

## **Effectieve programma's voor rekenen in het basisonderwijs: een best evidence synthese**

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Welke programma's leiden tot betere rekenprestaties voor basisschool leerlingen? Dit overzicht bevat het wetenschappelijk bewijs voor drie types van programma's, allen gericht op verbetering van de rekenprestaties in de groepen 1-8. De drie typen zijn:

- **rekencurricula** (curricula / Curr) zoals 'Everyday Math', 'Saxon Math' en andere standaard en alternatieve leerboeken.
- **digitale instructie** (computer aided instruction / CAI), zoals 'Jostens/ Compas Learning' en 'SuccessMaker'.
- programma's gericht op **instructie en proces** (instructional process / IP), zoals samenwerkend leren, klasmanagement programma's en andere benaderingen die tot doel hebben de instructie van leerkrachten te veranderen (niet zijnde curricula of schoolboeken).

### **Belangrijkste bevindingen:**

Algemene bevinding: 87 studies voldeden aan de selectiecriteria, waarvan bij 36 studies sprake was van random toewijzing aan behandelingen. Hiervan waren er 13 over curricula (2 gerandomiseerd), 38 studies over digitale instructie (15 gerandomiseerd) en .. studies over verandering van het instructieproces (20 gerandomiseerd).

- Wiskunde Curricula (MC). De evaluatie toont beperkt bewijs van het effect van curricula op leerlingresultaten op gestandaardiseerde toetsen. Studies van de curricula ondersteund door de National Science Foundation, zoals 'Everyday Math' en 'Math Wegbereiders' vond kleine verschillen in rekenprestaties in vergelijking met de controle groepen. Ook 'Saksische Math' en 'traditionele wiskunde teksten' hadden weinig bewijs van effectiviteit. De mediane effectgrootte over de 13 studies is +0.10.
- Digitale instructie (Computer Aided Instruction / CAI). De meeste studies naar digitale instructie vinden positieve resultaten. De resultaten zijn echter zeer gemengd en vooral de hoogste kwaliteit studies vinden enkele positieve gevolgen. De meeste studies hebben ook betrekking op programma's die niet langer beschikbaar zijn, er zijn weinig recente studies over ICT in het

rekenonderwijs. De mediane effectgrootte in de 38 studies is +0.19.

- **Instructie en proces (IP)**. De hoogste kwaliteit studies en sterkste positieve effecten werden gevonden voor verandering van het instructieproces, zoals coöperatief leren, klasmanagement en motivatie programma's en tutoring in kleine groepen. De mediane effectgrootte in de 36 studies is +0.33.

## **Engelstalige (review)samenvatting**

Gedetailleerde bevindingen en reviewmethode is te vinden in de Engelstalige samenvatting op [www.bestevidence.org](http://www.bestevidence.org).

PDF: [http://www.bestevidence.org/word/elem\\_math\\_Mar\\_11\\_2009\\_sum.pdf](http://www.bestevidence.org/word/elem_math_Mar_11_2009_sum.pdf)

## **Volledige onderzoeksrapport**

Slavin, R. E. & Lake, C. (2007, February). Effective programs in elementary mathematics: A best-evidence synthesis. Baltimore, MD: Johns Hopkins University, Center for Data-Driven Reform in Education.

PDF: [http://www.bestevidence.org/word/elem\\_math\\_Feb\\_9\\_2007.pdf](http://www.bestevidence.org/word/elem_math_Feb_9_2007.pdf)

Gepubliceerde versie:





Slavin, R.E. & Lake, C. (2008, September). Effective programs in elementary mathematics: A best-evidence synthesis. *Review of Educational Research*, 78, 3, 427-515.


## Engelstalige bijlage met waardering afzonderlijke programma's en methodiek

### 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 <a href="mailto:greenwood@ku.edu">greenwood@ku.edu</a> .
	Missouri Mathematics Program	IP	Program focusing on active teaching, classroom management, motivation.	No contact information available.
	Peer Assisted Learning Strategies (PALS)	IP	Structured pair learning strategy in which children take turns as teachers and learners.	Website: <a href="http://www.kc.vanderbilt.edu/pals">www.kc.vanderbilt.edu/pals</a>
	Student Teams-Achievement Divisions (now disseminated as PowerTeaching: Mathematics)	IP	Structured cooperative learning program in which students work in 4-member teams.	Website: <a href="http://www.successforall.org">www.successforall.org</a> Contact Rachal Edwards at <a href="mailto:powerteaching@successforall.org">powerteaching@successforall.org</a>

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: <a href="http://www.projectseed.org">www.projectseed.org</a>
	Small-Group Tutoring	IP	Provides tutoring in small groups for struggling first graders.	Contact Lynn Fuchs, Vanderbilt University, at <a href="mailto:lynn.fuchs@vanderbilt.edu">lynn.fuchs@vanderbilt.edu</a>

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### 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: <a href="http://www.renlearn.com/mathrenaissance">www.renlearn.com/mathrenaissance</a>
	Dynamic Pedagogy	IP	Program that provides teachers with workshops in math strategies.	Contact Eleanor Armour-Thomas at <a href="mailto:armourthomas@yahoo.com">armourthomas@yahoo.com</a>

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: <a href="http://www.greatsource.com">www.greatsource.com</a>
	Excel Math	MC	K-6 math curriculum that focuses on problem solving, integrated lessons, and development of thinking skills.	Website: <a href="http://www.excelmath.com">www.excelmath.com</a>
	Everyday Mathematics	MC	NSF-supported curriculum that emphasizes problem solving and concepts.	Website: <a href="http://www.wrightgroup.com">www.wrightgroup.com</a> or <a href="http://everydaymath.uchicago.edu/">http://everydaymath.uchicago.edu/</a>
	Growing with Mathematics	MC	Core mathematics program for PreK-5.	Website: <a href="http://www.wrightgroup.com">www.wrightgroup.com</a>

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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: <a href="http://www.eduplace.com/math">www.eduplace.com/math</a>
	Knowing Mathematics	MC	Remedial program for students performing below grade level.	Website: <a href="http://www.eduplace.com/profdev/knowning1">http://www.eduplace.com/profdev/knowning1</a>
	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: <a href="http://www.plato.com">www.plato.com</a> (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: <a href="http://www.ifsi.org/projectchild/">www.ifsi.org/projectchild/</a>

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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.