



Best Evidence Encyclopedia

Center for Data-Driven Reform in Education

Johns Hopkins University

BEE

EFFECTIVE PROGRAMS IN ELEMENTARY MATHEMATICS: A BEST EVIDENCE SYNTHESIS

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The Best Evidence Encyclopedia

EDUCATOR'S SUMMARY

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.

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with evidence of effectiveness [click here](#)

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General Findings

Overall, 80 studies met the inclusion criterion, of which 36 used random assignment to treatments. These included 11 studies of mathematics curricula (1 randomized), 34 studies of CAI (15 randomized), and 35 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 11 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 34 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 35 studies +0.33.

Listed below are currently available programs according to these categories. Within categories, programs are listed in alphabetical order.

Program Ratings



Strong Evidence of Effectiveness

Classwide Peer Tutoring (IP)
Missouri Mathematics Program (IP)
Peer Assisted Learning Strategies (PALS) (IP)
Student Team Learning (IP)
TAI Math (IP/MC)



Moderate Evidence of Effectiveness

Classworks (CAI)
Cognitively Guided Instruction (IP)
Connecting Math Concepts (IP/MC)
Consistency Management & Cooperative Discipline (IP)
Project SEED (IP)
Small-Group Tutoring (IP)



Limited Evidence of Effectiveness

Accelerated Mathematics (CAI)
Dynamic Pedagogy (IP)
Everyday Mathematics (MC)
Knowing Mathematics (MC)
Houghton-Mifflin Mathematics (MC)
Lightspan (CAI)
Math Trailblazers (MC)
Project CHILD (IP/CAI)



Insufficient Evidence

Math Steps (MC)
Saxon Math (MC)
Scott Foresman-Addison Wesley Mathematics (MC)

N





No Qualifying Studies

Compass Learning (CAI) (Current version)
Corrective Math (MC)
Count, Notice, & Remember (IP)
Destination Math Series (CAI)
Harcourt Math (MC)
Investigations in Number, Data, and Space (MC)
Larson's Elementary Math
Math Advantage (MC)
MathAmigo (CAI)
Math Blasters (CAI)
Math Central (MC)
Math Coach (MC, IP)
Math Expressions (MC)
Math Explorations and Applications (MC)
Math in My World (MC)
Math Made Easy (CAI)
Math & Me Series (MC)
Math & Music (CAI)
Mathematics Plus (MC)
Mathematics Their Way (MC)
Mathletics (MC)
MathWings (IP/MC)
Macmillan McGraw-Hill Math (MC)



McGraw-Hill Mathematics (MC)
 Number Power (MC)
 Problem Solving Step by Step (IP,MC)
 Progress in Mathematics (MC)
 Project IMPACT (IP)
 Rational Number Project (MC)
 Real Math (MC)
 Reciprocal Peer Tutoring (IP)
 Singapore Math (MC)
 SuccessMaker (CAI) (Current version)
 Voyages (IP,MC)
 Waterford Early Math (CAI)

Descriptions and Contacts of Programs with Evidence of Effectiveness






Mathematics Curricula

- 
 Everyday Mathematics—NSF-supported curriculum that emphasizes problem solving and concepts. www.wrightgroup.com or <http://everydaymath.uchicago.edu/>
- 
 Houghton-Mifflin Mathematics—Standard math curriculum that has a focus on skill building, problem solving, and concept mastery. www.eduplace.com/math
- 
 Knowing Mathematics—Remedial program for students performing below grade level. <http://www.eduplace.com/profdev/knowing1>
- 
 Math Trailblazers—NSF-supported curriculum that emphasizes problem solving and concepts. www.mathtrailblazers.com








Computer Assisted Instruction

- 
 Classworks—Supplementary integrated learning system. www.curriculumadvantage.com
- 
 Accelerated Mathematics—Supplementary program that prints out assignments for students based on their level of performance. www.renlearn.com/mathrenaissance
- 
 Lightspan/Plato Learning—Supplementary integrated learning system. Also provides CAI programs for home use. www.plato.com

Instructional Process

- 
 Classwide Peer Tutoring—Pair learning approach in which children take turns as teacher and learner. Contact Charles Greenwood at greenwood@ku.edu.
- 
 Missouri Mathematics Program—Program focusing on active teaching, classroom management, motivation. Contact Thomas Good, University of Arizona, at good@u.arizona.edu
- 
 Peer Assisted Learning Strategies (PALS)—Structured pair learning strategy in which children take turns as teachers and learners. www.kc.vanderbilt.edu/pals
- 
 Student Team Learning—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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 TAI Math—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

-  Cognitively Guided Instruction—Program that provides teachers with workshops in math strategies. Contact Linda Levi, Teachers Development Group, at lindalevi@teachersdg.org
-  Connecting Math Concepts—Structured approach to math with grouping by performance. www.sraonline.com/math
-  Consistency Management & Cooperative Discipline—Program that emphasizes classroom management, student engagement. Contact Jerome Freiberg, University of Houston, at cmcd@uh.edu.
-  Project SEED—Supplementary program that has mathematicians teach advanced topics in math to supplement regular instruction. www.projectseed.org
-  Small-Group Tutoring—Provides tutoring in small groups for struggling first graders. Contact Lynn Fuchs, Vanderbilt University, at lynn.fuchs@vanderbilt.edu
-  Dynamic Pedagogy—Program that provides teachers with workshops in math strategies. Contact Eleanor Armour-Thomas at armourthomas@yahoo.com
-  Project CHILD—Program that uses cooperative learning, multi-age grouping, extensive computer-assisted instruction, and other features. www.ifs.org/child.htm





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.

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:

Program Ratings

-  **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 median ES=+0.10 or more.
-  **Insufficient Evidence :** Studies show no significant differences
- N No Qualifying Studies:** No studies met inclusion standards

Connections

For a related What Works Clearinghouse review of Everyday Mathematics, click on <http://www.whatworks.ed.gov/Topic.asp?tid=04&ReturnPage=default.asp>