*EVERYDAY MATHEMATICS*

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**An elementary school curriculum for grades K–6, developed by the University of Chicago School Mathematics Project.**

*Everyday Mathematics* is a K–6 curriculum intended to enrich the mathematical experiences of teachers and children. It builds on fundamental mathematical strands such as numeration and order, measures and measurement, reference frames, operations, patterns, functions, and sequences. It uses more of the mathematical spectrum by exploring data and chance, geometry and spatial sense, and algebra and the uses of variables.

The curriculum integrates mathematics into other subject areas; mathematics becomes part of ongoing classroom routines, outdoor play, and the transitional moments that occur every day. Teachers use *Everyday Mathematics* as a core curriculum during class time. They incorporate mathematical ideas and routines throughout the school day and encourage the children to continue the routines at home with their families.

The *Everyday Mathematics* curriculum incorporates the belief that people rarely learn new concepts or skills the first time they experience them, but fully understand them only after repeated exposures. Students in the program study important concepts over consecutive years; each grade level builds on and extends conceptual understanding.

The instructional model blends exposition and discussion, individual and group work, projects, explorations, and investigations. In each grade level of the program, students experience hands-on, student-centered, small-group activities which introduce them to various mathematics concepts. Children also learn and practice basic facts throughout the curriculum, in the context of problem solving, choral drills, and a variety of games.

The program includes cross-curricular projects that let children apply mathematics in other subject areas. In grades 4 and 5, children participate in the year-long World Tour and American Tour projects, in which students apply mathematical concepts to learning about the United States and other countries.

Calculators are an integral part of the program as an aid to concept development and applications. The curriculum assumes that each child has a slate, calculator, measuring tools, and drawing tools, and that each teacher has a classroom set of manipulatives.

Every student in grades 1–6 uses two consumable journals throughout the school year to record mathematical ideas and responses to activities and problems. In grades 1–3, students also have a consumable *Activity Book*. At grades 4 and 5, student materials include the non-consumable *World Tour Guidebook* (4th) and the *American Tour Almanac* (5th). At grade 6, student materials include the non-consumable *Student Reference Book*. Grades 5 and 6 use the Geometry Template for drawing and measuring geometric figures.

Each grade level of *Everyday Mathematics* has a Teacher Resource Package that contains a *Teacher's Manual and Lesson Guide*, *Resource Book* (with all blackline masters), a *Teacher's Reference Manual*, *Towards a Balanced Assessment*, and other teacher support items.

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# MAX BELL ▸ DEVELOPER

Max Bell is professor emeritus at the University of Chicago. He has degrees in mathematics and mathematics education from U.C.L.A, University of Chicago, and University of Michigan. His work in the 1960s in secondary school mathematics, as a teacher and as a teacher of teachers, revealed pervasive failures in mathematics education, probably rooted in early schooling. About 1970 he shifted his attention to work with elementary school children and teachers. His 1974 article "What Does 'Everyman' Really Need from School Mathematics?" was one of several precursors to the NCTM *Standards*, and his work with applied mathematicians in the School Mathematics Study Group (SMSG) and with Zalman Usiskin on *Applying Arithmetic* (1983) showed the considerable extent to which numbers and operations could be linked to their everyday uses. Research and development with many collaborators in the 1980s and 1990s resulted in the University of Chicago School Mathematics Project (UCSMP) K–6 *Everyday Mathematics*.

## Development of *Everyday Mathematics*

While working with inner-city high schools I was appalled at the fact that 80 to 90 percent of entering 9th graders were assigned to remedial classes in mathematics. Since that seemed obviously linked to prior schooling, I switched my concerns from teaching and learning in high schools to teaching and learning in grades K–6. That involved both training of teachers and research on what might be going on in mathematics in elementary school classrooms.

The research and development that eventually led to K–6 *Everyday Mathematics* went through several stages. A first stage was an effort to define what should happen in school mathematics. This was eventually summarized in an article, "What Does 'Everyman' Really Need From School Mathematics?" which first appeared in *The Mathematics Teacher* in 1974. Subsequent revisions became the basic statement of objectives of our efforts to build a new curriculum. It is consistent with the NCTM *Standards*, but we were using it as a guide in our work for more than 10 years before the *Standards* were published.

A second stage was a series of efforts to find out what was actually happening in K–6 schooling in mathematics. For that we worked with teachers and interviewed each of 400 K–3 children three times: at the beginning of their year, at the end of their year, and at the end of their following year. We asked them to respond to a number of problems, recorded their verbatim responses, and tried to categorize those responses. The results showed conclusively that K–3 children were capable of learning a lot more mathematics than schools were offering them. For example, at that point in time, kindergarten books were filled with pictures of sets of up to 10 objects. The kids were to count them and either circle or write the appropriate number at the bottom of the picture, and that was about it for the entire content of the kindergarten year. But our interviews showed that most beginning kindergarten children could count sets of more than ten objects, and then count on verbally well beyond that. So most children had mastered the entire content of the kindergarten curriculum before starting their kindergarten year.

We'd push a set of things at a child and say, "Please give me half of these." We'd get half, from five- and six-year-old children. "Half" had a precise and accurate meaning to them. We'd ask them to act out equal sharing problems and they never made mistakes. So fractions and division were not new to them, even though they wouldn't see them in their schoolwork for several more years. Again and again we found that at the level of action and intuition, the kids were ready for a much richer program than they were getting. But, at the same time, for example, we would show children the symbol for one-half on a card, say, "What does this mean?" and get just about anything as answers. That is, children often didn't know the written symbols for things they knew very well at an action level.

By that time we had helped begin the University of Chicago School Mathematics Program, and we turned the "everyman" article into a set of mathematical strands to guide our curriculum work. At this stage, we were trying to produce an example of a program that covered a broad range of mathematics as defined by the everyman list, going well beyond the content of most basals of that period, yet consistent with what many teachers saw as needed and what most children seemed ready to learn.

*Everyday Mathematics* was the end result of that research and development effort. In it, we try to begin a whole range of mathematics strands at kindergarten, and develop them from that point on. Arithmetic is treated as one of 10 or so important categories, not as the entire curriculum. We also tried to link mathematics to the child's world, or to the child's imagination, at every point possible. And we tried hard to do all this in a program that was practical and workable, from a teacher's point of view.

## What's unique about *Everyday Mathematics*?

Numbers and their pencil-and-paper arithmetic have long been the dominant content of elementary school mathematics programs. Concepts and practical work concerning data explorations, probability, geometry and spatial sense, patterns, functions and sequences, algebra and uses of variables, estimation, and links to the outside world have been neglected. We tried to include those additional topics, as well as arithmetic, in the K–6 *Everyday Mathematics* program.

Most of those topics beyond arithmetic are also in *Investigations in Number, Data and Space* and in *Math Trailblazers*. I think these three programs are all valid approaches to the same problem. Adopting any one of them seems to me a much better choice than continuing with standard basals with little more in them for the seven K–6 years than basics of arithmetic and computation. Of those three reform-oriented curricula, I believe that *Everyday Mathematics* most resembles the feel of the standard curriculum, not in its content, but more in lessons that say to teachers, "Start out this way, then proceed to this, then proceed to something else, and wind up with the Math Boxes and Home Links for spaced practice and review..." That is a relatively familiar and conservative instructional pattern.

What's different is that in that prescribed sequence of events there's very little "Please sit down and be quiet and do the work on pages 78 and 79." The new programs ask children to explore some mathematics, often in partnerships or small groups and often beyond arithmetic as such, and then talk about what they've done.

## Approach to pedagogy

Another stage in the early research and development process came from trying to sort out what was actually going on in elementary school mathematics by visiting many classrooms. We found that in 1st grade and 2nd there were two almost universal ways of dealing with the mathematics period. For one of them, the period began by the teacher saying, "Wherever you got to last hour, start there. I'm here at my desk. If you have problems, come see me." Or, alternatively, "I'll be walking around, and if you're puzzled, raise your hand and I'll see what I can do about helping you." Under that scheme, some kids were finished with the material in the book by Christmas, and they typically were put into enrichment-type workbooks—usually more paper-and-pencil arithmetic. Other kids didn't get through half of the book by the end of the year. It was "individualized," but with total reliance on printed materials.

The other pattern also relied totally on the book. The period began with, for example, "Yesterday, we were working on page 59. Today, open up your books to page 60. Here's what's on that page. There are examples at the end. Go to work. I'll be around to help you if you're in trouble." That way everybody got to exactly the same point by the end of the year. We didn't see any other patterns. We saw almost no use of manipulatives. We saw almost no input from students to the group. We saw very little questioning by the students, except in the context of, "I don't know

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what they mean here." Or, "I got the wrong answer and I don't know why." There was almost no linking of the abstract pencil-pushing stuff to anything outside the printed page. Everything else that went on during the day was something quite apart from what went on in the mathematics period.

We set out to change this pedagogic philosophy. In *Everyday Mathematics*, there is not exclusive reliance on print. You set up activities. You give children counters, pattern blocks, and other materials to act things out with, without necessarily insisting that they use them if they don't find them helpful. You help the children do a lot of measuring—you don't just talk about measures. You help the children do surveys—you don't just present the data from surveys. The children are actively involved. You guide what they do and you move them along, but the discussions are based on what they are doing.

If the program is implemented in the ways that we like to see, students work with other students. Even if they're doing pencil/paper stuff, we want them to be with a partner, so they compare answers and say, "How come you got that and I got this?" and, "Why did we...?" There are hardly any times that we wouldn't want a conversation among the students to be going on as they do things. The teachers set up the situations. They keep things moving. They respond to the kids, "So now you've done that. Let's talk about what you did. What do you think?" There's not much direct expository teaching, except to set up new situations.

### Basic skills

There are some aspects of arithmetic (and mathematics more generally) that eventually should be nearly automatic. To have to stop and think about the answer to 7 + 8 gets in the way of conceptual development. If your mind has to dwell on that, then you can't keep track of the larger patterns that are developing. My friend Pam Ames likens this to finger exercises on the piano. It's all very well to noodle around on the piano, but if you want to really play well with individual expression, your fingers have to go pretty much automatically to the right place and do the right thing.

So we believe strongly in trying to give children a certain set of near-automatic skills, and in giving teachers the devices and games to help students develop those skills. I believe in the usefulness of, for example, knowing by rote the multiplication and the addition tables and having at least one workable procedure for each operation—not necessarily the standard algorithm, but one that works for you. All of that is important. At the same time it needs to be acknowledged that, for a small percentage of children, developing those skills is very difficult and not a reasonable expectation at a given time. Teachers should help those few children find alternatives to automatic reflexes. But for the great majority of kids, these are reasonable expectations. So we give a lot of games and routines to support skill development.

A lot of the conceptual development comes in the patterns you see in the basic stuff. In addition to learning the addition table, we talk quite a lot about the structure of the addition table. And we work on number grids a lot, which gives, I think, a good conceptual feel for how the number system works, as well as giving another entrée into order and computation. In terms of algorithms, we found in our research that kids often invented their own ways of doing things that were pretty nice. For addition and subtraction, they would nearly always start at the left instead of the right. And then they had a variety of ways of keeping track of the changes that needed to be made, the place value, and so on. Hence, we took the line in the original version of the materials that while algorithms as such are

important mathematically and worth doing, any algorithm that works reliably is pretty much as good as any other. Some kids understand one procedure for multiplication better than another. That approach worked fine in the material.

But we seem to have underestimated the attachment that parents, teachers, and others in the world at large have to standard algorithms—the ones they learned in school. For many people, it is almost a matter of faith and morality to do the standard algorithms in the standard way. In retrospect, our stand may have caused unnecessary difficulty. I don't think we were wrong in substance, but we were out of step with the politics and expectations of early schooling. We could have compromised more and not caused so much grief for parents, and hence, for teachers. We've added quite a bit to the program to accommodate this wish for more work with standard algorithms, while still encouraging invention and variety.

### Early exposure, repeated practice

One principle we used in developing the program was providing early exposure and repeated practice with concepts. In principle, but not in exact detail, we adopted a "two-year, five-exposure" rule borrowed from science educators we admire. That is, any concept you're going to get really serious about in, say, 3rd grade, would have been anticipated a couple of years earlier, and in the two intervening years, it would have gotten some attention five or more times, in different ways. In this spirit we tried to design the program to ensure that everything comes up over and over again. There's always this kind of a playing around with a concept early on, returning to it from time to time. Then, perhaps much later, we get to "Let's really nail this down," and then do review and practice after that to keep the concepts fresh.

This has been difficult for teachers, because they are accustomed to pedagogic procedures in which you bring up something, then teach and test to "mastery," all within a fairly short time. What we want teachers to do is to bring it up, drop it, bring it up again, let it go, bring it up again, let it go, and then at some point, aim for mastery. That's built into essentially every part of our program. Teachers have to be aware that they will seldom push something on to mastery the first or second time the kids see it. It's one of the things about *Everyday Mathematics* that is strange and difficult for both teachers and parents. But it does work well and will remain a feature of our program.

### Calculators

The program has a lot of hands-on stuff in it, including calculators. They're not optional. They're built into many of the activities throughout the program. We insist that, as part of the initial capital investment a school makes to implement any part of K–6 *Everyday Mathematics*, kids need to have calculators along with other manipulatives. In kindergarten, for example, we give the kids calculators pretty much as display and counting devices, not as computation devices. Kids don't hold a pencil very well when they're four and five years old, and they don't form numerals easily, but it's easy to display a number by pushing a button and seeing it appear. It's also easy to set up a cheap calculator so it "counts." Press a number key and the plus key. Then with repeatedly pressing the equals key, one sees on the screen "1, 2, 3, 4, 5, ..." or "5, 10, 15, 20, ..." or whatever. And so you can have the kids both chanting and seeing number sequences. There are many connections that come from the ability of the kids to see the numbers displayed before they can actually form the numbers themselves.

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We use calculators as a tool for a lot of conceptual teaching. Also, since *Everyday Math* is closely tied to real-life problems, the kids often see or pose a problem that's beyond their calculation capabilities. If they understand a problem, and what needs to be done to solve it—say, for a 2nd or 3rd grader who sees the need to average out something—but they don't have the skills to do that, then the calculator gives them a way to get an answer.

I've done some research that shows that kids rarely become dependent on calculators, but we're still sensitive to teachers' and parents' concerns that this may happen. For example, we have a "Beat the Calculator" game starting early on in the program. In this game, half of the children are the "calculators," and half of the children are the "minds." The teacher calls out a problem and the kids race to see who gets the answer first. They quickly discover that you can say the answer to 7 x 8 much faster than you can put 7 x 8 in the calculator and read the answer. If the kids not using calculators are beating the kids who are, it's pretty clear that there are times when it doesn't make sense to use the calculator. We try to make the point throughout the program that there are times when you don't calculate at all, when an estimate's good enough. There are times when you calculate, but you do it mentally. There are times when pencil-and-paper calculation is useful. And there are times when any sensible person uses a calculator.

## Implementing *Everyday Mathematics*

When we developed the program, we wanted continuity of development of each topic, from 1st grade to 2nd to 3rd to 4th, and so on. Through our field testing and pilot testing, we tried to discover how far most teachers could get in 1st-grade work, then use that in developing the 2nd-grade program, and so on. It was done on a year-to-year basis, not all at once. That means that the 2nd-grade program depends on what went on in 1st grade, 3rd depends on work in 2nd and 1st, and so on up the line.

So the best implementations start with the kindergarten or 1st-grade kids, keeping the standard program for the rest of the grades. Then, they phase in 2nd grade in the subsequent year, and phase in 3rd, 4th, 5th, and 6th grades in the years following.

In the real world we have found that the program is overwhelming when adopted all at once, rather than year by year. Many school districts, forewarned that they shouldn't implement all grades at once, have said, "Tough, we've got the money this year. We won't have it next year. We're going to do it anyway. But, I understand what you're saying, and we'll really work on it." And many places have really made all-at-once implementation work—pretty much by giving teachers permission to cover less with children beyond 1st grade who are new to the program, and to mix what they and the children are used to doing with the new stuff. Good implementations have relied a lot on initial in-service work, discussion groups during the year, and often, a math supervisor going around and helping teachers. But even though many school districts have made it work, I believe the conflict of our year-by-year design with all-at-once implementation is one of the biggest unsolved problems with implementation of *Everyday Mathematics*. The easiest and best implementations are a grade at a time, but they are rare. In other implementations, it's a hard road for a couple of years, but things do tend to even out in the end.

## Supporting Implementation

In implementing *Everyday Mathematics*, you're asking teachers to both radically change the way they teach mathematics and escalate what they expect of the kids.

The most frequent comment we get is, "I was really dubious at first, and became a believer when I saw what the children could do." Nearly always teachers are surprised at the enthusiasm and capabilities of their students.

I don't think it's wise or fair to ask teachers to implement the new programs without specific in-service training or without an investment in the tools and manipulatives built in to the programs. Failure to provide either of these causes a lot of frustration, and may lead to failure. I believe school districts and administrators must make commitments. If they're not willing to make the capital investment in an adequate set of materials, if they're not willing to make the capital investment in some initial training and some follow-up training, then they simply shouldn't buy the program. We feel really strongly about that.

In the best implementations, support of teachers is explicitly promised: "We're going to talk about the program for a few days before we start; and then every once in a while we're going to get together and talk about it again, and share impressions." The best implementations have regular meetings for teachers throughout the year. Nearly every school district has discovered that it's smart to have a parent night early in the year. The message is, "We're trying something new here. We think it'll be good for the kids, but it'll look a little strange to you." The implementations that fail often failed to help the teachers and ignored the parents. Some of those failures are disastrous, and do harm to the reform movement.

### Impact on test scores

As far as results go, we've known all along that, at least in the U.S., if the kids don't do well in year-end testing (the Iowa test, for example), it doesn't matter how good a job we do on everything else. In the development of the *Everyday Mathematics* program, we assumed the kids would do just fine on tests. They would be more involved, they would work harder, they would spend more time on mathematics. We made sure there was enough skill development and spaced practice in the program, much of it in games. But we didn't do anything in particular in development to ensure success on the high-stakes tests.

The almost universal report from school districts using the program is that, in fact, the kids do fine. We make available several publications that summarize data on various high-stakes tests given where the program is used. The quick summary is that on standard computation-oriented tests, there is no bad news—sometimes significant gains are reported but the usual report is of scores much like the past on such tests or parts of tests. On other parts of the high-stakes tests—concepts and contextualized problem-solving—reports are essentially always of significant gains over testing in past years, and this is true across all socio-economic groups. Cities such as Pittsburgh have documented that the better the implementation by individual schools or teachers, the better the test results. On high-stakes tests that are oriented to the NCTM *Standards* (such as several statewide testing programs) there are nearly always excellent results from use of *Everyday Mathematics*. Of course, we are talking about normative results here—no program, including ours, works for every teacher or ensures the success of every individual child.

So, overwhelmingly, the testing has turned out just fine. We used to say, "Implement the program and things will be fine, trust us." These days, we don't have to say that. We now say, "The experience of your peers has been that if you implement the program well, you won't pay a price for it." ■

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# JUDY CHAMBERS ▸ MATH TEACHER, GRADES 2–5

Judy Chambers teaches at North Fayette Elementary School, in Fayette County, Georgia. She has taught mathematics using *Everyday Mathematics* for the past seven years, using it in 3rd and 4th grade classrooms, and in her current position as a teacher of remedial math for grades 2, 3, 4, and 5. Judy is a veteran teacher who has 30 years of experience and has taught children in all grades K–5. In 1995, Judy was a Georgia Presidential Awardee for Mathematics. Judy also provides professional development for other teachers, both within and outside of Fayette County, who are using *Everyday Mathematics*.

Fayette County is a suburban district about 25 miles south of Atlanta; there are 14 elementary schools in the district. The system is an affluent one and has strong parental involvement in most of the schools. The county has a diverse cultural and socioeconomic background. North Fayette's population is predominantly African-American. Prior to using *Everyday Mathematics*, Fayette County used *Merrill Math*.

## Goals for kids

First and foremost, I want children to like math and feel self-confidence in math. If they don't like it, they will never be confident in it. I want them to understand what they're doing—not just know that 2 + 2 is 4, but what is 2 + 2. I want them to be able to visualize what they're doing and what it's about. If they see 2 + 2, I want them to see a picture of two things plus two things equaling four things.

I also want, particularly with my remedial students, for them to be ready for real-life math. Even if they don't go to college, they're prepared for life. I want them to understand those things that we all need and use every day.

My remedial students are very hands-on people. They need to do a lot of bodily activities as far as acting out problems. We have an outdoor math lab that I use where the children can go out and get involved in the math. We actually hop up and down number lines and we count by jumping on squares and we do hopscotch addition and things like this. So they get physically involved in the activities.

## Why *Everyday Math*?

One of the reasons we chose *Everyday Math* is because it is a more challenging curriculum; it works more on high-order thinking skills rather than on just rote operation. The program makes children stop and think and discover alternative solutions to things. Business-world people have said for years that people in business have got to learn to think "outside the box." There can't be just one solution to a situation. You've got to be able to see: is there an alternative, a way to solve a problem? If we don't start teaching children this at an early age, then by the time they're 18, 21 years old, they won't have learned how to think in alternative ways. Children need to learn to look for solutions, to say, "Is there another way to solve this? Can I get there a different way?"

I would say that a lot of the approach of *Everyday Math* is based on real-life application. Children talk about things that have meaning to them, which makes math more interesting. Children talk about planning vacations: how do you figure out how far you're going on a vacation? If we're going to drive from Atlanta to Washington, D.C., how far is it? How do we get there? The program helps children think about what the numbers mean.

Another strength of the program is that it has a spiral approach. This approach means that you don't just teach a unit on addition for the first six weeks of school and then that's it. It's spiraled. So if a child is missing part of it or developmentally was not ready to do something, it's reintroduced and reintroduced and reintroduced, and it gives them an opportunity to pick it up a second and third and fourth and fifth time. They get it in little bites rather than just choking on one big chapter.

Children also do explorations. Explorations are more cooperative partnership problem-solving activities. They don't necessarily coordinate exactly with the unit they're on, but they do lead to what's coming up. They're all hands-on type activities, and are all very good for centers or mini-stations. I think they're wonderful, again because it makes the child think. It's not a computational type thing—it's strategy, problem-solving, involving those critical-thinking skills.

For my students, two of the more challenging parts of the program come in the 4th and 5th grade where they have the World Tour and the American Tour. The tours make a lot of connections with other subject areas, particularly social studies. On the World Tour, you start in your hometown and you calculate the distance from your town to the state capital, then from the state capital to the nation's capital, and then they branch out all over the world. So they're learning facts about different countries, and different continents. It involves working with a lot of large numbers, like how many million square miles are in a particular area.

I can remember one World Tour activity that just totally blew my kids' minds. There was one country they were reading about where there was only one TV for every 97 people. A little boy popped up in my room, and said, "Wow, we've got five in our house." It's sometimes kind of mind-boggling to them to learn about the rest of the world. But the activities in there really challenge them to think. I mean, not only think about numbers, but think about life and think about where they stand in relation to the rest of the world. I have found it to be fairly challenging for most of the students, but they like it.

### Mathematics

What mathematics does *Everyday Math* teach particularly well? I would say the geometry strand, the prealgebra-type activities, and patterning. It begins geometry very early, very simply. They do a lot of prealgebra-type activities, so when the children get to middle school, it's not a totally foreign subject to them—even though they've never used the term algebra. It's the background skills for algebra that they're getting in this program. And children do a lot of work as far as seeing patterns in numbers. They start off early with patterns and shapes, patterns and numbers, counting patterns, things like this.

In my opinion, *Everyday Math* also does a great job teaching basic facts and extensions of facts. Children can see that since 2 x 2 is 4, 2 x 20 has got to be 40. They really learn these extensions.

*Everyday Math* builds enough of a foundation in things like geometry and algebra and patterning that students can make the transition to middle-school mathematics a little easier. Our middle schools are using Scott Foresman's *Transition Math*, also developed by the University of Chicago School Mathematics Project, so the programs transition quite well. Our children have transitioned very easily into the *Transitions* program. Also, they've learned how to create and use alternative algorithms, multiple ways to solve problems and to look at situations—so they don't go to middle school math scared. They go in with the confidence that they can solve anything.

### Games

One of the things I love about the program is the fact that it uses a lot of basic skill games. Not games just to kill Fridays with, but games that really help them practice and memorize the basic facts, the basic skills. Right now my class is working with a game on fractions and percents. It's like a concentration game, where they have to match equivalent expressions of a number. It makes the children stop and think, "Okay, 25% is what decimal or what fraction? One-fourth." They're very skill-oriented games. There's a multiplication baseball game in 3rd, 4th, and 5th grades that has got to be the number-one love of every child I've ever seen in *Everyday Math*. It gives them great practice in the basic facts and multiplication.

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If I gave them a worksheet with the equivalent number of facts on there to solve, they'd moan and groan for a day. I give them the game and they sit there and generate problems until they turn purple. They love playing the games—but in addition to having fun, they also are getting the practice. Children learn the facts because they know they need to know the facts in order to win the game.

## Parents

Sometimes it's hard for parents to adjust to the *Everyday Math* program. This is a different approach to teaching math and it's not like what Mom and Dad learned when they were in school. If parents aren't informed, then they're scared. Parents don't like not knowing what they're doing when they're helping their children with homework. I can understand that; I'm a parent, too.

At our school, to offset that, I do "lunch-and-learn" sessions. Parents come in at lunchtime for an hour-and-a-half session three or four times a year. For each session, I focus on one specific area like how we assess children. We do one session on the games. It's a parent information meeting. It has been very successful and we get a good turnout. We answer questions parents might have about the program, talk about things coming up at their child's grade level and what they can do to help their child, and terminology that the child might be learning.

The county has been very diligent in trying to orient parents to the new program. We've had the parent lunch-and-learns, we've had curriculum night meetings, we've had informational booklets that go out. Once the parents get all this basic information and they understand what's going on, then it makes it much easier for them. I think once the parents see how the program works, and they see how much their children like it, then they become very comfortable with it. And they're thrilled to death to see their children's test scores going up. That makes them feel good about the program, too.

I think parent information was a weakness of the initial edition of the materials. The program has addressed it in a lot of ways since its inception. There's a good parent information book that we send home now. I'll say this much for the program: they are exceptionally good at responding when they hear of problems arising—they go back and modify the materials to fix those needs.

## Supplementing practice

I heard some people say in the past that they felt like there was not enough computational practice. Since then, *Everyday Math* has come out with a *Skills Link* book, which is basically a computational practice supplemental book. I use a lot of the *Skills Links* now, when I want to build in a little extra practice.

As far as supplementing is concerned, though, I use strictly *Everyday Math*. I don't pull in any other program. There's more than enough in this one to satisfy the children's needs and I've just stuck with that.

There are times, of course, that you need to modify any program. I do a lot of modifications if I need to for a particular child. It's always within the structure of *Everyday Math*, but when I see a need for a modification, of course I make it. The program really has enough activities built in as far as using manipulatives, the games and activities in there, that it pretty well incorporates everyone in their learning style.

As far as meeting the needs of the range of learners is concerned, you can adjust up and down in this program when you're working with children to help them meet their needs. I work with the remedial students and I have found that with very few modifications, I can adjust it to fit their needs. Sometimes if we're working on a beginning skill or something like that, I may modify. Instead of using three- or four-digit numbers, I may use a two-digit number where the number's comfortable. Then once we get comfortable with the skill, we increase the intensity of the number. For the lower-achieving students, I would say they need maybe a little more practice in some things. But for the average, above-average, and even below-average students, it's structured quite well. As far as being challenging, I think the program presents enough challenges to meet the needs of any children. I really do.

We have a very high transient rate at our school, so I get a lot of children coming in who don't have a background in the program. That can be difficult, but for most students, it's just a matter of adjusting to the program, and usually that happens within a few weeks. As one of my children told me one day, "We learned the way of the math book." Once they get adjusted to the uniqueness of the program, then they're fine.

Who is the program best suited for? I think *Everyday Math* would work well in any school, any neighborhood, any area. The only situation where it won't work well is if you are in a district that believes in rote computational practice. If you've got a system where the philosophy is "drill, drill, drill, drill, let's do all the computational practice we can," this is not the program for you. This book does not offer pages of drill and practice. Students have to apply those skills to learn them, which I think is great.

## Technology

*Everyday Math*'s philosophy with technology is, "Why reinvent the wheel?" So they put together a guide, done grade by grade, lesson by lesson, that recommends very easy-to-find software. It's the type of software that you can pick up almost anywhere. You don't have to go out and purchase separate software that exclusively works with this program.

## Preparation

The preparation time, as far as the making materials, is very minimal. The games that are in the program are usually something that's in the student journal or in their activity book or maybe something you need to duplicate. There's not a lot of making little things to go with games and having tons of little beans or whatever to store. I've used other programs and sometimes making the games was more overwhelming than teaching the games. Not so with this program. Preparation is very, very simple to do.

The materials give you wonderful suggestions on how to organize the materials. They have math tool kits that you can keep so the children can keep their manipulatives available if they need to. It's not mandatory, but the ideas for them are there if you need them. They give wonderful suggestions in the manual and the resource guide as far as ways to handle different things in the room: assessment, observations, anecdotal notes, things like this.

I think the layout of the lesson, the teacher's manual, is superb. It starts off with a unit organizer that tells you in advance everything you're going to be doing in a unit, and what we're going to be assessing in this unit—so you make sure you can

*We started doing* **Everyday Math** *and I started doing the games and the activities and the explorations with them. Pretty soon I saw the children coming over to me saying, "Mrs. Chambers, can we take this game outside and play it at recess?"*

focus on those things. It lists the materials you're going to need in this unit so you can go ahead and get them ready.

It also tells you in the upper grades what the prior knowledge is. Let's say we're working on fractions in 4th grade—it will tell you what children dealt with in fractions in 1st, 2nd, and 3rd grade. So you know what they've been exposed to and it makes it a whole lot easier.

### Initial skepticism

Many years ago when they first brought the program to the county, I read through it and I looked at the spiral and I thought, "This approach isn't going to work." I was teaching 3rd grade at the time and it was one of those classes that the only thing they wanted to learn was how fast they could run on the playground. But it was really funny. We started doing *Everyday Math* and I started doing the games and the activities and the explorations with them. Pretty soon I saw the children coming over to me saying, "Mrs. Chambers, can we take this game outside and play it at recess?" And I'm thinking, "You want to take a math game outside for recess?" They were very anxious for math every day. They finally said one day, "Can we do math first thing in the morning?" Their enthusiasm was building. And of course as they get more enthusiastic about something, they're going to learn more.

The more I worked with the program, the more I realized it really worked. I think the first year was real hard because it is a different approach. I was very skeptical—I was one of those old dogs that was having a hard time learning new tricks. And now that I've seen the curriculum with 2nd, 3rd, 4th, and 5th graders, and with remedial students, I see how the progression of the program takes place and it's really neat. It works. I hear the children saying, "Oh, well, I remember doing this last year. I remember doing this last month." So they see it, too.

A lot of teachers, particularly experienced teachers, get a little frustrated at first because it is different. I've gotten to the point now where I just keep telling them, "Don't sweat it. It will work. Just follow it, trust it. It works."

### Professional development

I would strongly recommend any district starting out with the program to make sure they get some good staff development for teachers. Teachers need training before they use the program and then maybe a couple of sessions through the year, because questions arise. Before you begin teaching it, you think, "No problem." Then you get into it and then you have questions like, "What do I do if I get this situation? How do I handle this?" Or, "I'm not sure I understand this lesson." That's why I always say that maybe six weeks after you get into the year, try to schedule a second session. That way teachers have a chance to figure out what they don't understand—that they thought they understood—and to go back and get some support.

I also strongly suggest support groups within the school system. Let your grade levels meet together and discuss problems and challenges and successes and what you have done that's worked really well.

*Everyday Math* has a users' conference in the summer that is quite good. It's a day-and-a-half intensive training for new teachers by grade level. So if you're a 3rd-grade teacher, you would have a day and a half exclusively on 3rd grade. They

also have an experienced users' conference. You go back and refresh and rethink and share ideas. They're very worthwhile.

In our county, teachers found the program a little scary at first, because it is different. But the county has provided a tremendous amount of support as far as helping new teachers, traning teachers when they come to the county or change grades. We do workshops for them that help them make the adjustment, make the change. I think, for the most part, all of the teachers have found that once they get into it, it is successful, and they like the program.

### Test scores

In our county, test scores have gone up every year since we've been in the program. So that says, yes, this is working. That's probably the favorite thing of our administrators, that the test scores are going up every year. It's not just that the kids like the games more. We're actually seeing written results that they are doing well, that they are improving. And it's not just in computation. It's in problem-solving and concepts and the alternative thinking.

I think the program helps the children develop self-confidence, because it teaches the use of alternative strategies. They feel more confident when they do the tests. They really do.

### Assessment

In the last year or so, *Everyday Math* came out with an assessment guide that gives you a great checklist to use with your class. It's so specific: it tells you the level the child should be at, whether they're beginning, developing, or secure in an activity. It's broken down by units, and by grade levels. As far as testing is concerned, there are paper-and-pencil tests in the units. Children also do a lot of "slate" activities. You give them a question, they do it on their slate, and you go through the class looking at the slates. This allows you to very quickly assess a whole group at a time.

I get a lot of assessment information from the Math Boxes[1] built into the lessons. These are practice pieces, a grided page with four to six activities. Most of them are review-type questions. A few of the boxes will give you a quick assessment to see if children are ready for the next unit. If in the next unit you're going to be dealing with fractions, and you give a Math Box on fractions and nobody even knows what a fraction is, then you know it's time to back up and do a little background work with the group.

In addition, in the lower grades, they have an attitudinal checklist. You know, "Do you like math? Do you like working with a group or would you rather work alone?" These are simple questions that we may have seen on other checklists, but they do give the teacher good information.

The older grades have mid-unit review checklists or review tests as well as the end-of-the-unit tests. They also take time to reflect in the 4th and 5th grade, with some attitudinal and some reflective-type questions. So they're having to think about the math as well as solve the math. You can get a lot of insight as to where children are from these questions. ■

***I think the program helps the children develop self-confidence, because it teaches the use of alternative strategies. They feel more confident when they do the tests. They really do.***

[1]Math Boxes are materials for regular review. The masters are divided into cells; some contain review problems, while others are blank to allow teachers to write problems most suitable for their students.

# LISSETTE SALEJ-ZEOLLA ▸ TEACHER, GRADES 2–3

Lissette Salej-Zeolla teaches a bilingual, multigrade 2–3 class in the Bronx in New York City. She has been teaching for seven years, first in a middle school, and then in 2nd, 3rd, and 4th grades.

Lissette's school, P.S. 103, is a large school: there are 11 other 2nd-grade classes in addition to hers. Her school district has been implementing *Everyday Mathematics* for the past four years, each year adding on one grade. Lissette has been teaching *Everyday Mathematics* for three years, with both 2nd and 3rd graders.

## Why *Everyday Math*?

I think one of my most important mathematical goals is to have students realize that math is a part of your everyday life and that it's not just for some people who have talents. I think it's much more about skill and exposure. Math is used in almost everything we do: shopping, buying furniture, or measuring, filling out an application, cooking. If I can project that math is not something foreign and useless, that it's something very useful, very real and important to have as a skill, then that would be my first goal.

The new curriculum is wonderful because it's not dull. It's much more interesting and realistic. One of the strengths of the *Everyday Mathematics* program is that there are many different modes in which lessons are introduced to students. For instance, there are times when students are working as an entire class, but there is also space for individual work and for small groups. There's also different media. There are times when our lesson has hands-on components. There are other times when students are writing. Other times, they have to listen to each other and come to some kind of agreement. Still other times they're interacting with the teacher. So there are a lot of modes; it's not just strictly handouts. There are also a variety of materials. The *Skills Link* book that they have is very direct and computational, so you can go over some basic skills. But then the Journal allows opportunities for problems that are more varied, so you can work on concepts.

The program doesn't introduce a lesson in just one way. It provides various opportunities for students to grasp the concepts. It's also very engaging so everyone can participate. If they're too shy to answer within the class, then there is an opportunity for them to work with someone next to them, and so forth.

I think for teachers using the program, you learn that the children can accomplish more than maybe you anticipated. There are certain concepts, like range, or median, that the children do understand if it's brought into their vocabulary, brought to their attention, and you work with them on it. So an important part of the program is that the children can accomplish a higher level of mathematics, much higher than was expected a decade or 20 years ago.

The program that we were using previously was more computational; it did have some word problems, but didn't really go much beyond computation. And students sometimes didn't know when to use what operation. With *Everyday Math*, students have been able to learn not only their facts, but when to use certain types of operations. Working with some of the projects and the explorations, as well as with the written work, children really connect ideas. It's not all so separate for them. They make much better connections of when to use what mathematics.

## Classroom context

I have bilingual students, new from Spanish-speaking countries. Sometimes they're from major cities, urban areas, and sometimes they're from rural or semi-rural areas. There are certain things about the city, obviously, that they're not exactly familiar with, that they're just learning. And the children's experiences are different from each other. Sometimes it's a little difficult because the program assumes a certain type of student, so you have to introduce some background first before a lesson. For instance, there's one part of *Everyday Mathematics* that

speaks of an odometer. A lot of my students' parents don't have cars. Then you have to introduce what an odometer is and what it's for before you even get into the lesson. It's important to know beforehand what the children know, what their experiences are, what they're familiar with before you jump into certain lessons.

There are experiences in the curriculum that don't really connect with my students. But I don't know how you could write a book that would work for my class and then also for someone else's. I don't think there's anything necessarily that's inequitable. There is a book for Spanish-speaking students. Of course, that's another can of worms because the vocabulary in Spanish varies from one country to another and even within a country. Since a lot of my students are learning the vocabulary for the first time anyway, it doesn't really present an issue for us.

I'm in a multiage classroom with 2nd and 3rd graders. There's a math teacher that comes in to my classroom: she works with one group, and I work with another group. I only have six 3rd graders, but two of them just came into the country last year without much schooling in their own country. They're not really able to do a lot of the 3rd-grade material, but the four children that can, do. For a lot of it, the 3rd grade is not so different from the 2nd grade. It's not all in the same sequence, but the material is basically about the same. The level's a little more difficult than the 2nd grade, but it's not so far off. You can keep the groups together, and then you can pull them aside to work just a little more in-depth, at a little higher level. For example, the 2nd grade does division, and so does the 3rd. They're just working at a different level with it. Plus, the 2nd grade, as it is, goes to such a high level that it's not like the 3rd-grade student is always missing out on something.

## Mathematics

I think *Everyday Math* does a very good job with addition, through the use of the number grid. The number grid is like a hundreds chart. Children have to fill out certain number grids as part of the program. The grids help them see, like when you're adding tens, that just the tens unit is changing or just the ones unit is changing. After using the grids in many different ways, the students are better able now than before to know that 19 + 10 is 29. Plus 10 is 39. Plus 10 is 49. With previous programs, children were more likely to count on their fingers and didn't really see that it was just the tens unit changing. The program really does a great job in addition—which of course also helps with their subtraction. There are also a lot of opportunities for work with the basic operations through explorations, in games like "What's My Rule?"[1] and devices like the Frames-and-Arrows diagram[2]. It just presents different ways of using the operations.

The program also does a great job with geometry. The kids really learn all sorts of flat-plane figures and three-dimensional figures. The multiplication in the program is great, as are decimal points, money, and time. It really gets the children to work at a much higher level mathematically. You can really see it. If you're a teacher who has used another program and then you use *Everyday Math*, you can see the change. My students now are younger than the students I first worked with, but are better able to understand certain concepts than the others may have been, because of the way we're now doing it.

***Working with some of the projects and the explorations, as well as with the written work, children really connect ideas.***

[1] What's My Rule? activities help students learn rules for determining which numbers belong to specific sets of numbers.

[2] Frames-and-Arrows diagrams organize activities with sequences; a string of frames (each containing a number in the sequence) is connected by arrows that represent a rule that determines the number for the next frame.

## Challenges

One challenge I've dealt with is the spiral curriculum. The spiral works, but sometimes I find I have to modify. For example, one of the early lessons in the 2nd-grade *Everyday Mathematics* has multiplication. That's fine, because students have been exposed to multiplication the year before. But it goes from multiplication, from doing arrays, right into doing division with remainders. They were introduced to it in 1st grade, yes, but a lot of it they've forgotten. So you can't just jump into division with remainders. It's a little too early within the year to just put all that in. So I find in September and October, with the spiral, I'm usually reintroducing things that they may know, but that they need to brush up on. The students show me in the way that they're responding that it's a little like, "We did that?" So we just refresh or revisit at that point.

Some of the explorations and projects are wonderful. The children enjoy them and they're realistic. These are things where the kids don't realize they're doing math. They think it's play time. That's good because they're learning the process and I'm not having to trick them into doing it. They're willing to do it and it's engaging.

There are those few explorations that you kind of laugh and say, "Well, I don't know. There's one where there's watermelon seed spitting with your students, to see who can spit the furthest. And that's a little nutty. I mean, if you have 20-some kids, you don't want them with watermelon seeds in their mouths. Someone's going to choke, someone's going to spit on someone else. Maybe watermelon seed tossing? But I don't know about watermelon seed spitting. So I just skip those.

## Assessments

There are so many assessments you can use in the *Everyday Math* program. Besides the designated assessments, you also have other opportunities in class to assess. When the children are working in groups, you're walking around and you hear their responses. They're also responding in class discussions. You can collect a Math Box[3] that children have done, and see how they're coming along with that. You can collect some of the Home Links[4] or you can have them work on the Journals. When they're working with the manipulatives, you can go around and see physically what they're doing. You see them working on explorations. You see who's understanding the concepts and who's not. It's not always an entire class assessment, but there are a lot of opportunities to see a child working in different modes.

Besides the assessments that the program has, we also have district assessments. The district writes assessments that correlate with *Everyday Mathematics*. So every month you're giving an assessment that incorporates all the lessons of a particular unit, to keep up with a certain pacing. As a teacher, you know approximately where you should be and where the kids should be. When we were starting out, one important thing we knew was that if the district was going to keep the assessments, then they should correlate with the new program. The wording, the vocabulary, should correlate with *Everyday Math*. The sequencing of topics should really correlate with the program. And that's what our assessments do.

[3] Math Boxes are materials for regular review. The masters are divided into cells; some contain review problems, while others are blank to allow teachers to write problems most suitable for their students.

[4] Home Links are homework activities for students that require interaction with adults or older children. They provide follow-up and enrichment to lessons, and involve parents or guardians in their child's mathematics education.

## Teacher training

In the beginning, it is very tough for a teacher who's starting to use *Everyday Math*. That's why in our school, we had two teachers in one grade beginning the program first, so that they could kind of work through the kinks. Then when everyone else in the grade starts, they can go to those two people who have already been through the program, so they're not lost when they have problems.

When I started, I went to numerous workshops, and they were helpful. Our school even provided time when we would get together with the math coordinator. I also visited another school and watched someone who had been doing the program—but still there was much more I needed. There was so much to learn. It's not just learning the program, but also learning how to work with the students.

There were so many little details that were important to figure out in the beginning. You need workshops really to take you almost by the hand, at least in the beginning, because there were so many components to the program. If you're not familiar with this program and you see all these components you need to use on an everyday basis, you might not even know where to begin. There were times when the teachers who were starting the program needed to know things like, "For this lesson, you need to have a chart. Here's the chart. This is where you're going to put your math message. You should have this prepared. These are the materials. These are the tool kits. This is how you best number it.

In other words, the program is very different from what you were teaching before: it's much more hands-on, children work in groups, the lesson flows differently. In the beginning, you're dealing with all the different pieces, when to use it and how to use it and when to prepare for it and how much in advance to have it, and what materials to have ready for the students and for yourself. It's overwhelming. But once you get into it, in the second or the third year, you start to see that the students are able to do it, and they're enjoying the math better. And it makes you more confident in what you're teaching.

## Parents

Our school has provided workshops for the parents, for them to know how to work with the Home Links and understand what they should be doing at home. Most of the activities for Home Links require children to work with another person at home. The parents who have participated, those who have been exposed to the program, love it. Even though it's challenging for them because it's very different from the way they were taught math, they still see how advanced it is. And they're happy about it. They feel like the school and the district are doing a good job in preparing their children for the job market and the world. The difficult part is that there are a lot of parents, who aren't familiar with the curriculum, and who don't participate with the Home Links. We don't really get much of a feeling for how the parents who don't come to meetings feel about the curriculum.

## Administrators

Our administrators are very happy about the curriculum. We've been going in this direction—taking the children more to abstract thinking than concrete—not only in math, but in all other subject areas. Administrators are happy with the results. They're happy with what the students are doing—not that every student succeeds all the time with this program, but that it raises expectations. It sets your expectations in mathematics higher, and you're able to get more from the students than you would if you just said, "Well, they can only get to this level." ■

# ELEANOR YURA ▸ INSTRUCTIONAL SPECIALIST

Eleanor Yura is an instructional specialist in mathematics in the K–8 Community Consolidated School District 21 in Wheeling, Illinois. She has been an instructional specialist for three years; before taking her current position, she taught for over 25 years in several school districts, teaching all grades K–5. She started her career teaching home economics.

SD–21 is a K–8 suburban district about 25 miles outside of Chicago with approximately 7300 students in nine elementary and three middle schools. The district encompasses parts of five communities (Arlington Heights, Cook County, Buffalo Grove, Wheeling, and Mount Prospect). It serves a population that is quite varied socioeconomically and includes many bilingual students (primarily Hispanic, but also Russian, Polish, and Indian). *Everyday Mathematics* is being used in all the elementary schools, in grades K–5. The district began piloting the program in 1992–93, and then adopted it for use in grades K–3 in 1993–94, adding the 4th and 5th grades in subsequent years. Eleanor provides support for teachers using the program and also works with parents and administrators on related issues.

## Why *Everyday Math*?

I would love to see all kids willing to tackle a math problem instead of saying, "I can't do this" and shutting down immediately. I've seen a lot of children, when the numbers get big, say absolutely, "I can't do this." I want children to look at a word problem and be able to analyze it and decide what kind of operation they need to do in order to solve the problem. I absolutely adore the way the children are given the freedom in the *Everyday Math* program to decide to solve a problem in a way that I might not have thought of.

I would love to see all kids being able to look at statistics and data and make sense out of the data, and get their practice in the computation. I play a game with some of the 4th and 5th graders called Landmarks—it's the statistical landmarks, the mean, median, mode, and range. We talk about why we even need this kind of information. I want kids to realize that they're not in school just because they're going to be tested on this stuff; they're learning this because they're going to use it, it's real. This is what people in the real world, outside of a schoolroom, do. When they see that, it makes the learning much more meaningful and they want to learn. I think once they want to learn and they see the purpose of it, many of the behavior problems disappear in the classroom. Even the kids who are struggling are given a reason to learn—if they cannot do the actual computations necessary, let them pick up a calculator—but if they know what they're doing, and why they're doing it, that's why they're in school.

I think using a program like *Everyday Math* gives more and more students the opportunity to experience math at much higher levels—we're not just saving the good stuff for high-achieving students. It's going to give every opportunity to every child to learn those wonderful parts of mathematics that have always been saved for the last chapters of the books; the wonderful geometry in the primary grades, the data collection, the measurement, all of that is intertwined constantly throughout this program. So all the children have exposure to many different topics and they're not locked into the first six weeks of just doing addition, and then the next six weeks of just doing subtraction, which is what most traditional programs look like.

## Spiral

When I first started teaching in the elementary grades, I knew one way to teach the children how to subtract, and it was the traditional way. There were a bunch of students in my class who just weren't getting it, and I wasn't at a level myself to be able to say, "Well, maybe they're not developmentally ready for it, or maybe this doesn't make any sense to them." I had learned it that way and I was just a total rote learner. Everyone doesn't learn like that, though, and I think that it's been really, really exciting to have a program that addresses those differences, through the spiral nature of the curriculum. It allows you to have the confidence to say, "Well, I'm not going to beat it into the kid. We'll come back to it."

The spiral curriculum is one of the hardest things for teachers to adjust to. When I work with teachers, I tell them, "You need to have the faith that the children are going to see it again. Don't be afraid to leave a concept, don't expect mastery right away." I think the teacher at the outset has to talk to her class or his class and explain to the children that, "We don't expect you to learn everything the first time

we teach it. You're going to see things over and over again and you might not understand it the first time, and that's okay." For your high-achieving students, that can be very difficult. They've always been able to pick something up the first time they've been taught, and all of a sudden some of the high-achieving students are not the high-achieving students, and that's very, very hard. We have to constantly remind the kids that it's okay not to have complete comfort with this: "Don't worry, you're going to see it again."

Those teachers who are teaching this program for the first time don't know what's really coming up. Now, in the materials, there's a resource for that. In the new edition of the materials, they've added materials that tell you, by grade level, every concept that is taught and whether children are beginning, developing, or secure in their understanding of it. When the teachers see that in print, it's much more comfortable for them. When I started with the program, they didn't have anything like that, and they kept saying "Trust the program." Well, it's pretty hard to trust something that you haven't seen, but now it's all beautifully laid out. The new teacher's manual also has a section called "Lesson Content in Perspective," which tells the teacher where that concept was handled before, in what grade, what lesson, and where it's going to go. That's a real important piece.

With the spiral curriculum, when a child is just not understanding a concept, we don't spend day after day after day on that same concept with the child feeling worse and worse and worse every day because they're just not understanding it. If a teacher is explaining to a child, "We're going to see this again. Don't worry about it and let's move on," that's comforting to a lot of kids. If they hear, "I don't have to know this right now. I'm going to see it again—the teacher's not worried that I don't know it right now," and then move into something that the child can be successful at, then the child's attitude towards math becomes much more positive. On the other hand, one of the weaknesses of the spiral that I see—and this is related to its strengths—is that we're constantly changing topics, and that sometimes is frustrating for children and teachers.

### Working well for students

What's working well is that there isn't what I call the dullness of the drill-and-kill kind of program. It's not, "Oh, no, it's math again, here we go—we're going to turn to this page and we're going to do all these problems." The children have the experience with what we call Explorations and, just like their name says, the kids have an opportunity to explore different concepts, usually using manipulatives of different sorts, and looking at things in a different way. They do something in 1st grade with fractions and pattern blocks, and the kids really enjoy playing. At this point, they're not even thinking that they're learning the basics of fractions. They build on those skills and, boom, they wind up in 4th grade, and when they start doing mixed-digit fractions with different denominators, all of a sudden it makes so much sense because they played with this before.

I think the program is working really well in the classes where the teachers are doing all the different activities. There's some direct teaching, there's some groupwork, there's some game playing—there's such a variety of things going on in the primary classrooms. When you see children in the 3rd, 4th, and 5th grades, it's very easy to see who their previous teachers were. Some children will tackle some of the fractions and the decimals and are not fearful because they've had this experience in the earlier grades. You can easily see whose class they were in 1st, 2nd, and 3rd

***I think using a program like* Everyday Math *gives more and more students the opportunity to experience math at much higher levels—we're not just saving the good stuff for high-achieving students.***

***Yes, they need to play the games—that's where they're getting their practice. They're not doing the 12 sheets with 50 problems, but by playing the games, that's where the practice is coming in.***

grade when they get to 4th grade, because many of the other students have not experienced those Explorations. Teachers vary in their use of the Explorations, because they are time-consuming and they're "messy"—it's a lot of stuff and the kids are doing a bunch of different things. It's not as controlled a situation, and sometimes the outcomes are different than what you anticipated when the kids do an experimental kind of thing. For some teachers that's very difficult, to be in a situation where they're not in total control. So it's a combination of different things, but I just find it real interesting that the kids moving from concept to concept with ease are the students who were experiencing many things in the primary grades.

### Mathematics

One topic I think *Everyday Math* does a great job on is geometry. Geometry is introduced at a much earlier age, where the children are talking about things like prisms and pyramids, and they can distinguish between two-dimensional and three-dimensional shapes. I was just looking at the 4th-grade materials recently, and they start right off with geometry—the rationale is that geometry is a leveling kind of concept where many more children can be successful, so everyone has a more positive attitude toward mathematics when the school year starts. I think that's a tremendous strength. I don't think I've ever seen in any other program as much support in the geometry strand.

Another strength is in data collection, and the landmarks of data, with the mean, median, and mode. That's introduced as early as 2nd grade—and certainly it's not at a mastery level—but the kids have heard the terms and then the following year they're doing a little bit more with it, and by 4th grade they're really doing some good stuff with the data collection, again relating everything that they do to the real world.

As much as I love the program, I still have a hard time with the rather small amount of time that's spent on computation. I would really love to see a little bit more of an emphasis on basic computation so that the children truly know those addition and subtraction facts by the end of 2nd grade, and by the middle of 4th grade they know their multiplication and division. It makes actual computation later on so much simpler if they have the facility with that. But I also know if they're going to increase that strand in the program, they have to take from something else, and I wouldn't know where to suggest taking it from because I do like all the other things we're able to do.

When I was in the classroom, I always used the games, and I strongly encourage the teachers to do that. I think that's another piece that's hard for teachers. "How can I take time to play games? Don't be ridiculous, I can't play games." Yes, they need to play the games—that's where they're getting their practice. They're not doing the 12 sheets with 50 problems, but by playing the games, that's where the practice is coming in.

### Implementation plan

One of the pluses of our implementation is that we first adopted the program at grades K–3, and then added a grade one level at a time. Ideally, if every district could, I would love to see them do even K–2, then the rest year by year, because 3rd grade has so much material and so many new things. If the children have at least the exposure to things like the number grid, Frames-and-Arrows, and What's My Rule?, typical things that start in the early grades, it makes it that much easier. I

know of districts that have adopted K–5 and K–6 at one clip, and the only thing that makes me comfortable with that is that I know the kids are being exposed to such incredibly good mathematics that I could say, "Okay, that's not so terrible." But it's very, very difficult for the teachers, and it's difficult for the children.

### Challenges for teachers

I want kids to think mathematically. I want them to love math and I want them to be excited about math. Many of the teachers themselves are not excited about math. But in using *Everyday Math*, many teachers have said to me, "I wish I had been taught math this way," and they are much more enthusiastic about teaching mathematics. They're much more actively engaged in mathematics. It's not the kind of program where you can say to the children, "Open to page 57, do numbers one through 25." Or, "Girls do the odd numbers, boys do the even numbers." That's about as creative as a math teacher used to get in the elementary grades. Now we're asking teachers to be actively involved in not only presenting a lesson, but in circulating around a classroom and observing whether the children are working. It's not just standing in front of the class. One of the kids once said to me, "Why do you have a chair at your desk, since you never use it?" I said, "It's there to catch me." It's a very, very active program for the teacher.

There's a lot of "stuff" that goes along with this program—by that I mean a lot of components and manipulative pieces—so the teacher has to be a master at making sure that she has all the manipulatives set up in a way that they're easily accessible to the children. Very often the children are asked to use a calculator. Some teachers have a real hard time letting the children keep calculators in their desk. So that takes up time, passing out calculators, passing out rulers, passing out counters, things like that. That's one of the complaints I hear from teachers—there's just so much stuff to use.

The actual preparation before a lesson is more intense than with a straight textbook, and it's harder certainly the first year; after the second year, it's no more difficult because you're familiar with the book. I know I used to walk around holding my manual—a "take my life but not my manual" kind of thing. I'm not the kind of teacher who needs a script, but some are, and again mathematics is not the strength of many, many elementary teachers.

We have a pretty large ESL and bilingual population in our district. In 1991, we had about 275 bilingual students. We now have upwards of 1300 or 1400. *Everyday Math* is an extra challenge for those kids for whom language is a problem to start with—there is a tremendous amount of language in this program. A drill page in a traditional program is numbered. Either the kid has it or doesn't have it, and that's it. In this program, they're using true mathematical terminology. When the teachers are speaking to the children they're not afraid to use the words "factors," and "products,"and "denominators,"and "numerators." For children for whom language acquisition is a problem, that is a challenge.

### Assessment

Assessment is a part that's very difficult for many of the teachers. The assessments that come with the program at the end of each unit are very difficult for the children. They're something I have a hard time with: many of the things on those

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assessments are on topics that have only been covered with one or two lessons, and I as a teacher found it very hard to give those assessments. I had a discussion with Max Bell, one of the authors, about it. He was saying that the assessment unit reviews are not what you should look at as a traditional test, but as a guide for the teacher to see where the child is on a continuum, sort of a progress sheet. That made me a little bit more comfortable with the assessments.

Teachers are used to traditional kinds of tests; there isn't any such thing in *Everyday Math*. So we encourage teachers to use the Math Boxes to help them because that's where the children get their review. I've encouraged teachers to use the format of the Math Boxes to make up their own problems, to take even Math Boxes as they're written and just white out the number and put in another number. When you want to test them, give them the same kind of problem with another number in it and you can get a good feel for where the child is on that particular concept.

There are also lots and lots of opportunities for observation. I would often walk around my classroom with a clipboard, with the children's names on little index cards on it and make notes. While children were playing a game, I would observe very carefully and be able to tell which child had the computation piece in place, and which child was struggling with fractions. Our district also has certain assessments that we have written in-house. I've just finished working on what we call CRTs, criterion-referenced tests, and they are intended to be given uniformly in each of the buildings, at each grade level. The tests were written to follow the program, so the children will see the different elements of the curriculum, like Frames-and-Arrows and What's My Rule?, embedded in the test. Those children who are truly familiar with it will be much more successful.

In addition to that, we've been writing what we call CBMs, curriculum-based measurements. Those are given three times a year, and their purpose is to monitor children's progress so we will be able to pinpoint where the children are early in the year.

### Support for teachers

When we started in 1992–93, four or five of us went to the national training and became consultants to the company that publishes *Everyday Math*, and began conducting workshops. From that point on, the district was wise enough to tap the people they knew had been trained to be trainers and use them in-house. I did training with teachers in the spring to get them ready to use the program in the fall.

We also had grade-level support groups. Once a month, all of the 2nd-grade teachers would get together, all of the 3rd-grade teachers, and so on, and each group would set their own agenda. It wasn't mandatory; it was an afterschool meeting, usually from 4:00 to 5:30, and they would talk about their successes and distresses. I think that support was very, very, very important, where a colleague would say, "I tried this lesson and this was so difficult for me. What would you suggest I do next time?"—that kind of thing. Or somebody would say, "I was a little scared about trying this, but this worked so well and maybe you should..."

One thing our district did was get substitutes and invite all the LD teachers[3] to come to some training, because we decided that that was a group that was sort of

[3]Learning Disabled. These teachers focus on Special Ed students with individual education plans (IEPs).

neglected. They used half-day substitutes, so that half of the LD teachers in the building would come in the morning, and the other half in the afternoon. At least the LD teachers found out what the routines were, and what the games were. I would make suggestions about how to modify the program so that their students could be successful.

I think for the most part the teachers who are trained, either in-house or at the conferences that *Everyday Mathematics* runs, are so excited about what they've learned, they can't wait to get back to their classrooms to try it. Those are the teachers who really have such a positive attitude to trying new things; they feel confident that if a lesson doesn't work well, it's okay. They don't say "That's it. I'm not going to try this program. I'm not going to work so hard on it. I'll go back to what I'm used to." I think it's really the training of the teachers that's crucial and if they're trained well, then teaching this program is really no more difficult than any other program where they can just open up a book. But the first year is hard, even with the training.

Because our school district is a site for one of the big training conferences, we get a certain number of "free spots" and I certainly encourage the principals to send all their new hires, and to talk to some of their teachers who've been teaching several years, just to get them fired up and to really learn the right way to do it. We've also had several teachers in our district who have taught the program for a few years, and then gone to the experienced users' training. They come back saying, "Hey, this is really neat. I never thought of doing it this way." So I think those teachers who are willing to give the time are the people who are able to teach it knowing precisely what they're doing. Of course, in return, the students benefit when they have a teacher who is excited about what she is doing.

We've also encouraged the principals to attend the *Everyday Math* workshops that are offered for them—certainly the workshops here in Chicago because of their proximity. Several of the principals have attended the workshops. Participants work with other administrators and talk about how best to be a knowledgeable administrator when you're using this type of standards-based curriculum, because it's different. For example, the principal walks into a classroom and the kids aren't sitting quietly in seats—they're usually up and around and moving and talking with other students. It's a different look. What I've said to the principals is, "If you walk in a classroom and the kids are sitting at their desks and working on a drill sheet, you're not seeing what you're supposed to be seeing." The principals are given that kind of advice: what to observe, what to be looking for. The next day of the training, they're invited to join any grade level they want, so they can participate with the teachers—the new users—so they see what the program looks like.

### Parents

A big part of my job is to work with parents and run parent nights, whether it's in the central office or in individual buildings. I spend a lot of time with parents in the evenings and very often I'll spend time on the phone with parents who are concerned about certain issues. In our district, I think we're doing a pretty decent job of working with parents and teaching them, along with their kids, what is expected.

Initially some parents had concerns about what we were doing, especially the parents of successful students. Parents whose kids have been successful don't want us to change things, and many parents think mathematics is just computation. I tell the parents that the world their children are going to be living and working in

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is so different from the world we're living in today that we need to teach the children really just to think, and how to access information, rather than to do things by rote. It's not that important to memorize all those formulas. It's great if you can, but there are so many other things. If you know where to get that information, that's what's really important. I think at this point our parents are comfortable; many of them are starting to understand where we're coming from and why we're teaching differently. We give the parents an opportunity to see what the children are doing, and to let them know, "Even though it doesn't look quite like what you did when you went to school, yes, this is really good, solid mathematics." ■