What Works Clearinghouse

INSTITUTE OF EDUCATION SCIENCES

Accelerated Math

Program Description[1]

Accelerated Math, published by Renaissance Learning, is a software tool used to customize assignments and monitor progress in math for students in grades 1–12. The *Accelerated Math* software creates individualized assignments aligned with state standards and national guidelines, scores student work, and generates reports on student progress. The software can be used in conjunction with the existing math curriculum to add practice components and potentially aid teachers in differentiating instruction through the program's progress-monitoring data. Studies in this review assess the effectiveness of *Accelerated Math* as part of a school's core math curriculum.

Research

No studies of *Accelerated Math* meet What Works Clearinghouse (WWC) evidence standards, and three studies meet WWC evidence standards with reservations. These three studies, which included approximately 2,200 middle school students in grades 6–8, compared standardized test scores of students who used *Accelerated Math* with those of students who used traditional curricula.[2]

Based on these three studies, the WWC considers the extent of evidence for *Accelerated Math* to be medium to large for math achievement.

Effectiveness

Accelerated Math was found to have no discernible effects on math achievement.

	Math Achievement
Rating of effectiveness	No discernible effects
Improvement index[3]	Average: +4 percentile points Range: –3 to +7 percentile points

1. The descriptive information for this program was obtained from publicly-available sources: the program's website (http://www.renlearn.com/am/, downloaded July 2008), Nunnery and Ross (2007), Ysseldyke and Bolt (2007), and Ysseldyke and Tardrew (2007). The WWC requests developers to review the program description sections for accuracy from their perspective. Further verification of the accuracy of the descriptive information for this program is beyond the scope of this review.
2. The evidence in this report is based on available research. Findings and conclusions may change as new research becomes available.
3. These numbers show the average and range of student-level improvement indices for all findings across the studies.

Additional program information

Developer and contact

Renaissance Learning developed and distributes *Accelerated Math*. Address: PO Box 8036, Wisconsin Rapids, WI 54495-8036. Email: answers@renlearn.com. Web: www.renlearn.com/am/. Telephone: (800) 338-4204.

Scope of use

Accelerated Math was first released in 1998. In 2008 Renaissance Learning released the *Accelerated Math* Second-Edition Libraries, which included a revised scope and sequence for grades 1–8, algebra I, and geometry. According to the developers, more than 30,000 schools nationwide use *Accelerated Math* and other Renaissance Learning math programs.

Teaching

The *Accelerated Math* software can be used with existing textbooks and instructional methods for students in grades 1 through high school to add practice assignments and progress monitoring to the existing curriculum. Students are placed into grade-level libraries in *Accelerated Math* based on teacher discretion or their performance on a norm-referenced, standardized measure of general math achievement. After instruction on a math objective, teachers can use the software to create individualized practice assignments for students. Students then record their answers through a handheld responder or on forms that are scanned into the computer. After scoring the assignment, the software generates a report showing student progress in mastering the objective as well as information about items answered correctly and incorrectly. Teachers also receive student- and classroom-level reports. After reviewing students' progress, teachers can adjust instruction for the entire class, for small groups of students struggling with similar objectives, or for individual students as needed. *Accelerated Math* generates future assignments based on a student's performance on previous assignments.

Cost

The *Accelerated Math* Enterprise Edition is available for a $2,899 one-time school fee, plus a $1,000 annual fee for up to 250 students. Additional students cost $4 each per year. The Enterprise license includes nine hours of web-based professional development, content libraries for grade 1 math through calculus, unlimited technical support, software updates, and hosting of the software for the first year. After the first year, web hosting costs $399 a year. Single classroom packages are also available. The cost of an optical scanner (needed to grade student assignments) is not included.

Research

Thirty-eight studies reviewed by the WWC investigated the effects of *Accelerated Math*. None are randomized controlled trials that meet WWC evidence standards. Three studies (Nunnery & Ross, 2007; Ysseldyke & Bolt, 2007; Ysseldyke & Tardrew, 2007) are randomized controlled trials or quasi-experimental designs that meet WWC evidence standards with reservations. The remaining 35 studies do not meet either WWC evidence standards or eligibility screens.

Meets evidence standards

No studies meet evidence standards.

Meets evidence standards with reservations

Nunnery and Ross (2007) conducted a quasi-experiment to assess the impact of the School Renaissance program—a comprehensive school reform model, which includes the *Accelerated Math* program—on the math achievement of students in a suburban Texas school district. Treatment schools implemented the program. Although supplemented by a professional development component known as Math Renaissance, the program's key math component was *Accelerated Math*. Math achievement was measured by the Texas Learning Index math scores obtained from the Texas Assessment of Academic Skills. Two treatment middle schools were matched to two comparison middle schools based on the Texas Education Association's Academic Excellence Indicator System (AEIS). The AEIS groups each school with 40 similar schools based on their percentage of African-American, Hispanic, White, economically disadvantaged, and limited English proficient students as well as student mobility rates as determined by cumulative attendance. From a list of 40 similar schools, the most similar school was matched to the treatment school, with preference given to those schools that did not implement *Accelerated Math* or other components of School Renaissance. The authors did not describe the existing math curriculum in the treatment or comparison schools. Although the study sample included students in grades 3–8, only students in grades 6–8 are relevant to this review. The analysis sample included 992 students in four middle schools (482 students in two treatment schools and 510 in two comparison schools) in grades 6–8. The findings section reports the effectiveness of the *Accelerated Math* program for the grade 6–8 cohort.

Ysseldyke and Bolt (2007) conducted a randomized controlled trial with severe attrition. The authors randomly assigned classrooms to treatment and control groups to assess the impact of *Accelerated Math* on the STAR Math and Terra Nova exams. Principals who had shown interest in *Accelerated Math* were contacted to participate in the study. Ultimately, *Accelerated Math* was implemented in eight schools in seven districts in seven states (two schools in Texas and one each in Alabama, Florida, Michigan, Mississippi, North Carolina, and South Carolina). The study sample included students in grades 2–8, but only those in grades 6–8 are relevant to this review. The middle school analysis sample included more than 450 students in 21 treatment classrooms and approximately 400 students in 19 control classrooms. In middle schools, intact classrooms were randomly assigned to treatment and control groups. Because middle school math teachers taught multiple classes, study teachers taught both *Accelerated Math* classes (the treatment condition) and traditional classes. Treatment classrooms were assigned to be taught using *Accelerated Math* as an integrated addition to the existing math curriculum. Control classrooms were assigned to be taught using the existing curriculum without *Accelerated Math*. In practice, the *Accelerated Math* program was not implemented for approximately 40% of students in grades 2–8 in the initial treatment sample; the authors did not report the implementation percentage for the middle school analysis sample. The study meets standards with reservations because of a severe overall attrition rate.

Ysseldyke and Tardrew (2007) conducted a classroom matched-pairs quasi-experimental design to assess *Accelerated Math*'s impact on posttest scores on the STAR Math test. The study was designed for school principals to randomly assign classrooms to treatment or comparison conditions; however, the authors had no control over this process and reported that they had no basis for claiming that random assignment occurred. Thus, the WWC reviewed the study as a quasi-experimental design. The total study included 2,397 students in 125 classrooms in 27 schools in 24 states (Alabama, Arkansas, California, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Massachusetts, Michigan, Minnesota, Missouri, Montana, New Mexico, Ohio, Oklahoma, Oregon, Pennsylvania, Tennessee, Texas, Virginia, Washington, and Wisconsin). Results are reported by grade for grades 3–6 and in cohorts for students in grades 7–8 and 9–10. The grade 6 sample included 326 students in 17 classrooms (169 students in nine treatment classrooms and 157 students in eight comparison classrooms). The grade 7–8 sample included 149 students in four classrooms (66 students in two treatment classrooms and 83 students in two comparison classrooms).

Extent of evidence

The WWC categorizes the extent of evidence in each domain as small or medium to large (see the What Works Clearinghouse Extent of Evidence Categorization Scheme). The extent of evidence takes into account the number of studies and the total sample size across the studies that meet WWC evidence standards, with or without reservations.[4]

The WWC considers the extent of evidence for *Accelerated Math* to be medium to large for math achievement.

4. The Extent of Evidence Categorization was developed to tell readers how much evidence was used to determine the intervention rating, focusing on the number and size of studies. Additional factors associated with a related concept—external validity, such as the student demographics and the settings in which studies took place—are not taken into account for the categorization. Information about how the extent of evidence rating was determined for *Accelerated Math* is in Appendix A5.

Effectiveness

Findings

The WWC review of interventions for middle school math addresses student outcomes in the math achievement domain.

Nunnery and Ross (2007) reported a positive and statistically significant effect of *Accelerated Math* on overall math achievement based on the Texas Learning Index math scores. After accounting for the misalignment between the school as the unit of assignment and the student as the unit of analysis, the WWC determined that this finding was neither statistically significant nor substantively important according to WWC criteria (an effect size greater than 0.25).[5]

Ysseldyke and Bolt (2007) examined two outcomes in this domain: the STAR Math test and Terra Nova math subtest. The authors reported a statistically significant positive effect for one outcome (STAR Math) and no statistically significant effect for the other (Terra Nova).[6] After adjusting for misalignment between the classroom as the unit of assignment and the student as the unit of analysis, the WWC determined that, for both outcomes, the effects were neither statistically significant nor large enough to be considered substantively important according to WWC criteria.[7]

Ysseldyke and Tardrew (2007) reported a positive and statistically significant effect of *Accelerated Math* for the grade 6 classrooms on overall math achievement based on STAR Math scores. They also reported a positive, but not statistically significant, effect for the grade 7–8 *Accelerated Math* classrooms. After adjusting for misalignment between the classroom as the unit of assignment and the student as the unit of analysis, the WWC determined that neither finding was statistically significant nor large enough to be considered substantively important according to WWC criteria.[8]

In sum, in the math achievement domain the WWC reviewed findings from four samples reported in three studies.[9] All four samples showed indeterminate effects. No studies implemented a strong design.

Rating of effectiveness

The WWC rates the effects of an intervention in a given outcome domain as positive, potentially positive, mixed, no discernible effects, potentially negative, or negative. The rating of effectiveness takes into account four factors: the quality of the research design, the statistical significance of the findings, the size of the difference between participants in the intervention and the comparison conditions, and the consistency in findings across studies (see the WWC Intervention Rating Scheme).

The WWC found *Accelerated Math* to have no discernible effects for math achievement

Improvement index

The WWC computes an improvement index for each individual finding. In addition, within each outcome domain, the WWC computes an average improvement index for each study and an average improvement index across studies (see Technical Details of WWC-Conducted Computations). The improvement index represents the difference between the percentile rank of the average student in the intervention condition versus the percentile rank of the average student in the comparison condition. Unlike the rating of effectiveness, the improvement index is based entirely on the size of the effect, regardless of the statistical significance of the effect, the study design, or the analyses. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.

5. The level of statistical significance was reported by the study authors or, where necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate the statistical significance, see Technical Details of WWC-Conducted Computations. In the case of Nunnery and Ross (2007), a correction for clustering was needed, so the significance levels may differ from those reported in the original study.
6. The study authors provided the WWC with findings for the WWC-relevant grade levels.
7. In the case of Ysseldyke and Bolt (2007), a correction for clustering was needed, so the significance levels may differ from those reported in the original study.
8. In the case of Ysseldyke and Tardrew (2007), a correction for clustering was needed.
9. The two grade-level cohorts—grade 6 and grades 7–8—in the Ysseldyke and Tardrew (2007) study were treated as separate studies because they examined the effects of *Accelerated Math* on different samples of students.

The WWC found *Accelerated Math* to have no discernible effects for math achievement *(continued)*

The average improvement index for math achievement is +4 percentile points across the four study samples in the three studies, with a range of –3 to +7 percentile points across findings.

Summary

The WWC reviewed 38 studies on *Accelerated Math*. None meet WWC evidence standards; three studies meet WWC evidence standards with reservations; the remaining 35 studies do not meet either WWC evidence standards or eligibility screens. Based on the three studies, the WWC found no discernible effects in math achievement. The conclusions presented in this report may change as new research emerges.

References

Meet WWC evidence standards

None

Meet WWC evidence standards with reservations

Nunnery, J. A., & Ross, S. M. (2007). The effects of the School Renaissance program on student achievement in reading and mathematics. *Research in the Schools, 14*(1), 40–59.

Additional sources:

Ross, S. M., Nunnery, J. A., & Goldfeder, E. (2003). *The effect of School Renaissance on TAAS scores in the McKinney ISD*. Memphis, TN: Center for Research in Educational Policy.

Ysseldyke, J., & Bolt, D. M. (2007). Effect of technology-enhanced continuous progress monitoring on math achievement. *School Psychology Review, 36*(3), 453–467.

Additional sources:

Ysseldyke, J., & Bolt, D. M. (2005). *High implementers of Accelerated Math show significant gains over low- or non-implementers*. Madison, WI: Renaissance Learning, Inc.

Ysseldyke, J., & Tardrew, S. (2007). Use of a progress monitoring system to enable teachers to differentiate mathematics instruction. *Journal of Applied School Psychology, 24*(1), 1–28.

Additional sources:

Ysseldyke, J. E., & Tardrew, S. P. (2003). *Differentiating math instruction: a large scale study of Accelerated Math (Final report)*. Madison, WI: Renaissance Learning, Inc.

Ysseldyke, J. E., Tardrew, S. P., Betts, J., Thill, T., & Hannigan, E. (2004). Use of an instructional management system to enhance math instruction of gifted and talented students. *Journal for the Education of the Gifted, 27*(4), 293–310.

Ysseldyke, J., Betts, J., Thill, T., & Hannigan, E. (2004). Use of an instructional management system to improve mathematics skills for students in Title I programs. *Preventing School Failure, 48*(4), 10–14.

Studies that fall outside the Middle School Math protocol or do not meet WWC evidence standards

Adams, L. J., Sievert, J., & Rapaport, A. S. (2007). *Evaluation of Accelerated Reading instruction (ARI) and Accelerated Math instruction (AMI) program: 2005-2006 school year*. Austin, TX: Texas Education Agency. The study is ineligible for review because it does not use a comparison group.

Atkins, J. (2005). *The association between the use of Accelerated Math and students' math achievement*. Unpublished doctoral dissertation, East Tennessee State University, Johnson City. The study does not meet WWC evidence standards because the intervention and comparison groups are not shown to be equivalent at baseline.

Bach, S. (2001). *An evaluation of Accelerated Math in a seventh grade classroom*. Madison, WI: Renaissance Learning, Inc. The study does not meet WWC evidence standards because the measures of effect cannot be attributed solely to the intervention; there was only one unit of analysis in one or both conditions.

Caputo, M. T. (2007). A comparison of the effects of the *Accelerated Math* program and the Delaware procedural fluency workbook program on academic growth in grade six at X middle school. (Doctoral dissertation, Wilmington University, Wilmington). *Dissertation Abstracts International* 68 (09A)

References *(continued)*

264-3772. The study does not meet WWC evidence standards because the intervention and comparison groups are not shown to be equivalent at baseline.

Castañeda, S., & Moellmer, A. (2005). *Evaluation of the Accelerated Reading instruction (ARI) and Accelerated Math instruction (AMI) program: 2003-2004 school year*. Austin, TX: Texas Education Agency. The study is ineligible for review because it does not use a comparison group.

Gaeddert, T. J. (2001). *Using Accelerated Math to enhance student achievement in high school mathematics courses*. Unpublished master's thesis, Friends University, Wichita. The study is ineligible for review because it does not use a sample within the age or grade range specified in the protocol.

Holmes, C. T., Brown, C. L., & Algozzine, B. Promoting academic success for all students. *Academic Exchange Quarterly, 10*(3), 141–147. The study is ineligible for review because it does not use a sample within the age or grade range specified in the protocol.

Hongerholt, M. (2006). *The effect of the Accelerated Math program on the Minnesota basic skills test scores of ninth graders*. Unpublished master's thesis, Winona State University, Winona. The study does not meet WWC evidence standards because the intervention and comparison groups are not shown to be equivalent at baseline.

Johnson-Scott, P. L. (2006). *The impact of Accelerated Math on student achievement*. Unpublished doctoral dissertation, Mississippi State University, Mississippi State. The study is ineligible for review because it does not use a sample within the age or grade range specified in the protocol.

Kerns, G. M. (2005). *Moving from good to great: The evolution of learning information systems in Milford school district (Delaware)*. (Doctoral dissertation, University of Delaware, Newark). *Dissertation Abstracts International* 65 (12A) 157-4416. The study is ineligible for review because it does not include an outcome within a domain specified in the protocol.

Lehmann, R. H., & Seeber, S. (2005). *Accelerated Math in grades 4 through 6: evaluation of an experimental program in 15 schools in North Rhine-Westphalia*. Berlin: Humboldt University. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.

Additional sources:

Lehmann, R. H., & Seeber, S. (2005). *Accelerated Math in grades 4–6: summary of a quasi-experimental study in North Rhine-Westphalia, Germany*. Madison, WI: Renaissance Learning, Inc.

Metcalf, E. B. (2005). *Accelerated Math implementation and elementary student achievement and attitudes*. Unpublished master's thesis, University of North Carolina, Wilmington. The study is ineligible for review because it does not use a sample within the age or grade range specified in the protocol.

Nobiensky, C., & Smith, A. (2005). *Accelerated Math helps the Wisconsin Center for Academically Talented Youth rapidly advance mathematics skills of students in its accelerated learning program*. Madison, WI: Renaissance Learning, Inc. The study is ineligible for review because it does not use a comparison group.

Renaissance Learning, Inc. (1999). *Accelerated Math and Math Renaissance improve math performance (Scientific Research: Quasi-Experimental series)*. Retrieved January 5, 2006, from http://research.renlearn.com/research/pdfs/10.pdf The study does not meet WWC evidence standards because the intervention and comparison groups are not shown to be equivalent at baseline.

Renaissance Learning, Inc. (2007a). *Junior high school credits impact of Renaissance tools with recognition in Texas accountability ratings*. Madison, WI: Renaissance Learning, Inc. The study is ineligible for review because it does not use a comparison group.

Renaissance Learning, Inc. (2007b). *Texas junior high school makes extensive gains on the TAKS*. Madison, WI: Renaissance Learning, Inc. The study is ineligible for review because it does not use a comparison group.

Renaissance Learning, Inc. (2007c). *Texas teacher uses responders and gets 2Know! new level of student engagement*.

References *(continued)*

Madison, WI: Renaissance Learning, Inc. The study is ineligible for review because it does not use a comparison group.

Richter, M. P. (2006). *The effect of a supplemental mathematics support class (Accelerated Math) on students' academic achievement*. Unpublished master's thesis, California State University, Stanislaus. The study does not meet WWC evidence standards because the intervention and comparison groups are not shown to be equivalent at baseline.

Ross, S. M., & Nunnery, J. A. (2005). *The effect of School Renaissance on student achievement in two Mississippi school districts*. Memphis, TN: Center for Research in Educational Policy. The study does not meet WWC evidence standards because the intervention and comparison groups are not shown to be equivalent at baseline.

Additional sources:

Ross, S. M., Nunnery, J. A., Avis, A., & Borek, T. (2005). *The effects of School Renaissance on student achievement in two Mississippi school districts: a longitudinal quasi-experimental study.* Memphis, TN: Center for Research in Educational Policy.

Rudd, P., & Wade, P. (2006). *Evaluation of Renaissance Learning mathematics and reading programs in UK Specialist and feeder schools*. Slough, UK: National Foundation for Educational Research. The study is ineligible for review because it does not take place in the geographic area specified in the protocol.

Sadusky, L. A., & Brem, S. K. (2002). *The use of Accelerated Math in an urban Title I elementary school*. Tempe, AZ: Arizona State University. The study does not meet WWC evidence standards because the intervention and comparison groups are not shown to be equivalent at baseline.

Semones, M., & Springer, R. M. (2005). *Struggling high school students using Accelerated Math pass AIMS test*. Madison, WI: Renaissance Learning, Inc. The study is ineligible for review because it does not use a sample within the age or grade range specified in the protocol.

Shields, J., Rapaport, A. S., Adachi, E., Montgomery, E. W., & Adams, L. J. (2007). *Accelerated Reading instruction/Accelerated Math instruction (ARI/AMI) program: updated performance review*. Austin, TX: Texas Education Agency. The study is ineligible for review because it does not use a comparison group.

Spicuzza, R., & Ysseldyke, J. E. (1999). *Using Accelerated Math to enhance instruction in a mandated summer school program*. Minneapolis, MN: Minneapolis Public Schools. The study is ineligible for review because it does not use a comparison group.

Spicuzza, R., Ysseldyke, J. E., Lemkuil, A., Kosciolek, S., Boys, C., & Teelucksingh, E. (2001). *Effects of using a curriculum-based monitoring system on the classroom instructional environment and math achievement*. Minneapolis, MN: National Center on Educational Outcomes, University of Minnesota. The study does not meet WWC evidence standards because the intervention and comparison groups are not shown to be equivalent at baseline.

Springer, M. (2007). *Using Accelerated Math for intervention with at-risk students*. Unpublished master's thesis, St. Mary's College of California, Moraga. The study is ineligible for review because it does not use a comparison group.

Springer, R. M., Pugalee, D., & Algozzine, B. (2007). Improving mathematics skills of high school students. *The Clearinghouse, 81*(1), 37–44. The study is ineligible for review because it does not use a sample within the age or grade range specified in the protocol.

Stessman, M. (2006). *Closing the economic achievement gap: A case study of a successful Kansas secondary school*. Unpublished master's thesis, Wichita State University, Wichita. The study is ineligible for review because it does not use a comparison group.

Theisen, W. (2006). *Will the implementation of individualized self-paced instruction via the Accelerated Math software program improve math competency for target math students?* Unpublished master's thesis, Winona State University, Winona. The study is ineligible for review because it does not examine an intervention implemented in a way that falls within the scope of the review.

References *(continued)*

Vannatta, C. H. (2001). *Integrating Accelerated Math into the high school classroom*. Unpublished master's thesis, Minot State University, Minot. The study is ineligible for review because it does not disaggregate findings for the age or grade range specified in the protocol.

West, M. D. (2005). *The effectiveness of using Accelerated Math to increase student mathematical achievement and its impact on student and parent attitudes toward mathematics*. Unpublished master's thesis, University of Georgia, Athens. The study is ineligible for review because it does not use a sample within the age or grade range specified in the protocol.

Wu, L., Winkler, A., Castañeda, S., & Green, A. (2006). *Evaluation of Accelerated Reading instruction (ARI) and Accelerated Math instruction (AMI) program: 2004-2005 school year*. Austin, TX: Texas Education Agency. The study is ineligible for review because it does not use a comparison group.

Ysseldyke, J. E., & Tardrew, S. P. (2007). *Accelerated Math software and best practices: key scientifically based research summary*. Madison, WI: Renaissance Learning, Inc. The study is ineligible for review because it is not a primary analysis of the effectiveness of an intervention.

Ysseldyke, J., Spicuzza, R., Kosciolek, S., Teelucksingh, E., Boys, C., & Lemkuil, A. (2003). Using a curriculum-based instructional management system to enhance math achievement in urban schools. *Journal of Education for Students Placed at Risk, 8*(2), 247–265. The study is ineligible for review because it does not use a sample within the age or grade range specified in the protocol.

Ysseldyke, J. E., Spicuzza, R., & McGill, S. (2000). *Changes in mathematics achievement and instructional ecology resulting from implementation of a learning information system*. Minneapolis, MN: National Center on Educational Outcomes, University of Minnesota. Retrieved January 5, 2006, from http://www.education.umn.edu/NCEO/OnlinePubs/EBASSreport.pdf The study does not meet WWC evidence standards because the intervention and comparison groups are not shown to be equivalent at baseline.

For more information about specific studies and WWC calculations, please see the WWC *Accelerated Math* Technical Appendices.

Appendix

Appendix A1.1 Study Characteristics: Nunnery & Ross, 2007 (quasi-experimental design)

Characteristic	Description
Study citation	Nunnery, J. A., & Ross, S. M. (2007). The effects of the School Renaissance program on student achievement in reading and mathematics. *Research in the Schools, 14*(1), 40–59.
Participants	The analysis sample included 992 students (482 treatment, 510 comparison) in the 2001/02 grade 8 cohort from four middle schools (two treatment and two comparison). Of the student sample, 21% qualified for free or reduced-price lunch (21% treatment, 20% comparison), 4% were limited English proficient (4% treatment, 4% comparison), 7% African-American (9% treatment, 6% comparison), 3% Asian (2% treatment, 3% comparison), 19% Hispanic (19% treatment, 20% comparison), 0% Native American (0% treatment, 0% comparison), and 70% were White (69% treatment, 71% comparison). Information about attrition was provided only at the level of assignment. Of the 11 elementary and middle schools originally selected as comparison schools, three schools did not provide appropriate grade-level test score data and were replaced (it is unknown whether any of these replaced schools were middle schools). Students in the analysis sample remained in the same school and had matched data available for three consecutive years (1999/2000–2001/02).
Setting	The treatment group schools came from one suburban school district in Texas. Comparison schools came from other school districts in Texas with similar populations of students.
Intervention	In 2000/01, schools in the treatment group implemented School Renaissance, a comprehensive school reform model that includes *Accelerated Math*. *Accelerated Math* is a progress-monitoring software program that tracks students' daily activities, provides immediate feedback to students and teachers, alerts teachers to students struggling with certain assignments, and monitors achievement. Teachers can use the program with their existing math curriculum. Students in the treatment group experienced two years of the *Accelerated Math* program.
Comparison	Schools in the comparison condition were from Texas school districts that had not implemented the full School Renaissance package. However, it is still possible that some elements of *Accelerated Math* were present in the comparison schools.
Primary outcomes and measurement	The study used the Texas Learning Index (TLI) math scores (based on the Texas Assessment of Academic Skills); for the grade 8 cohort, program comparisons were based on average transformed scores for grades 7 and 8 from 2001 and 2002. The TLI has a common interpretation across grades: a score of 70 or above indicates performance at or above grade-level expectations. A student receiving the same score at consecutive grade levels made one year of academic progress. For a more detailed description of these outcome measures, see Appendix A2.
Staff/teacher training	A Renaissance coach conducts an initial training seminar and provides ongoing assistance to teachers.

Appendix A1.2 Study Characteristics: Ysseldyke & Bolt, 2007 (randomized controlled trial with attrition)

Characteristic	Description
Study citation	Ysseldyke, J., & Bolt, D. M. (2007). Effect of technology-enhanced continuous progress monitoring on math achievement. *School Psychology Review, 36*(3), 453–467.
Participants[1]	The initial study sample included 3,309 students in grades 2–8 during the 2003/04 school year from 133 classrooms in nine schools, representing eight school districts in eight states. In the initial study sample 1% of the students were Asian, 28% African-American, 38% Hispanic, 0% Native American, 24% White, and 8% not specified. This review focuses on the middle school sample, which initially included 1,823 grade 6–8 students (1,010 treatment and 813 control) in 73 classrooms (41 treatment and 32 control). Demographic data on the middle school students could not be culled from the original study. Middle school classrooms dropped from the analysis include: 7 special education or enrichment treatment classrooms taught by teachers who had access to, but did not receive training in, *Accelerated Math*; 4 classrooms (2 treatment, 2 control) taught by two teachers who, according to the authors, arbitrarily chose which students to treat; and 22 classrooms (11 treatment, 11 controls) in a large, urban middle school district that, according to the authors, was unable to devote sufficient time and resources to *Accelerated Math*. The results here are drawn from the test-takers in the 40 middle school classrooms (21 treatment, 19 control) included in the analysis—792 students took the STAR Math test (418 treatment, 374 control) and 851 took the Terra Nova test (454 treatment, 397 control). Postattrition treatment and control groups were equivalent on pretests at baseline. Because these samples reflect attrition rates greater than 20%, the WWC rated this study as meeting evidence standards with reservations.
Setting	The study took place in eight schools in seven districts in seven states: Alabama, Florida, Michigan, Mississippi, North Carolina, South Carolina, and two schools in Texas. The middle school sample analyzed here comprises three schools in Michigan, Mississippi, and North Carolina.
Intervention	Students were taught by teachers using the *Accelerated Math* program during the 2003/04 school year. *Accelerated Math* is a progress-monitoring software program that teachers can use with their existing math curriculum. The program tracks students' daily activities, provides immediate feedback to students and teachers, alerts teachers to students struggling with certain assignments, and monitors student achievement. Teachers assigned to the treatment group were asked to use *Accelerated Math* with their present math curriculum. In practice, the program was not implemented for approximately 40% of grade 2–8 students in the initial treatment group; the authors did not report the percentage of grade 6–8 students in the treatment group of the analysis sample that did not participate in *Accelerated Math*.
Comparison	Students in the control group were taught using existing math curricula, without *Accelerated Math*. The existing curricula included: Scott Foresman Middle School Math, Consumer Math, Everyday Math, Transition Math (Prentice Hall), and Chicago Math in Michigan; Glencoe in Mississippi; and Glencoe, McGraw-Hill, and the state curriculum in North Carolina. Control students had the same teachers as the intervention group students.
Primary outcomes and measurement	Participating students were pretested in October 2003 and posttested in May 2004 using two nationally normed, standardized tests (STAR Math and Terra Nova) for math achievement. Students in the treatment and control groups were compared using a linear regression analysis in which posttest scores were regressed on pretest scores and on dummy variables related to main effects for experimental condition and school.
Staff/teacher training	Teachers in the intervention group were trained to use *Accelerated Math*. During the school year, teachers using *Accelerated Math* received three to five visits from a Renaissance Learning math consultant, who guided teachers on how to improve their use of the program. Teachers also had unlimited access to technical support.

1. The study authors provided the WWC with sample sizes for the middle schools.

Appendix A1.3 Study Characteristics: Ysseldyke & Tardrew, 2007 (quasi-experimental design)

Characteristic	Description
Study citation	Ysseldyke, J., & Tardrew, S. (2007). Use of a progress monitoring system to enable teachers to differentiate mathematics instruction. *Journal of Applied School Psychology, 24*(1), 1–28.
Participants[1]	The initial study sample included 2,397 students (1,319 treatment and 1,078 comparison) in grades 3–10 during the 2001/02 school year from 125 classrooms (67 treatment and 58 comparison) in 47 schools in 24 states. The middle school analysis sample in this review included 475 grade 6–8 students (235 treatment, 240 comparison) in 25 classrooms (13 treatment, 12 comparison). Of the students, 43% were male (43% treatment, 43% comparison), and 49% female (48% treatment, 51% comparison). Of the total student gender, 7% were reported as unspecified (8% treatment, 6% comparison). Of the students, 0% were Asian (0% treatment, 0% comparison), 1% African-American (1% treatment, 0% comparison), 9% Hispanic (9% treatment, 9% comparison), 0% Native American (0% treatment, 0% comparison), 44% White (38% treatment, 49% comparison), and 46% were reported as unspecified (51% treatment, 42% comparison).
Setting	The study was conducted in 47 schools in 24 states (Alabama, Arkansas, California, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Massachusetts, Michigan, Minnesota, Missouri, Montana, New Mexico, Ohio, Oklahoma, Oregon, Pennsylvania, Tennessee, Texas, Virginia, Washington, and Wisconsin). The authors did not report whether all schools and states were represented in the middle school (grades 6–8) sample.
Intervention	Students were taught by teachers using *Accelerated Math* during the spring semester of the 2001/02 school year. A progress-monitoring software program, *Accelerated Math* can be used with teachers' existing math curriculum. The program tracks students' daily activities, provides immediate feedback to students and teachers, alerts teachers' to students struggling with certain assignments, and monitors student achievement. Teachers assigned to the *Accelerated Math* treatment group were asked to use the program with their existing math curriculum.
Comparison	Teachers assigned to the comparison group did not use *Accelerated Math* but continued their usual math curriculum and practices.
Primary outcomes and measurement	Using a computer adaptive test of math achievement (STAR Math), students were pretested in January 2002 and posttested in May 2002.
Staff/teacher training	Intervention teachers participated in a one-day training session conducted by Renaissance Learning. The training was designed to familiarize teachers with *Accelerated Math* and to guide them in integrating it into curriculum and instruction. Of 68 treatment group teachers in the full sample, 66 attended the training.

1. The study authors provided the WWC with the number of middle school classrooms by treatment status.

Appendix A2 Outcome measures for the math achievement domain

Outcome measure	Description
Texas Learning Index math scores (based on the Texas Assessment of Academic Skills)	The Texas Assessment of Academic Skills (TAAS) is a criterion-referenced standardized state test that measures problem-solving and critical-thinking skills. The Texas Learning Index (TLI) is an outcome metric, based on student performance on the TAAS, which allows for comparisons between administrations and between grades. The TLI has a common interpretation across grades: a score of 70 or above indicates the student performed at or above grade-level expectations. A student receiving the same score at consecutive grade levels made one year of academic progress. Analyses in the study were based on a transformation of the TLI that was conducted to induce normality.
STAR Math assessment	STAR Math is a computer-adaptive math test that assesses math skills. It combines computation and numeration items with word problems, estimation, statistics, charts and graphs, geometry, measurement, and algebra. STAR scores can appear as scaled scores or normal curve equivalent values.
Terra Nova mathematics subtest	The Terra Nova subtest is a national norm-referenced test that assesses academic performance in math.

Appendix A3 Summary of study findings included in the rating for the math achievement domain[1]

			Authors' findings from the study		WWC calculations			
			Mean outcome (standard deviation)[2]					
Outcome measure	Study sample	Sample size (clusters/ students)	*Accelerated Math* group	Comparison group	Mean difference[3] (*Accelerated Math*-comparison)	Effect size[4]	Statistical significance[5] (at $\alpha = 0.05$)	Improvement index[6]
Nunnery & Ross, 2007 (quasi-experimental design)[7]								
2001 and 2002 transformed Texas Learning Index scores	Grade 8 cohort	4/992	1.21[8] (0.47)	1.16[8] (0.44)	0.05	0.11	ns	+4
Average for math achievement (Nunnery & Ross, 2007)[9]						**0.11**	**ns**	**+4**
Ysseldyke & Bolt, 2007 (randomized controlled trial with attrition)[7]								
2004 STAR Math normal curve equivalent scores	Grades 6–8	40/792	48.11[10] (18.90)	44.45[11] (20.06)	3.66	0.19	ns	+7
2004 Terra Nova normal curve equivalent scores	Grades 6–8	40/851	46.89[10] (18.67)	48.17[11] (18.69)	–1.28	–0.07	ns	–3
Average for math achievement (Ysseldyke & Bolt, 2007)[9]						**0.06**	**ns**	**+2**
Ysseldyke & Tardrew, 2007, grade 6 cohort (quasi-experimental design)[7]								
2002 STAR Math scale scores	Grade 6	17/326	773.43[12] (114.49)	762.80[13] (93.82)	10.63	0.10	ns	+4
Average for math achievement (Ysseldyke & Tardrew, 2007 grade 6)[9]						**0.10**	**ns**	**+4**
Ysseldyke & Tardrew, 2007, grades 7 and 8 cohort (quasi-experimental design)[7]								
2002 STAR Math scale scores	Grades 7 and 8	8/149	801.14[12] (87.53)	786.47[13] (83.33)	14.67	0.17	ns	+7
Average for math achievement (Ysseldyke & Tardrew, 2007, grades 7 and 8)[9]						**0.17**	**ns**	**+7**
Domain average for math achievement across all studies[9]						**0.11**	**na**	**+4**

ns = not statistically significant
na = not applicable

1. This appendix reports findings considered for the effectiveness rating and the average improvement indices for the math achievement domain.
2. The standard deviation across all students in each group shows how dispersed the participants' outcomes are: a smaller standard deviation on a given measure would indicate that participants had more similar outcomes.
3. Positive differences and effect sizes favor the intervention group; negative differences and effect sizes favor the comparison group.
4. For an explanation of the effect size calculation, see Technical Details of WWC-Conducted Computations.
5. Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups.

(continued)

6. The improvement index represents the difference between the percentile rank of the average student in the intervention condition and that of the average student in the comparison condition. The improvement index can take on values between –50 and +50, with positive numbers denoting results favorable to the intervention group.
7. The level of statistical significance was reported by the study authors or, where necessary, calculated by the WWC to correct for clustering within classrooms or schools and for multiple comparisons. For an explanation about the clustering correction, see the WWC Tutorial on Mismatch. For the formulas the WWC used to calculate statistical significance, see Technical Details of WWC-Conducted Computations. In the case of Nunnery and Ross (2007), a correction for clustering was needed, so the significance levels may differ from those reported in the original study; no corrections for multiple comparisons were needed because there is only one outcome in this domain. In the case of Ysseldyke and Bolt (2007), a correction for clustering was needed, so the significance levels may differ from those reported in the original study; no corrections for multiple comparisons were needed because the WWC-computed effect sizes were not statistically significant. In the case of Ysseldyke and Tardrew (2007), a correction for clustering was needed, so the significance levels may differ from those reported in the original study; no corrections for multiple comparisons were needed because there is only one outcome in this domain.
8. Nunnery and Ross (2007, pp. 45–46) computed a transformation of the Texas Learning Index score to induce the distribution into normality to allow for an analysis of covariance.
9. The WWC-computed average effect sizes for each study and for the domain across studies are simple averages rounded to two decimal places. The average improvement indices are calculated from the average effect sizes.
10. The intervention group values from Ysseldyke and Bolt (2007) are the control group average plus the program coefficient from a regression analysis that controls for baseline pretest scores. The study authors provided the WWC with the program coefficient, unadjusted average, and standard deviations for both groups.
11. The control group average from Ysseldyke and Bolt (2007) are unadjusted.
12. The intervention group values from Ysseldyke and Tardrew (2007) are the comparison group means plus the difference in mean gains between the intervention (*Accelerated Math*) and comparison groups.
13. The comparison group means from Ysseldyke and Tardrew (2007) are unadjusted.

Appendix A4 *Accelerated Math* rating for the math achievement domain

The WWC rates an intervention's effects for a given outcome domain as positive, potentially positive, mixed, no discernible effects, potentially negative, or negative.[1]

For the outcome domain of math achievement, the WWC rated *Accelerated Math* as no discernible effects. The remaining ratings (potentially negative effects and negative effects) were not considered, as *Accelerated Math* was assigned the highest applicable rating.

Rating received

No discernible effects: No affirmative evidence of effects.

- Criterion 1: No studies showing a statistically significant or substantively important effect, either *positive* or *negative.*

  Met. No studies showed statistically significant or substantively important positive or negative effects.

Other ratings considered

Positive effects: Strong evidence of a positive effect with no overriding contrary evidence.

- Criterion 1: Two or more studies showing statistically significant *positive* effects, at least one of which met WWC evidence standards for a *strong* design.

  Not met. No studies showed statistically significant positive effects.

AND

- Criterion 2: No studies showing statistically significant or substantively important *negative* effects.

  Met. No studies showed statistically significant or substantively important negative effects.

Potentially positive effects: Evidence of a positive effect with no overriding contrary evidence.

- Criterion 1: At least one study showing a statistically significant or substantively important *positive* effect.

  Not met. No studies showed statistically significant or substantively important positive effects.

AND

- Criterion 2: No studies showing a statistically significant or substantively important *negative* effect and fewer or the same number of studies showing *indeterminate* effects than showing statistically significant or substantively important *positive* effects.

  Not met. The three studies that evaluated math achievement and met WWC standards showed indeterminate effects.

Mixed effects: Evidence of inconsistent effects as demonstrated through EITHER of the following.

- Criterion 1: At least one study showing a statistically significant or substantively important *positive* effect, and at least one study showing a statistically significant or substantively important *negative* effect, but no more such studies than the number showing a statistically significant or substantively important *positive* effect.

  Not met. No studies showed statistically significant or substantively important effects, either positive or negative.

OR

- Criterion 2: At least one study showing a statistically significant or substantively important effect, and more studies showing an *indeterminate* effect than showing a statistically significant or substantively important effect.

  Not met. No studies showed statistically significant or substantively important effects, either positive or negative.

1. For rating purposes, the WWC considers the statistical significance of individual outcomes and the domain-level effect. The WWC also considers the size of the domain-level effect for ratings of potentially positive or potentially negative effects. For a complete description, see the WWC Intervention Rating Scheme.

Appendix A5 Extent of evidence by domain

Outcome domain	Number of studies	Sample size: Schools	Sample size: Students	Extent of evidence[1]
Math achievement	3	>7[2]	≥2,259[3]	medium to large

1. A rating of "medium to large" requires at least two studies and two schools across studies in one domain and a total sample size across studies of at least 350 students or 14 classrooms. Otherwise, the rating is "small."
2. Nunnery and Ross (2007) include four middle schools. Ysseldyke and Bolt (2007) include three middle schools. Ysseldyke and Tardrew (2007) do not report the number of middle schools.
3. Nunnery and Ross (2007) include 992 middle school students in the analysis sample. Ysseldyke and Tardrew (2007) include 326 grade 6 students and 149 grade 7 and 8 students. Ysseldyke and Bolt (2007) include 792 students in the analysis of the STAR Math outcome and 851 students in the analysis of the Terra Nova outcome, but the authors do not report the extent of overlap between the two samples.