.

What if they don't do well? Their schools could receive increasingly strong sanctions.

Poverty's Effect

How does income affect math education? A study for the RAND organization said:

High-poverty schools generally have a higher proportion of poorly prepared teachers for math classes than schools in richer communities.

The teaching techniques used in the low-income schools are often less creative and innovative.

More Taking Advanced Math

Of those who graduated from U.S. high schools in 2000, nearly 40 percent took precalculus while 17 percent took calculus or statistics. Both figures had increased 8 percentage points from 1990 data, according to a report by the Council of Chief State School Officers.

No Child Left Behind

The 2-year-old federal education law known as No Child Left Behind is accelerating the emphasis on math proficiency. By two years from now, public schools throughout the United States will be required to test third-through eighth-graders each year in math (as well as reading). This is already being felt in increased focus on instruction aimed at improving reading and math scores.

Differences in Approach

The two schools of thought on teaching math:

Traditional

- Students work individually.

• Exercises and drills emphasize mastering skills.

• Often, it involves a fair amount of homework.

Constructivist

• Students work in clusters.

• There's an emphasis on the process.

• Problems stress real-life situations.

• There's not much homework.

• More emphasis is placed on statistics, data and probability.

• It aims to make math relevant, even fun.

What Is Mathematics?

"The public sees mathematics as adding, subtracting, multiplying and dividing." It's more than that. "Mathematics involves geometry, statistics, probability--we have broadened the definition of mathematics."--DeAnn Huinker, director, Center for Mathematics and Science Education Research, University of Wisconsin-Milwaukee

Problem for Teachers?

Some experts worry that U.S. math teachers don't know enough basic math. To test this, a University of Wisconsin-Madison education professor who taught a class for prospective elementary school math teachers gave them an eighth-grade-level problem to gauge their expertise. The problem: Divide 25.56 by 0.004. Fewer than half of them got the right answer, 6,390.

How to Help Your Kids with Math

Here are some tips for parents and caregivers on how to help children with math, suggested in 2002 by the Mathematics Learning Study Committee of the National Research Council, a non-profit organization associated with the National Academy of Sciences:

Before Children Enter School

• Play games such as dominoes and board games.

• Find natural opportunities to count, to sort objects, to match collections of objects, to identify shapes.

• Count a collection of objects and use number words to identify very small collections.

• Talk with your child about simple math problems and ideas (how many spoons do we need to set the table?).

After Children Enter School

• Have high expectations. "Children's math achievement is shaped--and limited--by what is expected of them," the committee says.

• Expect some confusion to be part of the learning process, but emphasize that effort, not ability, is what counts.

- Avoid conveying negative attitudes toward math.
- Ask what your child did in math class today.
- Expect your child's homework to include more than simple computational work sheets.
- Give your child meaningful problems that use numbers or shapes while you are going about everyday life.
- Advocate using a regular time each school day for math.
- Support professional development such as in-service education for teachers.