The University of Chicago School Mathematics Project

UCSMP Newsletter

No. 37 Spring 2007

Third-Edition UCSMP Texts Available for 2007-08

Research Shows that Students Continue to Learn and Grow with the New Materials

UCSMP has developed new editions of its research-based curricula for schools ready to update or change their mathematics programs. Third editions of the *Everyday Mathematics* grades Pre-K through 6 materials, as well as two books in the UCSMP secondary series, *Transition Mathematics* and *UCSMP Algebra*, are available for the 2007-08 school year. *Pre-Transition Mathematics*, *UCSMP Geometry*, and *UCSMP Advanced Algebra* will follow in 2008-09, and the entire revised secondary curriculum will be available for 2009-10.

These materials are written with care and tested to make sure that they work in the classroom for students and teachers. We are pleased to report on field studies of *Pre-Kindergarten Everyday Mathematics*, a new program published with the third edition elementary materials, and the third editions of *Transition Mathematics* and *Algebra*.

A Trial Run of the New Pre-Kindergarten Everyday Mathematics *Program*

This year, two groups of about 25 teachers in New York City and Chicago are implementing the field-test version of *Pre-Kindergarten Everyday Mathematics*. The trials are designed to help UCSMP and the school districts learn more about implementation and professional development in anticipation of the program becoming available for the 2007-08 school year. To this end, the authors have provided initial training on the new materials and follow-up sessions to address teachers' questions, monitor and support implementation, and delve more deeply into mathematical topics.

The current trials are the culmination of a multi-year process in which teacher input influenced the development of the pre-kindergarten program at every stage. During the summer of 2004, the authors of the early childhood materials worked with a group of preschool teachers to develop a collection of mathematical activities for a small, informal pretest during the 2004-05 school year. A second group of summer writers contributed additional activity ideas and provided feedback about program structure in 2005. UCSMP conducted a formal field test during the 2005-06 school year in over 20 classrooms spread across four states and a wide range of classroom situations. Field-test sites included private and public schools, Head Start and state pre-kindergarten programs, half-day and full-day programs, and classrooms with different combinations of three-, four-, and five-year olds, evaluating adaptability in a wide range of preschool contexts.

The resulting pre-kindergarten program is designed to bring rich, appropriate mathematics into early childhood classrooms. The program values child-initiated explorations of mathematics. At the sensory table, for example, children naturally explore capacity by pouring water or sand between different sizes of containers, or as they use a one-to-one

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BP Foundation Recognized for Leadership in Improving Mathematics Education

Collaboration with UCSMP Rewarded with Critical Impact Award

On April 30, 2007, the Council on Foundations honored the BP Foundation (formerly the Amoco Foundation) with a Critical Impact Award for its support of UCSMP.

The Council on Foundations has long recognized outstanding philanthropic work. With the Critical Impact Awards, new in 2007, it honors grant-funded projects that have a demonstrated impact on the common good, and that serve as models for others in philanthropy. Special attention is given to programs that show an unusual level of creativity, innovation, sustainability, and risk-taking.

The BP Foundation's support of UCSMP, in the amount of $8.4 million given between 1982 and 1994,

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FIELD STUDIES

Students Succeed with UCSMP, cont'd from previous page

correspondence to set the table for a pretend tea party. The program also values and supports the important role of the teacher in planning engaging, age-appropriate activities that respond to and extend children's mathematical knowledge and interests.

Field-test teachers are pleased at how well the program fits into a developmentally-appropriate preschool environment. They find that it helps them build upon the math that is already embedded in children's play and bring more mathematics into the classroom, without requiring them to add a specific "math" time to their schedule or ask young children to perform pencil-and-paper academic work prematurely. Teachers also report that the program's games are very popular, and promote both independence and cooperation. Several teachers have been surprised by how much mathematics children can do – and by how much they *want* to do.

Pre-Kindergarten Everyday Mathematics activities are organized into eight topics: Counting, Number Concepts, Operations, Graphing, Measurement, Shapes, Position and Spatial Relationships, and Patterns and Sorting. Within each topic, activities are grouped into three levels of difficulty to help teachers meet a wide range of ages and developmental levels. The pre-kindergarten *Teacher's Guide to Activities* includes important background information about each mathematical topic, with a focus on typical learning trajectories for that topic for young children. This information, along with informal "kid-watching" assessment tips throughout the activities, supports teachers in finding their own path and pace through the activities.

The content and unique structure of *Pre-Kindergarten Everyday Mathematics* make it a rich curriculum that stays true to the child-centered principles of early childhood education.

In addition to the Teacher's Guide to Activities, Pre-Kindergarten Everyday Mathematics *components include:*

- *Resources for the Pre-Kindergarten Classroom*, which includes theme-based mathematics activities; lists of songs, rhymes, books, games, and software that incorporate mathematics; and suggestions for newsletters and family letters.
- *Sing Everyday!*, a CD of songs and chants to reinforce mathematical learning.
- *Pre-Kindergarten Minute Math*.
- *Mathematics At Home Books*, three take-home books with suggestions for fun, informal math activities families can do together.
- *Pre-Kindergarten Assessment Handbook*.
- *Early Childhood Teacher's Resource Manual*, shared with the Kindergarten program.

A Strong Mathematics Program for Middle and High Schools

As the UCSMP Secondary Component develops the third editions of its middle and high school curriculum, it tests materials at different stages by measuring the impact of the new texts on student achievement and attitudes, and obtaining feedback from teachers about the sequence, organization, flow, and appropriateness of the materials for students. In 2005-06, UCSMP conducted field studies of *Transition Mathematics* and *UCSMP Algebra*. Soft-cover field-trial versions designed by UCSMP were used in the studies. Data from the studies have been analyzed, and the results are promising for UCSMP users.

Study Design

When schools applied to be part of the studies, they were asked to provide four classes – two using the new UCSMP texts and two comparison classes, using the materials already in place in the school. The classes were then matched at the beginning of the year on pretests of prerequisite knowledge. Matches were checked again at the end of the year using only those students who completed all pretest and posttest instruments.

For *Transition Mathematics*, there were eight matched pairs of seventh-grade classes; an additional five classes participated in the study with advanced sixth-grade students for whom no comparisons were available. Together, these classes were in six schools in six states; some additional classes taught by authors of the materials were not included in the formative study. Graphing calculators were provided on loan to support all third-edition *Transition Mathematics* classes.

For *UCSMP Algebra*, there were nine matched pairs of eighth-grade students, four matched pairs of mostly ninth-grade students, and two classes with seventh- or eighth-grade students for whom no match existed. The *UCSMP Algebra* classes were in six schools in five states. Once again, some authors taught the materials to obtain feedback but their classes were not part of the study. Graphing calculators with computer algebra systems (CAS) were provided on loan to support all third-edition *UCSMP Algebra* classes.

All participating teachers agreed to administer pretests, posttests, and other evaluation forms to students, and the third-edition teachers completed in-depth evaluation forms as they finished each chapter. In these evaluations, the teachers rated each lesson, commented on the narrative of the text and the way mathematical concepts were approached and explained, and answered specific, detailed questions about the

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technology used. They also told UCSMP how much of each chapter they were able to teach, allowing the evaluation team to gauge how much mathematics students had the opportunity to learn. Teachers using the field-trial texts came together at the UCSMP offices twice during the year to discuss their experiences with the books, and UCSMP staff visited all participating classrooms (UCSMP and comparison), observing the materials in action, and interviewing teachers one-on-one.

Results from the field studies of the new materials are promising for UCSMP users.

When UCSMP authors and staff revised the books in the summer of 2006, the chapter evaluation forms guided their work. They looked carefully at the reviews of each lesson and comments from the teachers, as well as student performance. As the authors strengthened the texts prior to commercial publication, they felt confident about the work they had already done, knowing that the field-trial versions had helped students to achieve more mathematically.

Transition Mathematics *(Third Edition) Field Study Results*

In the *Transition Mathematics* study, both the UCSMP and comparison groups made significant gains on arithmetic and algebra content. The UCSMP students made significant gains on measurement content. Field-study teachers reported that the materials provided good problem-solving experiences for their students as they prepared for state-mandated testing, while also covering topics beyond the scope of most standardized tests.

One teacher found *Transition Mathematics* to require stronger graphing skills from the start than the previous edition, commenting, "We're challenging our students to become better at math." Another teacher reported that *Transition Mathematics* is perfect for sixth-grade honors students, as it "offers a challenge, and also treats the basic skills that they need for the sixth grade." A seventh-grade teacher said, "After my kids finished their [state] testing last week, they said they felt well prepared. That's what I want to hear. They were prepared because they learned everything they needed to, and we took them way beyond the basics."

The third-edition study confirmed the results of studies of previous editions. Overall, *Transition Mathematics* students are ready for further study of algebra and geometry. They meet traditional expectations in arithmetic as successfully as their non-UCSMP peers on standardized measures even though they are more likely to use calculators regularly and study a broader curriculum.

UCSMP Algebra *(Third Edition) Field Study Results*

The *UCSMP Algebra* study showed that, although there were no significant overall differences in achievement, the UCSMP students performed better than their non-UCSMP peers on applications of algebra. On their chapter evaluation forms, UCSMP teachers remarked on the benefits of activities and the use of CAS. Several found that the third edition of *UCSMP Algebra* moves more quickly than the second, and believed this to be beneficial.

One *UCSMP Algebra* teacher found that students were not afraid of "big ugly numbers," and were feeling "very confident." Teachers had positive comments about the technology used in the new version of *UCSMP Algebra*. One noted, "The students really liked the CAS features. I believe they felt very successful." Another said, "The students really seemed to like solving [equations] with the CAS. It was good for them to be able to see if their strategy resulted in a simpler equation. I believe using the CAS first made them better equation-solvers when they started solving them on their own."

Studies of all editions of *UCSMP Algebra* show that students using these materials meet traditional expectations for computational facility with traditional algebra content as successfully as their non-UCSMP peers on standardized measures even though UCSMP students are more likely to use calculators regularly, and often use more powerful calculators. These results hold when *UCSMP Algebra* is used in eighth-grade classes and in high-school classes.

For those who wish to learn more, summary reports of the *Transition Mathematics* and *UCSMP Algebra* field studies are expected to be available from the UCSMP general office by the end of 2007. The reports will include detailed responses from classroom teachers, as well as analyses of student performance on a variety of measures, and the instruments used in the studies, such as pre- and posttests.

The revised *Everyday Mathematics* and UCSMP Secondary Curriculum materials align well, and build on the successes and richness of the earlier editions to help students learn more mathematics.

More information about third-edition UCSMP Pre-K through Grade 12 materials, including Transition Mathematics *and* UCSMP Algebra *overviews and sample chapters, can be found on Wright Group/McGraw-Hill's web site at* **www.wrightgroup.com**.

RECOGNITION AND RESOURCES

BP Foundation Honored for Support of UCSMP, continued from page 1

was unprecedented, and crucial to the Project's existence and success. UCSMP is pleased that the BP Foundation's generosity and desire to strengthen mathematics literacy for the 21st century has been recognized.

Critical Impact Awards were presented to five organizations at a gala evening during the Council on Foundation's annual meeting in Seattle. BP Foundation president Patricia Wright accepted the award in Benaroya Hall, home of the Seattle Symphony. UCSMP director Zalman Usiskin joined her on stage at the ceremony. Also in attendance were the Foundation's executive director Brian Dinges and board member Irene Brown.

In her acceptance speech, Wright said, "What began as a conversation between a university professor and an energy company research scientist grew into a marvelous collaboration which today touches millions of students in all 50 states…. We asked experts for their assessments and one said [UCSMP] resulted in 'a sea change in the mathematics curriculum materials available in schools in the United States.'" Noting that UCSMP is sustainable, with textbook royalties supporting the Project, Wright saluted the University of Chicago as "a partner in excellence."

In his remarks, Usiskin thanked the BP Foundation for its support and also expressed gratitude to the other private foundations that have supported UCSMP: the Carnegie Corporation of New York, the Stuart Foundation, the General Electric Foundation, the GTE Foundation (now the Verizon Foundation), the Exxon Education Foundation, Citibank, and the Ford Motor Company. Commenting on the impact foundations have had on the educational landscape, Usiskin said, "Private foundations enabled our work to have enough success and impact to convince the federal government that schools were ready for significant changes in mathematics curriculum. As a result, the National Science Foundation re-entered the curriculum development arena. Thus, the students, teachers, and schools who have used our materials are not the only ones who have benefited from the original grants. Many science and mathematics students and teachers have used materials from government-funded projects, as a result of the earlier generosity of private foundations."

Thanks to our funders!

UCSMP is grateful to all of its funders. The private foundations are mentioned in this article. We would also like to recognize the National Science Foundation and the Illinois Board of Higher Education.

New On the UCSMP Web Site:

Applying Arithmetic: A Handbook of Applications of Arithmetic

From 1979-1982, before UCSMP officially began, Max Bell and Zalman Usiskin co-directed a National Science Foundation-funded enterprise, the Arithmetic and Its Applications Project. The major product of this grant was a three-volume work, *Applying Arithmetic: A Handbook of Applications of Arithmetic*. The first volume is about numbers, the second volume is about operations, and the third volume is about maneuvers (rewriting, estimating, transforming, and displaying). Written for teachers, researchers, and lay people interested in mathematics education, the volumes sort and categorize the common types of applications of arithmetic, providing commentary about the various uses and a wealth of examples that may be used in the classroom. Readers will see many ideas that later were incorporated into UCSMP materials at both the elementary and secondary levels. This is truly a unique resource.

Those interested can now find all three volumes on the UCSMP web site, at **http://socialsciences.uchicago.edu/ucsmp/applying.html.**

EDITORIAL

Would National Curriculum Standards with Teeth Benefit U.S. Students and Teachers?

This editorial is adapted from remarks made by UCSMP Director Zalman Usiskin on a panel at the National Council of Teachers of Mathematics Annual Meeting in Atlanta, GA, on March 23, 2007 discussing the topic: "Would U.S. Students and Teachers Benefit from Consensus on National Curriculum Standards for Mathematics?"

The question this panel has been asked to consider is strange. I thought we had consensus national standards in 1989, when the National Council of Teachers of Mathematics (NCTM) came out with its *Curriculum and Evaluation Standards*. The entire mathematical sciences community endorsed them, including the Mathematical Association of America and the American Mathematical Society. What happened? In 1996, a small group of mathematicians, worried about the fact that the 1989 *Standards* did not convey their view of mathematics, rallied other mathematicians to rail against them. And so we thought we had consensus but we didn't.

The fact is that if we have any standards with any backbone in them, there will be those who do not agree, and we will not have consensus.

Currently, we have three documents that are viewed as attempts at national standards: NCTM's *Curriculum Focal Points* (2006) for Grades K-8, ostensibly based on NCTM's *Principles and Standards for School Mathematics* (2000) but in reality quite different; the College Board's *Standards for Success* (2006); and the American Statistical Association's (ASA) *Guidelines for Assessment and Instruction in Statistics Education, PreK-12* (2005). There is also a draft document floating around from Project Achieve titled *Secondary Mathematics Expectations*, based on an earlier document, *Mathematics Benchmarks for College and Workplace Readiness* (2004).

These documents are so different from each other in basic beliefs that no document could possibly be a consensus. There is no mention of technology at all in *Curriculum Focal Points*, the College Board recommendations embrace technology, the ASA assumes technology in the doing of statistics, and calculator technology is viewed negatively by Project Achieve.

So the question before this panel is not just about national curriculum standards, because we already have them. The question is whether we want one set of national standards with teeth in them, that is, standards that are agreed to by the states with assessments attached, what is called the alignment of curriculum and testing. Because a national curriculum would likely be considered unconstitutional, those who want such a curriculum hide behind the smokescreen of a voluntary set of standards that a state must follow if it wants federal funds. This is not really voluntary, as we have seen from No Child Left Behind.

Indeed, I find it hard to believe that, given recent and past history, anyone could possibly be in favor of national standards with teeth. Allow me to lay out the argument.

As I see it, five basic arguments are given for having one set of national standards with teeth. I believe not only that each of these links between problem and solution is more than subject to question, but in fact is likely to lead to the opposite conclusion.

Argument 1: *Our performance internationally is weak. This endangers our national economy. The highest-performing countries in the world have national curricula and national tests. It follows that having national standards would be more likely to increase national performance and help our economy.*

Rebuttal: There are two steps to this counterargument, the connection between national curricula and international performance, and the connection between international performance and the economy.

Step 1: Most of the countries of the world have national curricula. It is the case that some of the *lowest-performing* countries of the world have national curricula. The link between having a national curriculum and the performance of a country is tenuous at best.

The situations in many of our *states* are very much like those with national curricula. We have had state curricula for decades. No state has tried to have stronger central curricula and textbooks following those curricula than California, and the performance there tells us that there is little connection between strong state

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authority and student performance. In fact, the data would suggest just the opposite, since despite all of these decades, performance in California remains near the bottom of the nation. At the eighth-grade level, even in the past 15 years as California has flexed its muscle more, its NAEP scores have not kept up with the rest of the states in the Union. More generally, a study by Amrein and Berliner showed that states that have had high-stakes tests have not generally outperformed other states.[1]

Step 2: We were the lowest-performing country at the 17-year-old level on the first international study of mathematics in 1963-64, and second-lowest at the 13-year-old level. In 1980-81, we were among the lower-performing countries at both ages. Our economy did not suffer as a result, either in the short term or the long term. In fact, our performance in the 2003 TIMMS was better than we have done at any other time. But it seems to make no difference.

Argument 2: *Our state standards show great variety in the expectations and in the grade levels of common expectations. This creates large textbooks and unnecessary redundancies and inefficiencies.*

Rebuttal: The fact that our state standards show variety is evidence that wise people do not agree on what should be in the curriculum, or when it should be taught. Among other things, the research we have does not support the definitive placement of topics by one grade rather than another. This is a major point I would make: If there were agreement by state and national leaders on what we should teach, then it might be reasonable to codify that agreement in national standards. But there is not agreement, and any set of national standards will disenfranchise those who disagree. In fact, no subject matter is as prescribed in school curricula as mathematics. Yes, states may differ in the grades at which they think fractions should be taught, but they do not differ *that* fractions should be taught. Contrast this with literature or U.S. history or science. In this context, the differences are minor. Our arithmetic curriculum in the U.S. is remarkably uniform in this era of calculators. In fact, when there is even one change suggested in the arithmetic curriculum, such as teaching a different algorithm for long division, there are people who get up in arms. One mathematician criticized *UCSMP Algebra* because it used the acronym FOIL in the teaching of the multiplication of binomials. We are already far too anal-retentive.

For example, an algebra teacher any place in the country can expect what arithmetic the students have had. But that teacher cannot make assumptions about what geometry the students have had. In fact, it is in geometry and statistics that we have more inconsistencies and need more guidance than other areas, but the people who are most concerned about student performance are least concerned about these areas.

As for the concerns about "large textbooks" – such texts may actually help teachers to adapt a book to the diverse students in our classes. They help, rather than harm, students.

Argument 3: *The opportunities for students in our country are unequal. National standards would ensure that our students would be on the same playing field.*

Rebuttal: Some people push the equity argument as *the* argument for national standards. Experience shows that this argument, too, is faulty. Children come into first grade in our country in some communities two years ahead of children in other communities. The differences are generally not due to schooling but to the richness of the preschool environment. Are we to teach all these children in the same way? Around seventh grade the difference in the willingness of children to do homework becomes a major factor in their performance. Are we going to ignore that?

In Chicago a number of years ago it was decided that all students had to receive credit in algebra in order to graduate high school. This gave the teachers two choices: teach a standard algebra course and fail three-quarters of the class or teach a course at the level of the students – but that would not be algebra. Any national standards that did things by grade level would result in large numbers of failures and would ultimately be established as the More Children Left Behind era.

It is sometimes wrongly stated that many high-performing countries do not track their students. This is an ignorant statement. Singapore starts slowing down students in grade 4. In Singapore, Japan, and China, students are tracked into schools beginning, usually, at grade 7. The algebra course taught in one school in these countries can be as different from the algebra course taught in another as are honors and regular algebra courses in the United States. Furthermore, getting into these schools is one's ticket to getting into the better colleges and universities. These countries track more stringently than we do, and that is why the national tests at the end of grade 6 that determine a student's track are the source of so much study and so much pressure.

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Argument 4: *We are in a time of change, but change takes a long time to occur, and our schools are often very late in adopting the latest developments. With national standards, we could change the curriculum more quickly than without such standards.*

Rebuttal: We are without question in a time of change. In such a time, having a national curriculum is a force against change, because, judging from what we see internationally, national curricula slow down rather than promote change. There is almost no curriculum development in Japan, Singapore, China, Korea, and other countries we have often looked to as high performers. The development comes from countries that do not have strong central curricula. As we look to the high-performing countries, they look to the United States for new ideas. Here in America we have a tradition of local control of education, which among other things fosters innovation and improvement in curriculum and pedagogy. There is also much curriculum development in England, Australia, and in the Netherlands, where there are no strong central curricula.

Those of us in curriculum development in the U.S. always have more difficulty getting a school to try out new materials when the state in which it is located has strong state assessments tied to their curriculum than in states with more lax control. Teachers are naturally very reluctant to do anything that is not in their state curriculum and on the state tests. Personally, I *would* not have had a 40-year career in mathematics curriculum development had we had a national curriculum, because I *could* not have had such a career.

Argument 5: *Our local and state curricula are often very weak. With the best people forming national standards, we would be better assured of having a good curriculum.*

Rebuttal: On the surface, this seems to be a reasonable argument. However, our educational system has become politicized. Both President Reagan and our current president came into office with the agenda of getting rid of the Department of Education. Instead, President Bush dismantled the Eisenhower National Clearinghouses that collected research over many decades, and the Department of Education has filled its mathematics advisory committees with people who are not experts in school mathematics but have been loudly vocal against any modernization of our subject.

By spreading the control of the curriculum over the states and into local districts, we may have disasters in some places, but we avoid a national disaster. We are able to adapt to the extraordinary differences in students that come into these districts, as well as the major differences in state and local economies. We are able to take advantage of the strength and imagination of our nation's teachers, a core of individuals who are getting battered rather than assisted by the federal government's intervention in our schools.

In the opening session of the 2007 NCTM Annual Meeting, author and foreign-affairs columnist Thomas Friedman spoke of the strength of the horizontal nature of communication among individuals today, rather than the vertical, top-down nature of communication in the past. He compared the *Encyclopedia Britannica* to wikipedia.com to point out the power that individuals now have to help each other in this information age. Everyone knows that one gets the best performance from students when they are actively engaged in their own learning. Similarly, we know we get the best performance from teachers when they have a voice in what they teach. National standards with teeth have a tacit assumption: our teachers cannot be trusted to make decisions about the curriculum that is best for their schools. That is a recipe for disaster, a recipe for pushing the best people out of our profession, a recipe that in the long run will only result in a devastated teaching force and, as a consequence, poorer performance from our students.

Endnote

[1] Amrein, A.L. & Berliner, D.C. (2002, March 28). High-stakes testing, uncertainty, and student learning *Education Policy Analysis Archives*, 10(18). Retrieved February 12, 2005 from http://epaa.asu.edu/epaa/v10n18/.

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STAFF PROFILE

Denisse Thompson:
A Long History With UCSMP

Growing up, Denisse Thompson, the director of evaluation for the UCSMP Secondary Component, traveled widely. Although Florida has always been home to Denisse, she also lived in Mississippi, Texas, both Carolinas, Germany, and Okinawa (Japan). Wherever she went, she brought her childhood fascination with education, often playing teacher to an imaginary classroom.

As an undergraduate at the University of South Florida (USF), Denisse trained in earnest to become a teacher, with an ambitious triple major: a Bachelor of Science in physics, a Bachelor of Arts in mathematics, and a Bachelor of Arts in mathematics education. She then taught high school for over five years, simultaneously earning a Master of Arts in mathematics education at USF. After teaching high school, Denisse taught at a community college in Florida for five years.

Denisse R. Thompson

In 1985, Denisse saw a notice that UCSMP, then a young project, was seeking authors to write the first edition of its secondary mathematics curriculum. She had already started writing mathematics material on her own, creating a text for a basic skills class she taught to help students at risk of failing Florida's minimum competency test. Denisse remembers applying to UCSMP because, "It was an interesting opportunity, and I thought I would just try." She was fortunate to make the *UCSMP Advanced Algebra* team and views her early work with UCSMP as one of the best professional opportunities she has had.

Temporarily relocating to the northern part of the country for the first time, Denisse spent the next two summers working on *UCSMP Advanced Algebra*. After this experience, she decided to pursue her Ph.D. at the University of Chicago, with UCSMP director Zalman Usiskin serving as her advisor. While working on her doctorate, she was an editor for *Precalculus and Discrete Mathematics*. For her dissertation, she created and carried out her first field study, *An Evaluation of a New Course in Precalculus and Discrete Mathematics*.

After receiving her Ph.D., Denisse returned to USF, where she is currently a professor of mathematics education teaching undergraduate and graduate courses for prospective and practicing mathematics teachers. She continues to write constantly, publishing in a variety of journals, and co-editing a book, *Standards-based School Mathematics Curricula: What are They? What Do Students Learn?*, with her UCSMP colleague and friend, Sharon Senk. While teaching mathematics courses for elementary teachers in the mid-1990s, Denisse developed an interest in children's literature. She discovered that books are a good way to motivate elementary and middle school students to learn mathematics and sustain their engagement, and has since collected an impressive library of children's literature.

Through all of this, she stayed close to UCSMP, returning to work as an author again on the second edition of *UCSMP Advanced Algebra*, and helping to write the evaluation reports for the second edition.

As UCSMP prepared to write the third editions of the secondary curriculum, Denisse was asked to come back and design and conduct the field studies of the third edition. These important studies help UCSMP authors and staff make sure they are creating materials that will help students succeed. Always ready to try something new, Denisse took a leave from her teaching duties to begin work as the Secondary Component's director of evaluation for the third edition.

In this position, Denisse is once more traveling the country. She visits teachers using the new UCSMP materials, as well as their peers in matched comparison classes, who may teach from previous editions of the UCSMP texts, or from entirely different materials. She observes teachers in their classrooms and talks to them about their own experiences, as well as their students' successes and challenges. She also creates, receives, and analyzes the forms that teachers using new UCSMP materials complete after finishing each chapter, as well as some special tests that all students take, demonstrating their progress and achievement levels. Denisse then brings all that she has learned back to UCSMP, so that the field-study materials can undergo further revisions before they become widely available.

Denisse's history with UCSMP helps her to answer teachers' questions, but her ability to relate to others all over the United

CEMSE

States and to conduct interviews may be partially a result of the many experiences she has had throughout her life. Denisse enjoys working with UCSMP, explaining, "It has opened a lot of interesting doors. It has also been the best influence on what I write today."

While Denisse hops from state to state for UCSMP and spends countless hours analyzing the resulting data, she continues to advise doctoral students at USF, and to stay in touch with her colleagues there. She is also working with others on several book projects in the areas of methods of teaching high school mathematics, mathematics literacy for the middle grades, and children's literature in middle grades mathematics.

So how does Denisse relax? She laughs, "I don't think that word is in my vocabulary!" But she has carved out some time for personal travel, often with her family. She is planning a trip to Greece with her oldest nephew and periodically spends time at a second home in the mountains of North Carolina, where she works and relaxes. And, as much as she enjoys her work at UCSMP, she looks forward to returning to the sunny Florida climate when her USF leave ends. As Denisse says, "I like to travel, and I like to come home."

Writers Sought: A new project seeks writers of mathematics problems and applications at all student levels, elementary through high school. Excellent writing ability and subject matter background required; teaching experience desirable. If interested, please contact **CEMSE-mail@listhost.uchicago.edu**.

Restructuring Schools Project:
CEMSE's Hands-On Approach to Improved Elementary and Middle School Mathematics Education

The University of Chicago's Center for Elementary Mathematics and Science Education (CEMSE) and the Chicago Public Schools are collaborating on a new project to improve mathematics achievement in 10 elementary schools that are undergoing "restructuring" mandated by No Child Left Behind. Work in mathematics in the restructuring schools is focused on UCSMP's *Everyday Mathematics* in grades K-5 and Situational Mathematics, a new course for middle school mathematics teachers, in grades 6-8. The project has four components: 1) *Everyday Mathematics* professional development for K-5 teachers, specialists, and principals, offered through the Chicago Math & Science Initiative; 2) in-school support for mathematics specialists and K-5 teachers; 3) data-based technical assistance; and 4) Situational Mathematics, a course for teachers given by Paul Sally, Professor of Mathematics at the University of Chicago and former Director of UCSMP.

A Foundation of Professional Development

Mathematics specialists, principals, and K-5 teachers from the restructuring schools attend *Everyday Mathematics* professional development workshops offered though the Chicago Math & Science Initiative (CMSI), an intensive effort by the Chicago Public Schools to improve mathematics and science instruction and achievement at all levels. Since the 2003-04 school year, CEMSE has partnered with CMSI to provide *Everyday Mathematics* professional development for staff in over 200 schools throughout the Chicago Public Schools. Participants are offered up to 64 hours of professional development workshops, including previews of the mathematics content in upcoming units, opportunities for sharing teaching strategies for these units, reflection on past units, and discussions of topics such as pacing, assessment, differentiation, preparation for standardized testing, and managing manipulatives. These workshops provide a foundation for additional, more intensive work at each of the 10 restructuring schools. (See Volume 31, Spring 2003; Volume 33, Winter 2005; and Volume 34, Winter 2005-06 of this newsletter for further information about CMSI.)

Nurturing Mathematics Leadership

A team of *Everyday Mathematics* implementation specialists at CEMSE regularly visits each of the restructured schools to provide support to that school's mathematics specialists. This support aims to help the school-level specialists promote improved mathematics instruction in their schools. CEMSE's implementation specialists visit classrooms with the school-level specialists, attend grade-level and other teacher meetings, and provide school-based professional development. They prepare the specialists to deliver after-school professional development designed to meet the particular needs of the teachers in their schools and help the specialists develop strategies for supporting teachers. The long-term goal of this intensive coaching is to develop sustainable mathematics leadership at each of the participating schools.

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CEMSE

CEMSE, continued from previous page

Data-Driven Efforts

The data-based technical assistance (DBTA) component of the restructuring project supports the schools' leadership teams (principals, school-level mathematics specialists, and Chicago Public Schools Area mathematics coaches) by providing timely feedback on the status of mathematics instruction in the schools. DBTA researchers visit each school regularly. They observe classroom instruction using an open-ended protocol that targets four areas: 1) content, 2) pedagogy, 3) assessment, and 4) classroom management and lesson pacing. When possible, they interview teachers and school leaders. After each set of eight to ten observations, and in collaboration with CEMSE's implementation specialists, a school profile is written that includes data from the observations and interviews, data on student achievement (including standardized test results), and data on teachers' participation in CMSI professional development. The principal, the CEMSE implementation specialist assigned to the school, the DBTA researcher, and the in-school mathematics specialist discuss the profile and use it to inform decisions about program changes and mid-course corrections. Following that meeting, the profiles are revised and combined into reports to the Chicago Public Schools Area Offices responsible for the restructuring schools.

New Strategies for Teachers

Situational Mathematics is a new course for middle-school mathematics teachers developed by Professor Sally as part of the SESAME Program, a set of courses offered to Chicago Public School teachers through the University's mathematics department that leads to State of Illinois endorsements in teaching middle-school mathematics and science. Situational Mathematics is designed to help teachers at the restructuring schools develop strategies to answer nonstandard or perplexing questions asked by students in their mathematics classes. Situational Mathematics includes three approaches to mathematical questions arising in the classroom. The first is a presentation by teachers of students' questions and a discussion among participants about the meaning and background of the questions. The second is a discussion of inquiries by teachers about the mathematics in their textbooks and other sources used in their current teaching. The third is an inquiry-based learning experience in which Professor Sally presents a variety of ideas and suggestions about the mathematical foundations of the topics being discussed. This last part aims to develop the mathematical roots that are necessary to lead students to a proper understanding of the subject.

An ambitious project such as this restructuring work must overcome significant hurdles. Some teachers in the restructuring schools are relatively unfamiliar with the more challenging content and pedagogy in *Everyday Mathematics*; an intensive focus on reading instruction in the restructuring schools sometimes crowds out mathematics and other subjects; scheduling local after-school professional development can be difficult; some teachers are reluctant (or refuse) to use the school's adopted curriculum; and school leaders can be overwhelmed as they attempt to deal with the myriad challenges these schools face. Everyone involved with the project, however, recognizes the difficulty of the task and is committed to persevering.

The project has engendered increased involvement, collaboration, and creativity from school leaders at all levels. For example, during a recent profile review meeting at one school, a DBTA researcher mentioned that he would like to see more student discussion during mathematics classes, revolving around mathematical concepts rather than whether students' responses were right or wrong, or the proper procedures were used for doing a problem. The researcher explained that the use of smaller groups suggested by *Everyday Mathematics* could create more opportunities for discussion.

Actively listening, the school principal realized that they had found a place where the objectives for mathematics and literacy intersect, as both seek more high-level student communication. He suggested it would be appropriate for students in mathematics classes to "pair and share," just like students in reading, and offered to pass that observation on to teachers. In the next round of DBTA observations, the researcher noticed an increase in the number of classrooms using small groups as a pedagogical strategy during mathematics class.

This is just one instance of the effect of the project. Successful implementation of this model for improving mathematics instruction in restructuring schools has the potential for immense benefits.

***Everyday Mathematics* and *Science Companion* Consulting Services Available:** The Center for Elementary Mathematics and Science Education (CEMSE) at the University of Chicago provides a range of consulting services to schools and districts using *Everyday Mathematics*, UCSMP's Pre-K to sixth grade program, and *Science Companion*, a comprehensive inquiry science program for grades K-5 developed by the Chicago Science Group. Services available include leadership training, research and evaluation, and teacher development. For more information, e-mail **CEMSE-mail@listhost.uchicago.edu**.

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