

Effective Programs for Elementary Mathematics: A Best Evidence Synthesis Educator's Summary Last updated November 25, 2008

What mathematics programs have been proven to help elementary students to succeed? To find out, this review summarizes evidence on three types of programs designed to improve the mathematics achievement of students in grades K-6:

- **Mathematics Curricula (MC)**, such as *Everyday Mathematics*, *Saxon Math*, and other standard and alternative textbooks.
- **Computer assisted instruction (CAI)**, such as *Jostens/Compass Learning* and *SuccessMaker*.
- **Instructional process programs (IP)**, such as cooperative learning, classroom management programs, and other approaches primarily intended to change teachers' instructional strategies rather than curriculum or textbooks.

Key Findings

Overall, 87 studies met the inclusion criterion, of which 36 used random assignment to treatments. These included 13 studies of mathematics curricula (2 randomized), 38 studies of CAI (15 randomized), and 36 studies of instructional process programs (20 randomized).





- **Mathematics Curricula (MC)**. The review found limited evidence that it matters which textbook is used, at least for student outcomes on standardized tests. Studies of curricula supported by the National Science Foundation, such as *Everyday Mathematics* and *Math Trailblazers*, found small differences in math achievement in comparison to control groups. Similarly, *Saxon Math* and traditional math texts had little evidence of effectiveness. Median effect size across 13 studies: +0.10.
- **Computer Assisted Instruction (CAI)**. Most studies of CAI find positive achievement outcomes. However, the outcomes are very mixed, and the highest-quality studies find few positive effects. Also, most qualifying studies evaluated programs that are no longer available; there are few studies of current versions of CAI. Median effect size across 38 studies: +0.19.
- **Instructional Process Strategies (IP)**. The highest-quality studies and strongest positive effects were found for instructional process programs such as cooperative learning,

classroom management and motivation programs, and small-group tutoring programs.
Median effect size across 36 studies: +0.33.

Program Ratings

Listed below are currently available programs, grouped by strength of effectiveness. Within each group, programs are listed alphabetically. The type for each program corresponds to the categories above (e.g., IP = Instructional Process Strategies).


Strong Evidence of Effectiveness

Rating	Program	Type	Description	Contact / Website
	Classwide Peer Tutoring	IP	Pair learning approach in which children take turns as teacher and learner.	Contact Charles Greenwood at greenwood@ku.edu.
	Missouri Mathematics Program	IP	Program focusing on active teaching, classroom management, motivation.	Contact Thomas Good, University of Arizona, at good@u.arizona.edu
	Peer Assisted Learning Strategies (PALS)	IP	Structured pair learning strategy in which children take turns as teachers and learners.	Website: www.kc.vanderbilt.edu/pals
	Student Teams-Achievement Divisions (now disseminated as PowerTeaching)	IP	Structured cooperative learning program in which students work in 4-member teams.	Contact Nancy Madden, Johns Hopkins University, at nmadden@jhu.edu.

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www.bcatevidence.org

Rating	Program	Type	Description	Contact / Website
	TAI Math	IP/MC	Structured cooperative learning program in which students work on individualized materials in 4-member teams.	Contact Brent Farmer, Charlesbridge Publishing, 800-225-3214, or bfarmer@charlesbridge.com

MC = Mathematics Curricula, CAI = Computer-Assisted Instruction, IP = Instructional Process Programs



Moderate Evidence of Effectiveness

Rating	Program	Type	Description	Contact / Website
	Classworks	CAI	Supplementary integrated learning system.	Website: www.curriculumadvantage.com
	Cognitively Guided Instruction	IP	Program that provides teachers with workshops in math strategies.	Contact Linda Levi, Teachers Development Group, at lindalevi@teachersdg.org
	Connecting Math Concepts	IP/MC	Structured approach to math with grouping by performance.	Website: www.sraonline.com/math
	Consistency Management & Cooperative Discipline	IP	Program that emphasizes classroom management, student engagement.	Contact Jerome Freiberg, University of Houston, at cmcd@uh.edu.

Rating	Program	Type	Description	Contact / Website
	Project SEED	IP	Supplementary program that has mathematicians teach advanced topics in math to supplement regular instruction.	Website: www.projectseed.org
	Small-Group Tutoring	IP	Provides tutoring in small groups for struggling first graders.	Contact Lynn Fuchs, Vanderbilt University, at lynn.fuchs@vanderbilt.edu

MC = Mathematics Curricula, CAI = Computer-Assisted Instruction, IP = Instructional Process Programs





Limited Evidence of Effectiveness

Rating	Program	Type	Description	Contact / Website
	Accelerated Mathematics	CAI	Supplementary program that prints out assignments for students based on their level of performance.	Website: www.renlearn.com/mathrenaissance
	Dynamic Pedagogy	IP	Program that provides teachers with workshops in math strategies.	Contact Eleanor Armour-Thomas at armourthomas@yahoo.com

**Best Evidence
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Rating	Program	Type	Description	Contact / Website
	Every Day Counts	IP	An interactive K-6 bulletin-board program designed to supplement ordinary math instruction with discussions about math concepts built around the calendar and other classroom routines.	Website: www.greatsource.com
	Excel Math	MC	K-6 math curriculum that focuses on problem solving, integrated lessons, and development of thinking skills.	Website: www.excelmath.com
	Everyday Mathematics	MC	NSF-supported curriculum that emphasizes problem solving and concepts.	Website: www.wrightgroup.com or http://everydaymath.uchicago.edu/
	Growing with Mathematics	MC	Core mathematics program for PreK-5.	Website: www.wrightgroup.com

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Rating	Program	Type	Description	Contact / Website
	Houghton-Mifflin Mathematics	MC	Standard math curriculum that has a focus on skill building, problem solving, and concept mastery.	Website: www.eduplace.com/math
	Knowing Mathematics	MC	Remedial program for students performing below grade level.	Website: http://www.eduplace.com/profdev/knowning1
	Mastery Learning	IP	A strategy in which time to learn is adjusted to fit aptitude. Students proceed to new material only after basic prerequisite material is mastered.	No contact information available
	Lightspan	CAI	Supplementary integrated learning system. Also provides CAI programs for home use	Website: www.plato.com (Note: Lightspan and Plato Learning have merged.)

Rating	Program	Type	Description	Contact / Website
	Project CHILD	IP/CAI	Program that uses cooperative learning, multi-age grouping, extensive computer-assisted instruction, and other features.	Website: www.ifs.org/projectchild/

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Other Programs



Insufficient Evidence

Math Steps
Math Trailblazers
Saxon Math
Scott Foresman-Addison Wesley Mathematics



No Qualifying Studies

Adventures of Jasper Woodbury
AIMSweb® Pro Math
Bridges in Mathematics
Compass Learning (current version)
Corrective Math
Count, Notice, & Remember
Destination Math Series
First in Math®
Great Explorations in Math and Science
Harcourt Math
Investigations in Number, Data, and Space
Larson's Elementary Math
Math Advantage
MathAmigo
Math Blasters
Math Central
Math Coach
Math Expressions

Math Explorations and Applications
Math in My World
Math Made Easy
Math Matters
Math Their Way
Math & Me Series
Math & Music
Mathematics Plus
Mathematics Their Way
Mathletics
Math Realm
MathWings
Macmillan McGraw-Hill Math
McGraw-Hill Mathematics
Number Power
Problem Solving Step by Step
Progress in Mathematics
Project IMPACT
Project M3: Mentoring Mathematical Minds
Rational Number Project
Real Math
Reciprocal Peer Tutoring
Scott Foresman Math Around the Clock
Singapore Math
Skills Tutor/Cornerstone2
SuccessMaker (Current version)
TIPS Math
Voyages
Waterford Early Math
Yearly Progress Pro

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Review Methods





An exhaustive search considered hundreds of published and unpublished articles. It included those that met the following criteria:

- Schools or classrooms using each program had to be compared to randomly assigned or well-matched control groups
- Study duration had to be at least 12 weeks

- Outcome measures had to be assessments of the mathematics being taught in all classes. Almost all are standardized tests or state assessments.
- The review placed particular emphasis on studies in which schools, teachers, or students were assigned at random to experimental or control groups.

Program Ratings Basis

Programs were rated according to the overall strength of the evidence supporting their effects on math achievement. “Effect size” (ES) is the proportion of a standard deviation by which a treatment group exceeds a control group. Large studies are those involving a total of at least 10 classes or 250 students. The categories are as follows:

-  Strong Evidence of Effectiveness: At least one large or two small randomized studies with median ES= +0.20 or more.
-  Moderate Evidence of Effectiveness: At least two large or four small studies (randomized and matched) with median ES= +0.20 or more.
-  Limited Evidence of Effectiveness: At least one qualifying study with a significant positive effect and/or median ES=+0.10 or more.
-  Insufficient Evidence: Studies show no significant differences.
- N** No Qualifying Studies: No studies met inclusion standards.

Full Report

Slavin, R.E. & Lake, C. (2007, February). Effective programs in elementary mathematics: A best evidence synthesis. *Review of Educational Research*, 78 (3), 427-515.
www.bestevidence.org/word/elem_math_Feb_1_2007.pdf