

UCSMP Newsletter

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UCSMP six-year secondary series completed

WITH THE PUBLICATION OF *Functions, Statistics, and Trigonometry* and *Precalculus and Discrete Mathematics*, Scott, Foresman editions of the entire UCSMP secondary curriculum will be ready for the 1991-92 school year.

First to carefully sequence both pure and applied mathematics and to fully implement the NCTM *Standards*, the UCSMP series is to our knowledge also the first commercially published 7-12 curriculum for average students in any subject area.

Student editions of *FST* and *PDM* are expected to be ready in June, with teacher's editions and ancillaries to follow in August. According to Natalie Jakucyn of Scott Foresman, the company will now be able to fill purchase orders they have had for months. On the strength of their experience with other UCSMP texts, some districts placed orders sight unseen for their counterparts at the advanced mathematics level.

Project to publish Soviet translations and more

WITH ITS PUBLICATIONS PROGRAM NOW IN FULL SWING, UCSMP's resource component expects to publish its translations of twelve Soviet textbooks, seven Japanese texts, and four Hungarian primary school workbooks.

Recently negotiated copyright permissions will make possible the publication of the Soviet Union's standard texts for grades 1-5, student workbooks for grades 1-3, and geometry sequence for grades 6-8 designed by the world-renowned mathematician A.N. Kolmogorov. The first grade teacher's manual, representative of the Soviets' meticulous attention to support literature, will be published by NCTM.

The component has also recently received copyright permissions for four innovative Hungarian workbooks. Editorial work on the Japanese textbooks (grades 7-11), for which permissions were received last spring, is nearing completion. These will be available soon.

UCSMP researchers, who have been using the component's unpublished translations for many years, believe these

The books they receive will have been well worth the wait. As Jakucyn points out, *FST* and *PDM* are breaking ground as the first *advanced* mathematics textbooks to be given a four-color treatment, wraparound teacher's notes, *continued on page 2*

NSF funds teacher development

A NSF GRANT announced in March will provide \$702,625 for 1991-94 to the UCSMP Elementary Teacher Development Component. The funds will support a joint UCSMP initiative with the Consortium for Mathematics and Its Applications (COMAP). In an effort to promote mathematics specialists in grades 4-6, materials for both staff developers and specialist teachers will be piloted in 13 school districts across the country which have implemented math specialist programs with the help of UCSMP. These materials will include a series of teacher training seminars for staff developers as well as problem sets for teachers and students.

materials will be of great interest and value to U.S. mathematics educators.

IN A RELATED DEVELOPMENT, the NSF Survey of Applied Soviet Research in School Mathematics Education is working with the UCSMP Resource Component to publish additional titles in the new series of research monographs, *Soviet Studies in Mathematics Education*. The first six of these are being published by NCTM, and the resource component expects UCSMP to publish ten more in the series.

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SECONDARY CURRICULUM

Four years of UCSMP: study results

DURING THE 1989-90 SCHOOL YEAR a total of 141 students in public schools at three mid-western sites participated in the first longitudinal study of students in their fourth consecutive year (*Advanced Algebra*) of the UCSMP curriculum.

Site A consisted of a single college-preparatory magnet school (grades 7-12) in a large urban district where the school population is approximately one-third minority. Sites B and C both included feeder schools and a high school in affluent suburban areas with a largely white population.

At each of these sites, students were matched individually on the basis of scores on standardized mathematics and reading achievement tests given by the districts in the 6th grade, that is, before any of them had studied from UCSMP materials.

At Sites B and C, two comparison groups were created: The age cohort comparison group consisted of 10th graders and included a few students in advanced algebra but mostly students in geometry. The course-level cohort comparison group consisted of 11th graders enrolled in advanced algebra. At Site A, all 10th graders, both UCSMP and comparison, had taken geometry and were enrolled in advanced algebra; thus only a single comparison group was needed.

At Site A both UCSMP and comparison students were just above the 7th grade level in the spring of their 6th-grade year, or slightly above the 50th percentile nationally. Students at Site B, all of them enrolled in the site's regular track, were in about the 90th percentile nationally for mathematics and the 80th percentile nationally for reading. This was also true of

both UCSMP and age-comparison students at Site C, although the course-comparison students here were in the 80th percentile on both measures.

ALL STUDENTS participating in the study were given posttests in the spring of 1990. To measure achievement, a standardized multiple-choice test was used, the College Board Mathematics Level I Achievement Test from the Educational Testing Service, with possible scores from 200 to 800. No calculators were allowed on this 60-minute test. Additionally, because some of the content of the UCSMP secondary curriculum has not been standard in school curricula, a 30-item multiple choice application test (scored from 0 to 30) was developed for the study. Students were allowed to use calculators on this test.

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7-12 series published

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and extensive ancillaries, including the Explorer series, specially designed software developed by Scott, Foresman in conjunction with UCSMP. "We're very excited about that because it's state-of-the-art software," says Jakucyn, explaining that a graphing package will be available for the Mac in August and for the IBM in December; a statistics package will be ready for both the Mac and IBM in December as well.

WHEN THE SCOTT, FORESMAN edition of *Functions, Statistics, and Trigonometry with Computers* appears this June, it will be called simply *Functions, Statistics, and Trigonometry*. The title change does not signify any change in content or approach; it was made largely because the technology required for *FST* can be satisfied by today's graphing calculators and because although other

UCSMP secondary texts also require some sort of technology, no mention of it is made in their titles.

The title change does *not* mean the text can be used without the necessary tools; technology requirements for *FST* will be indicated on the title page. Students will need automatic graphers almost all the time; computers will be needed for statistics, simulations, and for running programs. Thus it is recommended that each *FST* class meet either in or adjacent to a computer lab and that graphing calculators be distributed to or purchased by all students.

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RESULTS

Schoolteachers form association

C HICAGO ELEMENTARY teachers with a common interest in mathematics have come together in the Association of Mathematics Specialists. "We provide support for each other as we try new methods in our classrooms," says Fran Goldenberg, one of several teachers involved in the UCSMP Mathematics Specialist Program who first organized the group as a way to continue meeting after their training was over in 1988.

According to Goldenberg, a longtime teacher in the Chicago Public Schools who has become the moving force behind the association, in January of 1991 they began offering participating teachers one hour of credit beyond a master's degree through the Chicago Board of Education.

Longitudinal study

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T HE RESULTS OF TESTING at all sites are summarized in the table below. On the Level I Achievement Test results were mixed. UCSMP students outperformed all of their comparison groups at Sites A and B, but at Site C both comparison groups outperformed the UCSMP students, the course-level cohort sig-

To earn this credit, participants meet twice a month for four months. With a current membership of mostly generalist teachers, the association functions as a seminar led by Goldenberg, who says, "It still provides the same sharing, but in addition there is more structure in the meetings, which are a vehicle for these teachers to learn more about what's happening in the field of mathematics."

In lieu of tuition, all members join the National Council of Teachers of Mathematics and at each meeting discuss current articles from *The Arithmetic Teacher*, published by NCTM. Individual participants are also encouraged to take responsibility for making presentations to the group as a whole, and occasional guest speakers are invited as well. Currently the teachers are working together through the first two chapters of *Mathematics: A Human Endeavor*, by Harold R. Jacobs.

nificantly so. Of interest is the high variability of achievement for the age cohort comparison students, especially at Sites B and C (attributable to the fact that some students had risen to the honors track subsequent to 6th-grade testing and were taking advanced algebra rather than geometry). This suggests that students in the traditional curriculum who begin the 7th grade within a relatively narrow range of achievement scores end up in 10th grade with these differences magnified; the UCSMP students remained within a narrower range of achievement scores.

The applications test, on the other hand, clearly favored UCSMP students, who significantly outperformed all but one comparison group. It is clear that at each of these sites UCSMP students were successful learners of mathematics applications.

B ECAUSE OF THE SMALL NUMBER of students involved in this study and because each school implements its mathematics curriculum differently, an across-the-board generalization of the results would not be justified. However, the experience of three public school districts in the midwest may be summed up as follows: At Site A, UCSMP students had significantly higher achievement and application scores than comparable students; at Site B, UCSMP students gained a full year in standardized achievement (they were comparable to 11th graders), as well as gaining in applications; at Site C, UCSMP age-cohort students had greater facility in applications but lower standardized achievement scores.

		POSTTESTS			
		Level I Achievement		Applications	
		mean	sd	mean	sd
		SITE A			
		age/course-level cohorts (n = 11 pairs)			
UCSMP		483.64*	41.05	18.18*	5.47
Comparison		432.73	53.12	13.00	3.16
		SITE B			
		age cohorts (n = 13 pairs)			
UCSMP		514.62*	32.82	21.77**	2.42
Comparison		460.00	73.48	15.62	2.79
		course-level cohorts (n = 10 pairs)			
UCSMP		513.00	36.53	21.90*	2.73
Comparison		506.00	37.48	17.90	3.41
		SITE C			
		age cohorts (n = 18 pairs)			
UCSMP		476.11	48.77	20.61*	4.67
Comparison		510.00	77.54	17.06	4.60
		course-level cohorts (n = 27 pairs)			
UCSMP		465.93	47.50	20.07	4.27
Comparison		525.19**	63.99	20.22	3.34

* $p < 0.05$ ** $p < 0.01$

STAFF PROFILE

Mary Fullmer: Getting the job done

In this issue we profile another of the UCSMP staff members who accomplish the important day-to-day activities of the project.

ASK MARY FULLMER what her task as manager of UCSMP's elementary teacher development component is and she has a ready answer: "Doing whatever needs to get done." Connected to the project practically since its inception in 1983, she joined the elementary teacher development component officially in 1984 to work on *MathTools for Teachers*, UCSMP's K-3 teacher development program. Over the years she has variously been called upon to write Minute Math cards for the *MathTools* package, install computers in selected primary classrooms, and assist at teacher workshops. "I've done all kinds of things," says Mary.

After the completion of *MathTools* in 1986, the focus of the elementary teacher development component shifted to grades 4-6 and the development of UCSMP's Mathematics Specialist Program, for which Mary logged many hours of classroom observation.

But this year she returned to *MathTools* again, presenting on her own the series of workshops at which she used to assist. A Chicago public school, a coalition of independent schools in the area, and the Academy for Math & Science Teachers in Chicago each requested the inservices. "I think primary math is my niche," she says with enthusiasm, "My experience and my interest is with the primary math." In fact, before taking some time off to raise a family, Mary was a school teacher herself. Back then she taught second and third grade, and ever since, she says, "I have felt a rapport, a real affinity for this group of students and the teachers who work with them."

Perhaps the most significant difference between UCSMP teacher development at the primary and intermediate levels is that the former deals with teachers responsible for a range of subjects. "A lot of times these teachers don't have a real comfort level with math," says Mary, "It's good for them to realize that they are more capable."



UCSMP Manager Mary Fullmer

She goes on to express her concern that in the isolation of their classrooms, some teachers become too closely identified with the grade level they are teaching. "They'll say, 'I'm in kindergarten, I'm in first grade' as though they were children," she observes rather poignantly. Because these teachers must prepare their charges to go on to ever higher levels of achievement, Mary considers it essential that they acquire "the basic feeling that they are competent."

The year-long course of *MathTools* workshops gets these teachers out of the classroom and among their peers, where they pick up ideas and discover that they have a few of their own to share. Mary clearly derives a great

deal of satisfaction from seeing this sort of give-and-take help teachers develop appreciation and admiration for one another and thus for themselves. "They respect each other," she says emphatically.

MUCH AS SHE ENJOYS WORKING WITH teachers, however, Mary does a number of other things as well. The nitty-gritty of keeping the component office going on a given day might involve fielding questions about the project, tracking down an overhead projector for a meeting of math teachers, or investigating facilities for a conference. She sees to it that the mail is picked up, supplies are ordered, and files are organized. One project just getting underway is the reorganization of data generated by past evaluations of UCSMP teacher development in order to make it more accessible.

And lately Mary has been making quite a few phone calls. In 1991, UCSMP received funding for a conference on the mathematical preparation of elementary teachers. In connection with this conference, she and other component staffers are calling state supervisors nationwide to collect information on innovative programs in an effort to monitor reform initiatives across the country.

All in all, working for the project, says Mary, "I feel that I have grown. I've certainly gained a greater appreciation for the importance of math education in the early grades. And the people I've been working with, well, we've been around a while and I think we make a good team."

A USER REPORTS

The Philadelphia Algebra Transition Project*

IMAGINE A MATHEMATICS PROGRAM that is implementing the recommendations embodied in the 1989 NCTM *Standards*: Each student would have a scientific calculator; each classroom would have a demonstration computer. Journal writing and working cooperatively in small groups would be built into the structure of the class. Its focus would be real-world applications rather than mechanical computations, and students would read, write, and communicate mathematically.

The teacher of this class would demonstrate a variety of approaches, including using manipulatives, cooperative learning, reading and writing in mathematics, and utilizing technology. Instructional practices would vary and the teacher's role would become that of a mentor/advocate/guide for the students.

The program described above is more than an idealized vision of the future. It is a reality in Philadelphia, PA, and it is called the Algebra Transition Project. Funded by the Philadelphia Schools Collaborative, the School District of Philadelphia, and the Community College of Philadelphia, this project was conceived by a group of high-school math department heads in the fall of 1989 to improve student access to and success in Algebra I in the 9th grade. Historically, half of the students who enter 9th grade in Philadelphia public schools enroll in Algebra I and half take General Mathematics I. In both cases, about half of the students fail their freshman year of math.

The program draws heavily on the recommendations of the *Standards* in an effort to establish an ideal teaching and learning environment. A description of this initiative:

The Summer Program

TEACHERS AT THREE PHILADELPHIA high schools and the middle schools that feed into them received 25 hours of staff development that included an extensive orientation to the UCSMP secondary curriculum as well as sessions addressing instructional techniques such as cooperative learning, the use of calculators and computers, and reading mathematics.

During the summer of 1990, 170 8th grade graduates of low to average ability participated in a six-week program held at the Community College of Philadelphia. Students were taught by teams of teachers representing the middle

schools they had just left and the high schools they would be entering in September. Also present were a small group of high-school seniors who acted as mentors as well as a member of the mathematics department of the college who served as resident mathematician.

The summer curriculum was chosen from the pre-algebra topics presented in UCSMP's *Transition Mathematics*. According to the Philadelphia teachers, these materials best reflected the recommendations of the *Standards*; that is, they include a wealth of real-world applications, de-emphasize computations and a consequent over-reliance on calculators, emphasize the connections between various topics in mathematics, and require students to read and communicate in the language of mathematics.

That summer students were introduced to integers, variables, simple equations, inequalities, and Cartesian coordinates. These topics were supplemented by enrichment activities as well as journal writing, calculator activities, and computer lab experiences.

Students spent 3 hours a day "doing mathematics." Significantly, the teachers' day extended nearly 2 hours beyond the student day. This time was devoted to planning and curriculum review as well as to administrative details. Teachers designed the curriculum sequence themselves and met regularly to review progress, identify success, and prevent failures. Parallel pretests and posttests were administered on which the average gain was 11.7 items out of a total of 44.

The School Year

DURING THE 1990-91 SCHOOL YEAR, students from the summer were enrolled in Algebra I using UCSMP's *Algebra* taught by the same teachers they had had during the summer. This was no mean rostering feat, but it was felt that the bond developed between teacher and student, and among students, would facilitate the transition to high school.

In the middle schools meanwhile, the 8th grade is being taught using *Transition Mathematics*, in the hope of better preparing the next crop of transition students and ultimately obviating the need for a summer program altogether.

Ongoing monthly UCSMP users' meetings during the school year are providing an opportunity for teachers to come together to discuss their progress and problems. The complaint heard most often is that there isn't enough time;

*For this article we thank Sue Stetzer, director of the Philadelphia Algebra Transition Project.

USER REPORT, CONT.

after the luxury of the summer program, 45-minute periods often seem abrupt and inadequate.

Preliminary Results

ALL INDICATIONS SUGGEST THAT the students are learning more algebra more thoroughly than in previous years. On November 1990 report cards, 85.6% of the students passed Algebra I. Ninety-seven percent of these students passed the city-wide Algebra I mid-term (which does not permit calculator use). Although grades in February 1991 were down slightly, still 77.5% of the students passed Algebra I, a success rate 16-24 percentage points higher than in the traditional Algebra I classes of these three high schools, numbers that are even more impressive considering that the students in the Algebra Transition Project are of low to average ability.

The Future

PLANNING IS BEGINNING for the summer of 1991. The question of what further support might be provided for students currently enrolled in Algebra I and the need to revise the summer curriculum in light of the fact that some eligible students will already have had *Transition Mathematics* in 8th grade are being addressed by the teachers who comprise the Algebra Transition Project.

Three Keys to Success

THREE THINGS HAVE BEEN CRUCIAL to the success of the Philadelphia Algebra Transition Project. First, the teachers involved determined themselves what their project would consist of, from the selection of the curriculum to the design of the students' day during the summer. This level of investment enabled a diverse group of teachers to share the responsibility for the education of their students and the success of the program.

Secondly, a thorough and thoughtful review of both curriculum and instruction was essential. Teachers chose the materials and helped shape the inservice training to meet their needs. The extended day during the summer provided for daily review of both curriculum and instruction. The luxury of a common preparation period for an entire staff is virtually impossible during a traditional school program, but has been a key ingredient of the success of the Philadelphia Algebra Transition Project.

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The third key factor has been the establishment of a relatively long-term relationship between teachers and students. Working on curriculum not in the abstract, but confident that the pre-algebra skills acquired during the summer would pay off in the Algebra I classroom during the school year, teachers were fully committed to their students.

Each of the three ingredients was a necessary condition for success, but none of them was sufficient. It took the combination to create a program that provided excitement and learning for students and teachers alike.

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