

UCSMP Newsletter

No. 21, Spring 1996-97

Achieving Excellence High Expectations, High Performance

Most readers of this newsletter know of the well-publicized results from the Third International Mathematics and Science Study (TIMSS), released in November 1996. Eighth graders in the United States scored an average of 500 on the mathematics test, compared with an international average of 513, a result the authors of the report called "disappointing." The United States' mean score was significantly lower than that of several of our major economic competitors—Japan, France, and Canada—and significantly higher than none. But . . .*

In January, news was released that was so encouraging President Clinton came to the site to announce it. Eighth-grade students in a consortium of school districts mainly in the north and north-west suburbs of Chicago scored an average of 587, far better than American students as a whole. The 8th graders were significantly outperformed only by students in Singapore (see the chart on p. 6). This collection of districts, representing 32 elementary schools, 17 middle schools, and 6 high schools, calling itself the "First in the World Consortium," was formed so that it could obtain permission from the TIMSS researchers to administer the tests exactly as if the Consortium were one of the TIMSS countries. The report of this consortium is entitled *Achieving Excellence: A Report of Initial*

*The report, *Pursuing Excellence*, is available on the Internet at <http://www.ed.gov/NCES/timss/>.

Findings of Eighth Grade Performance From the Third International Mathematics and Science Study.

The report writers, who are from the Consortium, identified four variables they felt were responsible for the high performance of these schools: local control over their own curriculum standards; a high percentage of 8th graders enrolled in either algebra or geometry; strong emphasis on professional development; and students' activities after school.

Local control was considered critical. Each Consortium district has a curriculum core revision process to improve the core academic subject areas. Consortium teachers have a great deal of say over the selection of their textbooks, and their curricula are generally anchored to the NCTM standards.

Regarding professional development, the

report specifically mentions UCSMP: "Within each Consortium district, emphasis is placed on training staff in both curricular and instructional practices. One example is the University of Chicago School Mathematics Program [sic], which is used in many of the Consortium districts. The unique nature of this program demands extensive staff training and it is based on the NCTM standards."

More generally, we think that UCSMP has influenced even those districts that do not use our materials—by helping schools realize that with a strong program more students can be successful in algebra and geometry before high school. Approximately 50 percent of the Consortium's 8th graders are enrolled in either algebra or geometry, perhaps four times the number that might have been enrolled in these courses fifteen years ago in the same schools. The report says, "We believe [this enrollment] accounts for our performance in the international assessment."

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Algebra in One Year or Two?

A teacher recently wrote us a letter, which we have edited to fit here:

“We are considering adopting UCSMP’s Algebra and Geometry textbooks at our high school. Currently, we use Transition Mathematics in the 7th grade and Algebra in the 8th. We plan to have some students complete Algebra in two years (8th and 9th grades) and have others (those who are capable) complete Algebra in one year (8th) and then take Geometry (9th). Here are some questions we need answered: For the two-year course, do we teach Chapters 1–8 in 8th grade and 9–14 in 9th, or do we teach as much as we can the first year and review/reteach the next? How do we get to factoring? What chapters can we skip?”

We forwarded the letter to the lead author of Algebra. His response was written at the end of the first semester this year.

Response from
John McConnell

Instructional Supervisor of Mathematics, Glenbrook South High School, Glenview, Illinois

I teach at a 9–12 high school that has three feeder elementary school districts. When we in the high school adopted the pilot versions of *Transition Mathematics* and *Algebra* 12 years ago, we used them to replace a two-year algebra course. We felt that dragging algebra out over two years made the course boring and forced many students to take less mathematics.

A large number of students now take algebra in grade 7 or 8 in our feeder districts. The largest of these districts uses *Transition Mathematics* in grade 6 for all students, with honors level doing the book in one year and all others in one-and-a-half years. (About one class in four is an honors class.) The grade 6 teachers are finding this pace difficult, but as of last fall, the grade 7 teachers liked the one-and-a-half-year pace. The class of 2001 is the first to have adopted this two-tier system, so until I meet with the grade 8 teachers to complete the placement of incoming students, I won’t know how it has played out. Because the middle schools are working with very

heterogeneous classes, I do feel that the expansion of two courses to cover three years has benefits.

At the high school, we teach UCSMP’s *Algebra* (2nd edition) in a single year to those students who have not previously had algebra. I have some hints for pacing the *Algebra* course, but to judge my choices, you should know the makeup of my classes. I teach two classes, each with 34 freshmen. The classes are heterogeneous: Since about 20 percent of the students come from outside our township, I have students who haven’t been exposed to the UCSMP curriculum, students who have had *Transition Mathematics* in grade 8 (generally in a level called Basic), and students who are repeating algebra, whether UCSMP’s course or some other. Attendance is good, but homework completion isn’t. A few of the students are recent immigrants, but students with moderate language difficulties are placed in an ESL algebra section that uses UCSMP.

To pace the *Algebra* course in one year:

- I have two days of review and a testing day at the end of each chapter.
- I try to do a lesson a day.
- I provide a “slack day” in the middle of each chapter to play catchup with ideas and to quiz.
- I do about half of the textbook’s activities—they don’t take a full period.
- I try to cover most of the lessons through Lesson 12-5.
- I am being trained in cooperative learning, so I frequently use “Applying the Mathematics” questions as in-class group investigations rather than homework assignments.

Our school calendar includes many days with assemblies and inservices that shorten my usual 40-minute class period to 25 minutes. We have also been interrupted by various events and snow days. As a result, I have had to rearrange topics and ideas frequently. For example, I did Lessons 2-9 and 2-10 on two of the shortened-schedule days by using them as

in-class work and exploration.

Since we do spreadsheets as the technology in the first semester (four laboratory days), I skipped Lesson 4-4. Students did a ClarisWorks laboratory instead. A substitute teacher covered the most familiar lessons (4-5 and 4-9) while I was away at a conference. I then finished the chapter with Lessons 4-6 through 4-8.

To test Chapter 5 before the last day of school in December, I made Lesson 5-9 a "day before vacation" activity—no homework. Final exams and weather interrupted Chapter 6. We did Lessons 6-1 to 6-5 and 6-8 before the final exam, 6-6 to 6-8 after. Lesson 6-6 was done as a class activity the first day we returned in January. I gave no test on Chapter 6, but went right into Chapter 7. Chapter 7 is very important, so I offered three slack days: one day for class activities to expand on the idea of a "line of good fit" in Lesson 7-7; one day for the writing assignment, which requires a day of data collection in the classroom (Project 3 in Chapter 7); and one day for individual help on computations and writing.

State testing will force three consecutive days of 25-minute classes when we move to Chapter 8. I will combine Lesson 8-9 with the usual two days of review and a four-calendar-day project from the end of the chapter. In Chapter 9, we will do a physics experiment, have a lab day, and use the "Wide World of Mathematics" CD-ROM for a group activity on the La Quebrada divers. Chapter 10 works pretty well. Lesson 10-7 provides a writing project, so I don't use it as homework. If necessary for time, I will start Chapter 11 before I do a chapter test, skip Lesson 11-8, and go to Chapter 12.

The class will probably not get beyond Lesson 12-5, but I will make sure that students can take a factorable quadratic $p(x)$ and show how the following relate: solutions to $p(x) = 0$ via a quadratic formula; a graph of $y = p(x)$ and intersec-

tions on the x -axis; factoring $p(x)$; and a geometric model of the factoring of $p(x)$. In any case, I will probably give two exams (and related reviews) for three chapters. I don't know whether I can get away with two major tests on Lessons 9-6 to 12-5. I may have a quiz to cover the first part of Chapter 12 and then pick up the test questions as part of the department's semester exam.

Almost all of my students will take UCSMP *Geometry* as sophomores. Since most of the students in our regular geometry classes are freshmen, we are committed to reviewing some algebra in detail at the beginning of the year.

UCSMP strongly encourages setting higher standards for students. If you push kids to do more faster, most—granted, not all, but most—will gradually meet your expectations. If you slow the pace of learning, *all* students will fall behind. If you have students who can't do algebra, don't spread the course out over two years. Rather, give them twice as much algebra time each day. If your class periods are shorter than 50 minutes, fight for longer periods for algebra classes. If that is not feasible, lengthen the course to one-and-a-half years.

Pushing for higher achievement now, not later, has a payoff. Because of UCSMP students, my school has had a 20-percent increase in AP calculus enrollment. These students may not get the top score, but they score high enough to earn calculus credit at most colleges. By eliminating two-year courses we have provided classes that both teachers and students enjoy. Although some of my colleagues initially questioned whether UCSMP was "really algebra," they wouldn't trade their assignments today with those 10 years ago. Although some parents and kids complained about reading and pace when we adopted *Transition Mathematics* and *Algebra*, UCSMP is now the norm and isn't questioned the way it was in 1987.

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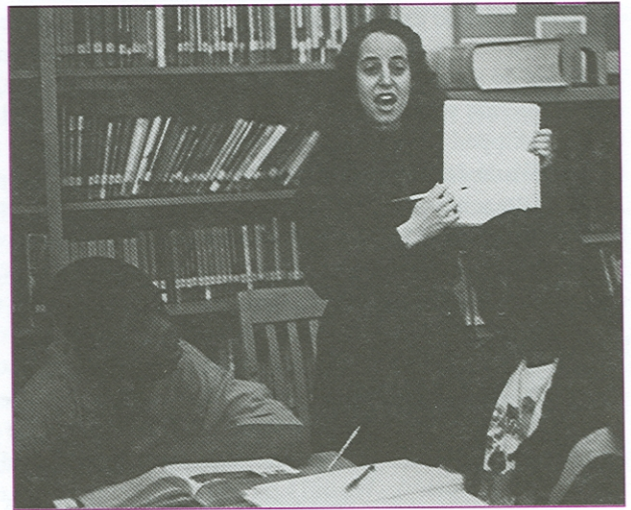
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Suzanne Levin: Making Connections

This is one in a series of profiles of UCSMP staff.



“Put your eyes on me,” says Suzanne, as her charges pile into the overstuffed library at Murray Language Academy, squeeze into their seats, and stash away their pictures of Dennis Rodman.

“Today,” Suzanne declares cheerfully, “you are going to learn about the Pythagorean Theorem, and I promise you, you are going to understand it *all*.”

On her day off from editing at UCSMP, Suzanne puts into practice the project’s credo: We can all do math; we just may not be able to do it at the same time. As a teacher’s aide, she helps the under-performers keep up with their peers.

Teaching these children is a challenge. She starts with definitions, talks of hypotenuses, works through the theorem in small, repetitive steps. This one sulks, that one brushes her hair, some scribble in their notebooks, and another proudly explains how she got her answer. Hands shoot up. And the level of noise rises several decibels.

“Wait, wait,” cries Emily. “Ms. Levin, I’m lost.” And, very patiently, attentively, Suzanne explains once again.

In the classroom, Suzanne is in her element, and it is hard to believe that circumstances might have drawn her elsewhere. On the advice of her father, she first signed up as an engineering major at the University of Maryland. Later, she dabbled in the theater, painting stage sets on weekends for small profes-

sional theater companies like the Silver Spring Stage. But by junior year, she needed to buckle down and choose a realistic major: that meant math education.

Her mentor was Eric Walstein, her math teacher in junior high school in Rockville, Maryland. Walstein introduced an innovative curriculum called Unified Math and selected 40 students to participate. Suzanne was one of them.

“He knew this was an experimental curriculum, so he taught us the standard courses as well,” Suzanne says. “Each year, we got two years of math—Unified Math each year and pre-algebra in 7th grade, algebra in 8th, and geometry in 9th.”

But more than the intensive exposure to math, Walstein’s philosophy, and encouragement, left its imprint. “He was way ahead of his time,” Suzanne explains. “He taught us that math was easy, logical, and beautiful. And he taught us that we could all do math.” The students held homework parties, went to math team meetings, and attended special lectures in the evening. Never the star student, Suzanne still performed well. Walstein kept pushing her. “He wouldn’t let me quit,” she says. “He taught us not to be afraid to ask for help, which was really neat.”

Walstein’s inspiration carried her through college and four years of teaching 7th and

8th grades at the progressive Ellicott Mills Middle School in rural Maryland, where she was the only instructor with math certification.

Suzanne began as an editor at UCSMP in 1992, the day she entered graduate school in the Department of Education at the University of Chicago. She has worked on the second editions of all six books in the secondary school curriculum and was an author of *Advanced Algebra* and the teacher’s edition of *Transition Mathematics*. She has also conducted evaluations, observed at schools piloting UCSMP textbooks, and moderated sessions at inservice conferences.

“I’ve learned a lot at UCSMP,” she says, “particularly about how a curriculum impacts students.”

Ironically, though, while serving on a committee assessing textbooks back at Ellicott, she had at first rejected *Transition Mathematics*. The reason: because the course required too much reading. After working at UCSMP, Suzanne returned to the middle school to tell the teachers their decision had been wrong, and explain why. Ellicott Mills subsequently adopted *Transition Mathematics* for its “gifted and talented” 6th graders.

After four years at the University of

Chicago and UCSMP, Suzanne is now hunting for an academic post. She wants to pursue both research and teacher education. "Teachers who don't keep up get stale," she says. "Technology is constantly changing. And attitudes about who should do math and when are advancing all the time." At the same time, "researchers have to keep one foot in the classroom," she says. "It is too easy to forget what kids can do."

Meanwhile, Suzanne is completing her dissertation. Entitled "Fractions and Division: Textbook Presentations, Researcher Conceptualizations, and Student Performance," it will examine children's misconceptions about the links between fractions and division, and teaching strategies to provide those links. The broader theme is connections in mathematics, the area she plans to focus on in her academic career.

Connections in mathematics, and the subject's inherent structure, are not always apparent to children, she says—and for good reason. "Much of school mathematics emphasizes speed and accuracy in computation, which involves more attention on the 'how' and less attention on the 'why,' thus ignoring many of the connections altogether." Teachers have to emphasize connections, she says—especially between old and new material.

And so, today, after walking her students through the Pythagorean Theorem and showing them squares and square roots, she asks them what other inverse operations they have learned this term.

"Multiplication and division," calls out one. "Addition and subtraction," shouts another. And suddenly, NeShanta sees the light. She jumps up from her seat. "I got it!" she cries, as she gives her friend Emily a high five.

Suzanne beams at her pupil. "I'm so proud of you!"

REMARKS FROM THE DIRECTOR:

Thoughts on the Use of UCSMP Translations

A letter to the editor of the *Los Angeles Times*, a couple of comments on the Internet in user groups, and our knowledge that our translations are being used in a few classrooms prompted this editorial.

Beginning many years ago, we translated mathematics texts from Japan and the former Soviet Union to make them available to interested parties in the United States. We felt they were of tremendous value to scholars and educators, enlightening all of us on what is happening in mathematics education in the rest of the world. These materials show the higher expectations that these countries have for their students. In particular, both countries' materials show that a substantial amount of algebra and geometry is taught to younger students. When planning the UCSMP materials, we kept this expectation, for we felt it would have a substantial effect on student performance. All of our studies have found that these higher expectations can be met, findings confirmed by the report *Achieving Excellence*, described on page 1 of this newsletter.

The *Achieving Excellence* report also confirms something else: schools do not need to go outside this country to obtain materials that will make the performance of U.S. students equal to any in the world. In fact, only about half of the students in the First in the World Consortium had studied algebra, and very few were studying geometry, which means that they performed as well as the average Japanese student despite having studied less mathematics. This would seem to indicate that Consortium students' understanding of mathematics was high enough on those topics they did study that they compensated for lower performance on those topics they had not encountered.

The texts we translated are very well written, yet were written before today's movements to incorporate applications of mathematics into the curriculum, to include probability and statistics, and to integrate algebra and geometry. Because of the date of their writing, they almost completely ignore today's available technology.

It is very important for students to see data and information relating the mathematics they study to other aspects of their lives. When our translations are used in U.S. classrooms, they should be supplemented with technology and appropriate applications.

ZALMAN USISKIN

Achieving Excellence

continued from page 1

The Consortium posed a question that was also asked of U.S. TIMSS students in general, and came away with a very positive answer. "If an international talent search were to select the top 10 percent of all students that participated in the TIMSS, what percentage of Consortium students would be included?" The answer: 26 percent, compared with 5 percent of the students in the United States sample as a whole.

The findings concerning after-school activities are also interesting. Consortium students reported watching less television than students all over the United States, and more time watching television news and documentaries. They also spend much more time reading.

Copies of the Consortium's report and additional information may be obtained from the North Central Regional Educational Laboratory, 1900 Spring Road, Suite 300, Oak Brook, Illinois 60521-1480 (telephone: 800-356-2735). The report is also available on the Internet at <http://www.ncrel.org>.

Nations' Average TIMSS Scores Compared with the Consortium's

<u>Nation</u>	<u>Avg. Score</u>	<u>Nation</u>	<u>Avg. Score</u>
Singapore	643	Thailand	522
Korea	607	Israel	522
Japan	605	Germany	509
Hong Kong	588	New Zealand	508
CONSORTIUM	587	England	506
Flemish Belgium	565	Norway	503
Czech Republic	564	Denmark	502
Slovak Republic	547	United States	500
Switzerland	545	Scotland	498
Netherlands	541	Latvia	493
Slovenia	541	Spain	487
Bulgaria	540	Iceland	487
Austria	539	Greece	484
France	538	Romania	482
Hungary	537	Lithuania	477
Russian Federation	535	Cyprus	474
Australia	530	Portugal	454
Ireland	527	Islamic Republic of Iran	428
Canada	527	Kuwait	392
French Belgium	526	Colombia	385
Sweden	519	South Africa	354

Note: The scores of Korea, Japan, Hong Kong, Flemish Belgium, the Czech Republic, and the Slovak Republic were not significantly different from the Consortium's.

UPCOMING UCSMP CONFERENCES

Elementary Users Conferences

• June 20-21 in Seattle, WA • June 24-25 in St. Louis, MO • July 1-2 in Wheeling, IL • July 11-12 in Boston, MA • July 15-16 in Lansing, MI • July 17-18 in Rye, NY • July 21-22 in Atlanta, GA • July 28-29 in San Antonio, TX • August 1-2 in Chicago, IL • August 8-9 in Minneapolis, MN

All conferences are open to those using UCSMP elementary materials in 1997-98 and include overviews and how-to-teach sessions. For more information, write Everyday Learning Corporation, P.O. Box 812960, Chicago, IL 60681, or call 1 (800) 382-7670.

Secondary Inservice Workshops, University of Chicago, August 4 & 5, 1997

• Day-long workshops devoted to teaching each course • Open to all those using UCSMP secondary texts in the 1997-98 school year • Registration deadline: July 25, 1997

Secondary Conference, University of Chicago, November 15 & 16, 1997

• Practical advice from experienced teachers • Manipulatives workshops • Technical sessions • User sessions • Registration open to all

Further information and registration materials for the secondary conferences will be sent to those on the UCSMP mailing list. To have your name added to this list, write UCSMP at 5835 S. Kimbark Ave., Chicago, IL 60637; call (773) 702-1130; or e-mail ucsmp@cicero.uchicago.edu.

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Editor: Sharon Butler

Directory

At Judd Hall, 5835 S. Kimbark Ave., Chicago, IL 60637

Zalman Usiskin, UCSMP Director/Secondary Co-Director
(773) 702-1560

Max Bell, Elementary Materials Director
(773) 702-1563

Larry Hedges, Evaluation Consultant
(773) 702-1589

Carol Siegel, Assistant to the Director
(773) 702-9770

At Eckhart Hall, 5734 S. University Ave., Chicago, IL 60637

Izaak Wirszup, Resource Development Director
(773) 702-7397

Paul Sally, UCSMP Director 1983-87
(773) 702-7388

At Wells Hall, Michigan State University, East Lansing, MI 48824

Sharon Senk, Secondary Co-Director
(517) 353-4691

At COMAP, Inc., 57 Bedford Street, Suite 210, Lexington, MA 02173

Sheila Sconiers, Elementary Teacher Development Director
(617) 862-7878

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