

# Accelerated Math Software and Best Practices

## Key Scientifically Based Research Summary

Accelerated Math software makes the essential student practice component of any math curriculum more effective. This practice time is personalized to each student's individual level to ensure a high rate of success and immediately followed by feedback to help educators target instruction. Personalized math practice includes closely monitoring student progress and intervening with appropriate instruction when necessary.

Accelerated Math software and best classroom practices have been shown by scientifically based research to be effective in helping educators dramatically accelerate math growth in K–12 classrooms. Numerous studies by independent researchers demonstrate that students' math abilities improve with the use of Accelerated Math and best practices, and that the performance gap between various subgroups of students is substantially reduced.

The large evidence base supporting Accelerated Math consists of a number of *experimental* and *quasi-experimental* research studies—generally considered by both the **No Child Left Behind Act** and the research community to provide the strongest evidence of effectiveness and to be consistent with the definition of scientifically based research—and includes articles that have been published in *peer-reviewed journals*. Key studies that support Accelerated Math are summarized on these pages.

### Large-Scale Study Reveals Impact of Accelerated Math on Grades 3–10 and Subgroups

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

Ysseldyke, J., & Tardrew, S. (2003). *Differentiating math instruction: A large-scale study of Accelerated Math* (Final Report). Madison, WI: Renaissance Learning.

#### Study Details

Location: 24 U.S. states

Design: Independent, quasi-experimental, peer-reviewed

Sample: 2,202 students in grades 3–10 at 47 schools

Measure: STAR Math

Duration: 1 semester

#### Results

Students in Accelerated Math classes gained 7 to 18 percentiles more than comparison students. In every grade and subgroup identified, such as eligibility for Title I and free or reduced-lunch programs, students in Accelerated Math classes performed better than students in classes not using the software. Additionally, students who more closely followed best practices by scoring greater than 85% correct and completing more objectives, gained even more than students who did not.

Accelerated Math educators reported qualitative improvements in their classrooms as well—teachers spent more time providing individual instruction, students spent more time academically engaged, and students enjoyed math more and took responsibility for their work. Eighty percent of Accelerated Math educators stated that students were learning basic math skills better.

#### For More Information

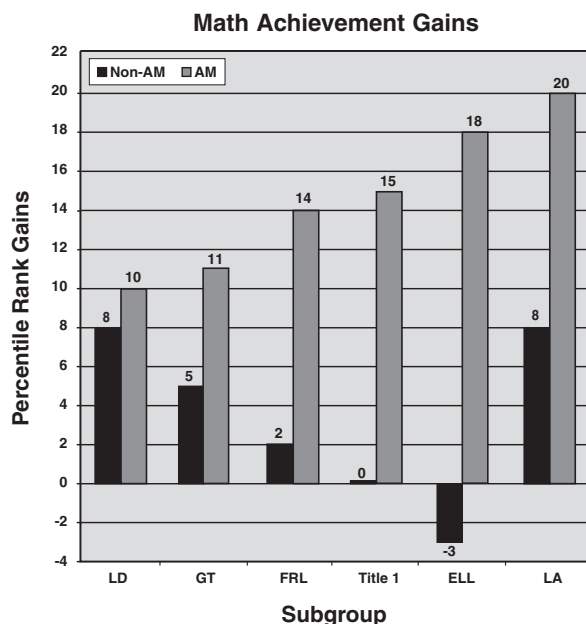
Article: Email [research@renlearn.com](mailto:research@renlearn.com) to request a copy.

Report (L1645): <http://research.renlearn.com/research/pdfs/129.pdf>

#### About the Authors

**Jim Ysseldyke, Ph.D., NCSP** is Emma Birkmaier Professor of School Psychology in the Department of Educational Psychology at the University of Minnesota. He specializes in research and development focused on enhancement of student competence and building the capacity of systems to meet students' needs.

**Steven Tardrew** was formerly director of research and evaluation for Renaissance Learning, Inc.



LD=Learning Disabled or Special Needs GT=Gifted and Talented  
FRL=Free/Reduced Lunch Title 1=Students in Title 1 Programs  
ELL=English Language Learners LA=Low Achievers

## Accelerated Math With Best Practices Is Key to More Growth

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

### About the Authors

**Jim Ysseldyke, Ph.D., NCSP** is Emma Birkmaier Professor of School Psychology in the Department of Educational Psychology at the University of Minnesota. He specializes in research and development focused on enhancement of student competence and building the capacity of systems to meet students' needs.

**Daniel Bolt, Ph.D.** is an associate professor of educational psychology at the University of Wisconsin–Madison, where he specializes in quantitative methods.

### Study Details

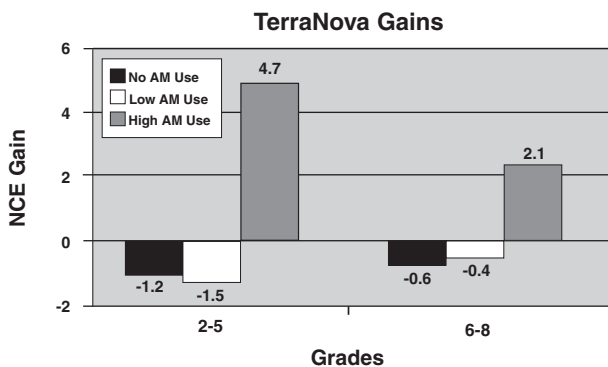
Location: 8 schools in AL, FL, MI, MS, NC, SC, and TX  
 Design: Independent, experimental, peer-reviewed  
 Sample: 1,880 elementary and middle school students  
 Measures: STAR Math, TerraNova  
 Duration: 1 school year

### Results

In selecting the sample for this study, an attempt was made to represent at least 3 different states, historically disadvantaged groups, and schools receiving Title I funding. Classrooms were randomly assigned to experimental (using Accelerated math with existing curriculum) and control (using only existing curriculum) groups. Students were pre- and posttested using STAR Math and TerraNova. Analysis of first-year data shows there were big differences in how teachers implemented Accelerated Math—some students spent much time using Accelerated Math, while others spent little time, and still others spent virtually no time. The key finding: When Accelerated Math is implemented as intended, students gain significantly more than students with limited or no implementation.

### For More Information

Summary: <http://research.renlearn.com/research/pdfs/186.pdf>  
 Article: Email [research@renlearn.com](mailto:research@renlearn.com) to request a copy.



## Schoolwide Accelerated Math Implementation Benefits Georgia Students

Holmes, C. T., Brown, C. L., & Algozzine, B. (2006). Promoting academic success for all students. *Academic Exchange Quarterly*, 10(3), 141–147.

Holmes, C. T., & Brown, C. L. (2003). *A controlled evaluation of a total school improvement process*. *School Renaissance* (Tech. Rep.). Athens: University of Georgia, Department of Educational Administration.

### About the Authors

**C. Thomas Holmes, Ed.D.** is a professor of educational leadership in the Department of Workforce Education, Leadership, and Social Foundations at the University of Georgia.

**Carvin L. Brown, Ed.D.** is professor emeritus at the University of Georgia and executive director of the Georgia Accrediting Commission.

**Bob Algozzine, Ph.D.** is a professor in the Department of Educational Leadership and director of the Behavior and Reading Improvement Center at the University of North Carolina at Charlotte.

### Study Details

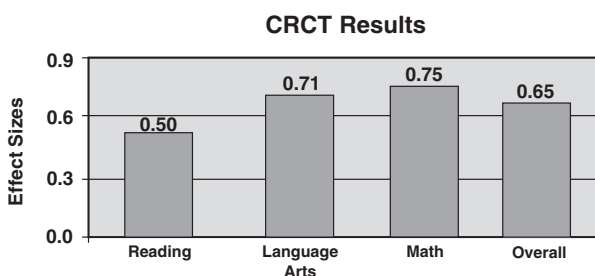
Location: Central and Northern Georgia  
 Design: Independent, quasi-experimental, peer-reviewed  
 Sample: 2,287 students at 4 elementary schools  
 Measures: STAR Math, STAR Reading, Georgia Criterion-Referenced Competency Test (CRCT)  
 Duration: 3 years

### Results

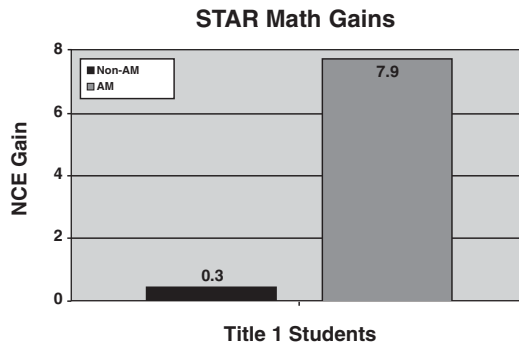
Of the 4 Title I schools in the sample, 2 were located in urban areas and 2 were located in rural areas. One school in each area was either a high or low implementer of Accelerated Reader and Accelerated Math. Results from the CRCT indicated that students in the 2 high-implementing schools outperformed students in the 2 low-implementing comparison schools overall (Effect size, ES = 0.65) and in reading (ES = 0.50), language arts (ES = 0.71), and math (ES = 0.75). Researcher observations confirmed that the 2 high-implementation schools engaged in Accelerated Math best classroom practices more often than the 2 low-implementation schools.

### For More Information

Summary (L2420): <http://research.renlearn.com/research/pdfs/136.pdf>  
 Article: Email [research@renlearn.com](mailto:research@renlearn.com) to request a copy.  
 Report: <http://www.eric.ed.gov/>, search for ED474261



## Title I Students See Improvement in Test Scores After Using Accelerated Math



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.

### Study Details

Location: 24 U.S. states

Design: Independent, quasi-experimental, peer-reviewed

Sample: 870 students in grades 3–6 at 47 schools

Measure: STAR Math

Duration: 1 semester

### Results

The students in this study were a subset of students who participated in a large national experiment by Ysseldyke and Tardrew, 2003 (see page 1). A two-group pretest/posttest comparison was used to evaluate the hypothesis that students in a Title I program whose teachers used Accelerated Math would show greater gains in mathematics achievement than similar students in a Title I program who received no intervention other than their regular math instruction. Results show that students using Accelerated Math significantly outperformed the comparison group with an average gain of 7.9 normal curve equivalents (NCEs) compared to an average gain of 0.3 NCEs for students not using Accelerated Math—a difference in gain of 7.6 NCEs. Thus, evidence was found to support the claim that Accelerated Math can improve the math achievement of Title I students.

### For More Information

Summary (L2235): <http://research.renlearn.com/research/pdfs/161.pdf>

Article: Email [research@renlearn.com](mailto:research@renlearn.com) to request a copy.

### About the Authors

**Jim Ysseldyke, Ph.D., NCSP** is Emma Birkmaier Professor of School Psychology in the Department of Educational Psychology at the University of Minnesota. He specializes in research and development focused on enhancement of student competence and building the capacity of systems to meet students' needs.

**Joseph Betts, MMIS, Ph.D.** is a school psychologist and measurement statistician. His research interests include latent variable modeling and utilizing technology in the classroom to improve student learning.

## Accelerated Math Helps Minnesota Students Surpass District on NALT

Ysseldyke, J., Spicuzza, R., Kosciolk, S., & Boys, C. (2003). Effects of a learning information system on mathematics achievement and classroom structure. *Journal of Educational Research, 96*(3), 163–173.

### Study Details

Location: Minneapolis, Minnesota

Design: Independent, quasi-experimental, peer-reviewed

Sample: 160 students in grades 4 and 5 at 3 schools

Measures: STAR Math, Northwest Achievement Levels Test (NALT)

Duration: 1 year

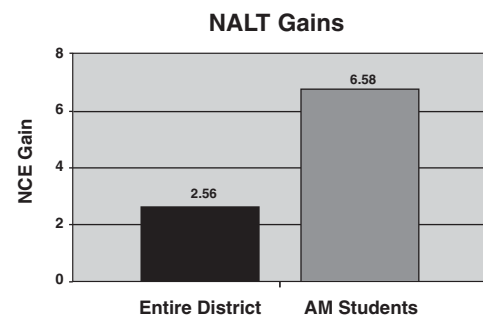
### Results

This quasi-experimental study examined the effects of Accelerated Math on math achievement and classroom behaviors known to be related to overall student achievement. Sixty-eight percent of students participating in the study at these urban schools were eligible for free or reduced-price lunch. Independent researchers assigned students to classes that used the district curriculum, Everyday Math, with Accelerated Math and without. Students in Accelerated Math classrooms excelled in mathematics achievement on STAR Math and the NALT, including outperforming a district sample on the NALT by 4.02 normal curve equivalents (NCEs).

### For More Information

Summary (L2258): <http://research.renlearn.com/research/pdfs/148.pdf>

Article: Email [research@renlearn.com](mailto:research@renlearn.com) to request a copy.

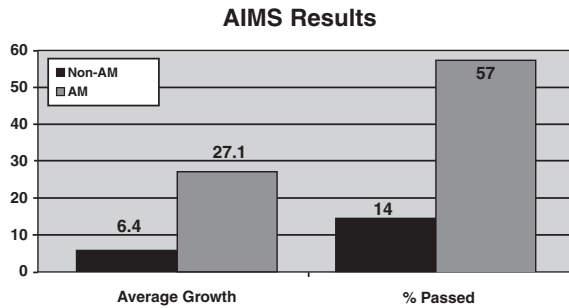


### About the Authors

**Jim Ysseldyke, Ph.D., NCSP** is Emma Birkmaier Professor of School Psychology in the Department of Educational Psychology at the University of Minnesota. He specializes in research and development focused on enhancement of student competence and building the capacity of systems to meet students' needs.

**Richard Spicuzza, Ph.D.** is director of research, evaluation, and assessment in the South Washington Public Schools System, and holds graduate teaching status at the University of Minnesota.

## Juniors at Arizona High School Pass the AIMS After Accelerated Math Intervention



### About the Authors

**Robert M. Springer, Ph.D.** is the vice president of education for SaddleBrooke Community Outreach. He directs a math and reading tutoring program with about 150 tutors at 7 schools ranging from 3rd grade to high school.

**David Pugalee, Ph.D.** is an associate professor in the Department of Middle, Secondary, and K–12 Education, and a research associate for the Center for Mathematics, Science, and Technology Education at the University of North Carolina at Charlotte.

**Bob Algozzine, Ph.D.** is a professor in the Department of Educational Leadership and director of the Behavior and Reading Improvement Center at the University of North Carolina at Charlotte.

Springer, R. M., Pugalee, D., & Algozzine, B. (2007). Improving mathematics skills of high school students. *Clearing House*, 81(1), 37–44.

### Study Details

Location: Arizona

Design: Independent, experimental, peer-reviewed

Sample: 28 students in grade 11

Measure: Arizona Instrument to Measure Standards (AIMS)

Duration: 1 year

### Results

High school juniors who failed the AIMS in 10th grade were randomly assigned to 2 groups. The experimental group enrolled in a course designed to aid in passing the AIMS test, which used Accelerated Math. The control group participated in normal 11th-grade curriculum without extra assistance.

More than half the students in the Accelerated Math class passed the AIMS test. And, all students in the Accelerated Math classroom demonstrated positive gains on the AIMS test.

### For More Information

Summary (L2161): <http://research.renlearn.com/research/pdfs/190.pdf>

Article: Email [research@renlearn.com](mailto:research@renlearn.com) to request a copy.

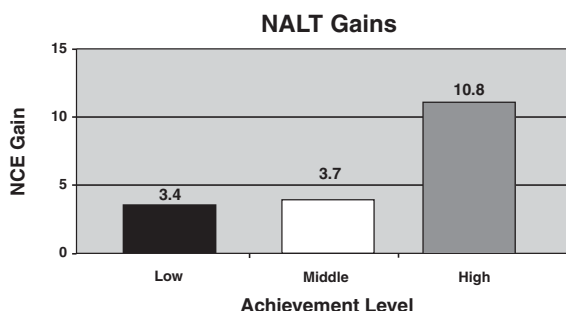
## Accelerated Math Practice Allows Midwestern Students to Exceed National Norms

Ysseldyke, J., Spicuzza, R., Kosciolk, 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.

### About the Authors

**Jim Ysseldyke, Ph.D., NCSP** is Emma Birkmaier Professor of School Psychology in the Department of Educational Psychology at the University of Minnesota. He specializes in research and development focused on enhancement of student competence and building the capacity of systems to meet students' needs.

**Richard Spicuzza, Ph.D.** is director of research, evaluation, and assessment in the South Washington Public Schools System, and holds graduate teaching status at the University of Minnesota.



### Study Details

Location: Large Midwestern school district

Design: Independent, quasi-experimental, peer-reviewed

Sample: 881 students in grades 3–5 at 4 schools

Measures: STAR Math, Northwest Achievement Levels Test (NALT)

Duration: 1 year

### Results

This study examined the effect of Accelerated Math on overall student achievement in a large urban district composed of approximately 75% minority students and 67% free or reduced-price lunch eligibility. Independent researchers assigned the students to use Accelerated Math with their curriculum or to continue using only their regular curriculum. Researchers found that students at all ability levels who used Accelerated Math demonstrated accelerated rates of performance compared to national norms. Gains ranged from 3.4 to 10.8 NCEs on the NALT, and were similar on STAR Math. Additionally, the study showed that high-, middle-, and low-performing students surpassed national norms, after beginning below national norms before participating in the Accelerated Math classroom.

### For More Information

Summary (L2295): <http://research.renlearn.com/research/pdfs/119.pdf>

Article: Email [research@renlearn.com](mailto:research@renlearn.com) to request a copy.

## Accelerated Math Spells Success for English Language Learners in Minnesota

Teelucksingh, E., Ysseldyke, J., Spicuzza, R., & Ginsburg-Block, M. (2001). *Enhancing the learning of English language learners: Consultation and a curriculum based monitoring system*. Minneapolis: University of Minnesota, National Center for Educational Outcomes.

### Study Details

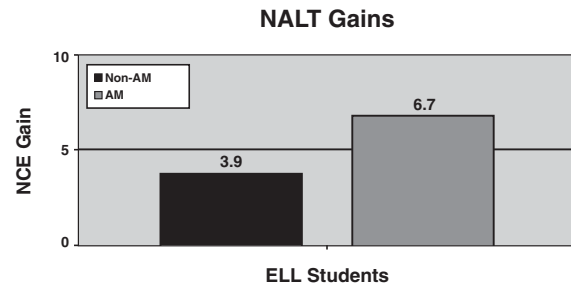
Location: Minneapolis, Minnesota  
 Design: Independent, quasi-experimental  
 Sample: 201 ELL students in grades 4 and 5  
 Measures: STAR Math, Northwest Achievement Levels Test (NALT)  
 Duration: 1 semester

### Results

At 4 urban schools, the math performance of ELL students using Accelerated Math with best classroom practices was compared to a control group of students who did not receive the intervention. ELL students participating in classrooms using Accelerated Math in conjunction with their math curriculum gained 6.7 normal curve equivalents (NCEs) on the NALT compared to ELL students from the control group who gained 3.9 NCEs.

### For More Information

Report (L0957): <http://cehd.umn.edu/nceo/onlinePubs/CBAreportELL.pdf>



### About the Authors

**Ellen Teelucksingh, Ph.D.** is an administrative intern, program facilitator, and school psychologist with Intermediate District 287 located in Plymouth, Minnesota. Her practice, writing, and research have focused on identifying and implementing best practices related to academic and social-emotional interventions for students receiving special education services.

**Jim Ysseldyke, Ph.D., NCSP** is Emma Birkmaier Professor of School Psychology in the Department of Educational Psychology at the University of Minnesota. He specializes in research and development focused on enhancement of student competence and building the capacity of systems to meet students' needs.

## Midwestern Students at All Achievement Levels Make Greater Gains With Accelerated Math

Spicuzza, R., Ysseldyke, J., Lemkuil, A., McGill, S., Boys, C., & Teelucksingh, E. (2001). Effects of curriculum-based monitoring on classroom instruction and math achievement. *Journal of School Psychology, 39*(6), 521–542.

### About the Authors

**Richard Spicuzza, Ph.D.** is director of research, evaluation, and assessment in the South Washington Public Schools System, and holds graduate teaching status at the University of Minnesota.

**Jim Ysseldyke, Ph.D., NCSP** is Emma Birkmaier Professor of School Psychology in the Department of Educational Psychology at the University of Minnesota. He specializes in research and development focused on enhancement of student competence and building the capacity of systems to meet students' needs.

### Study Details

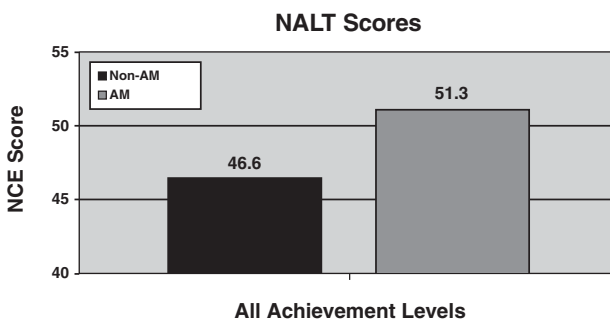
Location: Large Midwestern school district  
 Design: Independent, quasi-experimental, peer-reviewed  
 Sample: 198 students in grades 4 and 5 at 4 schools  
 Measures: STAR Math, Northwest Achievement Levels Test (NALT)  
 Duration: 4 months

### Results

The majority of students participating in the study at these urban schools were eligible for free or reduced-price lunch. Accelerated Math students at all achievement levels demonstrated more growth on STAR Math and the NALT than students in non-Accelerated Math classrooms. The STAR Math adjusted mean for Accelerated Math students was 42.96, while comparison students had an adjusted mean of only 31.45. On the NALT, the adjusted normal curve equivalent (NCE) mean for Accelerated Math students was 51.25; for the comparison group it was 46.50. The same students also outperformed a district sample of students in non-Accelerated Math classrooms.

### For More Information

Summary (L0954): <http://research.renlearn.com/research/pdfs/97.pdf>  
 Article: Email [research@renlearn.com](mailto:research@renlearn.com) to request a copy.



## Gifted and Talented Students Score Even Higher After Accelerated Math Practice

Ysseldyke, J., Tardrew, S., 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.

### Study Details

Location: 24 U.S. states

Design: Independent, quasi-experimental, peer-reviewed

Sample: 843 students in grades 3–6 (100 were GT students) at 47 schools

Measure: STAR Math

Duration: 1 semester

### Results

The students who participated in this study were a subset of students who participated in a large national experiment by Ysseldyke and Tardrew, 2003 (see page 1). All students in Accelerated Math classrooms experienced greater gains in achievement than their counterparts in comparison classrooms. Specifically, Gifted and Talented (GT) students in Accelerated Math classrooms advanced significantly more than GT students in comparison classrooms. The mean normal curve equivalent (NCE) gain for the experimental classrooms was 11.9 NCEs, and the mean NCE gain for the control classrooms was 4.8, a difference of 7.1 NCEs. In addition, GT students using Accelerated Math made higher gains, obtained a higher percent correct on practice and test items, attempted more tests, and mastered more objectives than non-GT students.

### For More Information

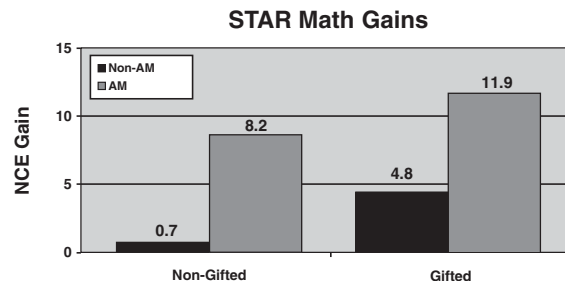
Summary (L2256): <http://research.renlearn.com/research/pdfs/160.pdf>

Article: Email [research@renlearn.com](mailto:research@renlearn.com) to request a copy.

### About the Authors

**Jim Ysseldyke, Ph.D., NCSP** is Emma Birkmaier Professor of School Psychology in the Department of Educational Psychology at the University of Minnesota. He specializes in research and development focused on enhancement of student competence and building the capacity of systems to meet students' needs.

**Steven Tardrew** was formerly director of research and evaluation for Renaissance Learning, Inc.



## Highly Engaged Accelerated Math Students Excel in Southwest

Brem, S. K. (2003). *AM users outperform controls when exposure and quality of interaction are high: A two-year study of the effects of Accelerated Math on math performance in a Title I elementary school*. Tempe: Arizona State University.

### Study Details

Location: Southwestern school

Design: Independent, quasi-experimental

Sample: 478 students in grades 3, 5, and 6

Measures: STAR Math, Stanford Achievement Test (SAT-9)

Duration: 2 years

### Results

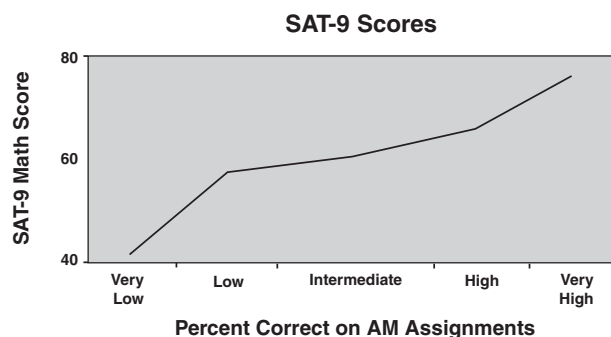
In this longitudinal study at an urban, Title I school, students with a high level of engagement with Accelerated Math, as measured both by number of problems attempted and average percent correct, gained significantly more on the math portion of the SAT-9 than students with lower levels of engagement or no exposure. The study results highlight the importance of teacher training in interpreting and using the data provided by Accelerated Math to guide personalized instruction for all students.

### For More Information

Report: <http://www.drbrem.net/renlearn/AM2004.pdf>

### About the Author

**Sarah Brem, Ph.D.**, a cognitive scientist, is an associate professor in the Division of Psychology in Education at Arizona State University.



# Kansas High School Students Realize Higher Scores With Accelerated Math

Gaeddert, T. (2001). *Using Accelerated Math to enhance student achievement in high school mathematics courses: An action research project*. Unpublished master's thesis, Friends University, Wichita, Kansas.

## Study Details

Location: Buhler, Kansas

Design: Independent, quasi-experimental

Sample: 103 high school pre-algebra, algebra, and geometry students

Measures: STAR Math, Stanford Achievement Test (SAT-9)

Duration: 3.5 months

## Results

Students in the 3 Accelerated Math classes experienced more improvement on the SAT-9 and STAR Math test than students in control classes. The total control group showed an average gain of 3.5 normal curve equivalents (NCEs) while the total intervention group showed an average gain of 10.1 NCEs, an average gain of 6.6 NCEs more than the entire control group. Students also responded to attitudinal surveys at the beginning and end of the study. At the end of the study, students using Accelerated Math showed more improvement in attitudes toward math than students in the control classes. Surveys of parents with children in the intervention classes also indicated more positive attitudes toward math than parents with children in the control classes.

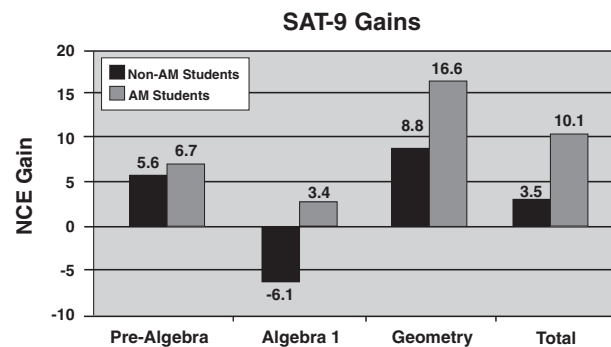
## For More Information

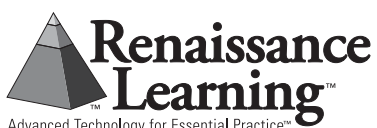
Summary (L0399): <http://research.renlearn.com/research/pdfs/79.pdf>

Report: <http://www.eric.ed.gov/>, search for ED463177

### About the Author

**Terri Gaeddert** is an assistant professor of education at Sterling College in Kansas. In addition to 11 years of public school experience as a math teacher and technology specialist, Gaeddert has written supplementary mathematics curriculum materials for the state of Kansas, including assisting in the development of an online, middle-level, mathematics endorsement program.





PO Box 8036 • Wisconsin Rapids, WI 54495-8036

To access more than 60 additional research pieces on Accelerated Math, visit Renaissance Learning's research website: <http://research.renlearn.com/> or call (800) 338-4204.

Accelerated Math, Advanced Technology for Essential Practice, Renaissance Learning, the Renaissance Learning logo, and STAR Math are trademarks of Renaissance Learning, Inc., and its subsidiaries, registered, common law, or pending in the United States and other countries.

© 2007 Renaissance Learning. All rights reserved.