



University of Illinois at Chicago All Learn Mathematics

PROGRAM DESCRIPTION

Content

- algebra readiness
- problem-solving
- inquiry-based instructional strategies
- cooperative learning approaches
- use of manipulatives
- use of scientific calculators
- redefining teachers' role

University of Illinois at Chicago—All Learn Mathematics (ALM) is a comprehensive staff development program for fourth- through ninth-grade teachers in the Chicago Public Schools. It includes classroom implementation of standards-based curricula, development of teacher leadership, follow-up, and math-related programs for families and students. Since 1995, the program has included more than 600 teachers in over 44 schools. The staff development program uses *Maneuvers with Mathematics*[®] and *Connected Mathematics*[®] materials. Approximately 50 percent of the mathematics teachers involved in the program during the study had four or fewer semesters of mathematics in college. Sixty percent had more than six years of teaching experience. Priorities of the study were to change teachers' practice and upgrade their understanding of mathematics. All Learn Mathematics built teachers' understanding of concepts such as problem-solving, algebra readiness, and use of scientific calculators, as well as developing their comfort with the instructional techniques that foster inquiry-based teaching and learning processes.

The program's goals are to incorporate students as partners in mathematics reform efforts, to promote broad-based community understanding and support for mathematics improvement, and to identify leadership committees to take responsibility for the continuous upgrading of the mathematics program.

Context

- diverse student populations including large populations of minority and low income students
- diverse school settings including rural, urban, and suburban schools

PROGRAM CONTEXT

The program is currently implemented in 44 public schools in Chicago in grades 4-8. The schools' student population is extremely diverse. In some schools more than 98 percent of the student population is identified as low income. Several have 100 percent African American students; one has over 98 percent Hispanic students; and several have over 60 percent Limited English Proficient students.



STAFF DEVELOPMENT PROGRAM

The staff development program for the University of Illinois at Chicago—All Learn Mathematics consists of a minimum of 60 hours of staff development outside the classroom and 40 additional hours of staff development in classrooms. Staff development sessions are conducted by facilitators who are experienced teachers with master's degrees in mathematics education. All ALM staff development workshops are conducted as seminars/discussions groups. A portion of each workshop is devoted to problem-solving sessions, in which teachers actively explore, share, and discuss mathematics and classroom lessons. Teachers also discuss a variety of school-related issues at the workshops.

A high priority of the staff development sessions is increasing the mathematical competence of participating teachers. Topics include problem-solving, algebra readiness, and use of scientific calculators in addition to facilitating learning groups, engaging students in inquiry and experimentation, using manipulatives, helping students construct their own mathematics ideas, and using alternative assessments.

Staff development in the teachers' classrooms is provided by an ALM Program Associate, and includes peer coaching, co-teaching, and modeling lessons. Workshops are held on Saturday mornings, after school, on release time, on professional development days, and during restructured days. In some schools *all* staff participate in the staff development program. In others, only mathematics teachers participate.

Process

- training
- modeling
- practice opportunities
- institutes
- lesson designing
- resource materials
- videotapes

Intended Audience

- entire school
- entire department or team
- individual volunteer teachers

SUMMARY OF RESULTS

Not only does the University of Illinois at Chicago—All Learn Mathematics program increase student achievement in mathematics at all participating schools, it increases teachers' understanding of mathematics and use of appropriate instructional strategies to create student-centered classrooms. As a result of ALM, significant changes in mathematics education were made, and a greater accountability for schools, students, teachers, and administrators has been initiated.

EVIDENCE OF INCREASED STUDENT ACHIEVEMENT



Success Indicators

- norm-referenced tests
- teacher surveys
- teacher interviews
- classroom observations



University of Illinois at Chicago—All Learn Mathematics improved student performance on the Iowa Test of Basic Skills. For the schools participating in both the first and second cadre, all improved their mathematics scores. The degree of improvement varied by schools with increases occurring at the lowest-performing as well as at the highest-performing schools. Differences in the number of students performing at or above the national norm at five of the six schools in the first cadre (schools that participated between 1995 and 1997) were statistically significant when compared to the control group. In the second cadre (schools which began in 1996), the difference in the number of students performing at or above the national norm at seven of the 18 schools was statistically significant, when compared to the control group. The lower performance of students in the second cadre is most likely due to the length of implementation.

Changes in teachers' practices were also attributed to All Learn Mathematics. Interview and survey results indicate that, as a result of participating in the staff development programs, teachers' attitudes about mathematics improved; classroom instructional practices shifted from lecture or teacher-centered to student-centered and students working in cooperation with each other; and teachers' preparedness to teach mathematics, including their own understanding of mathematics concepts, improved. Teachers felt well-prepared to have students work in cooperative groups, practice computational skills, and engage students in inquiry-oriented activities. They also felt competent to use performance-based assessment and informal questioning, lead a class of students on investigative strategies, and manage students engaged in hands-on or project-based work.

THE BOTTOM LINE



University of Illinois at Chicago—All Learn Mathematics has led to improved math performance at each school where it has been implemented. The schools in which ALM has been implemented are educationally challenging. Greater results for schools involved for two years rather than one year are evident. All Learn Mathematics is a successful program for changing teacher knowledge and pedagogy in middle school mathematics. As the program expands, continuing improvement in student performance is expected.

SAMPLE SITES



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DOCUMENTATION

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