What Works Clearinghouse

ies 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)

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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 Clearing-house, 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.