

Accelerated Math Software and AM 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 AM Best 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 these tools, and that the performance gap between various subgroups of students is substantially reduced. And Accelerated Math was the first progress-monitoring tool reviewed by the **National Center on Response to Intervention** to be categorized as a mastery measurement tool (www.rti4success.org) and has received highest ratings in that category.

The large evidence base supporting Accelerated Math consists of a number of experimental and quasi-experimental research studies—generally considered by 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.

To access more than 90 additional research pieces on Accelerated Math, visit Renaissance Learning's research website: <http://research.renlearn.com/> or call (800) 338-4204.

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

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.

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). Wisconsin Rapids, WI: Renaissance Learning.

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 AM Best Practices by scoring greater than 85% correct and completing more objectives, gained even more than students who did not.

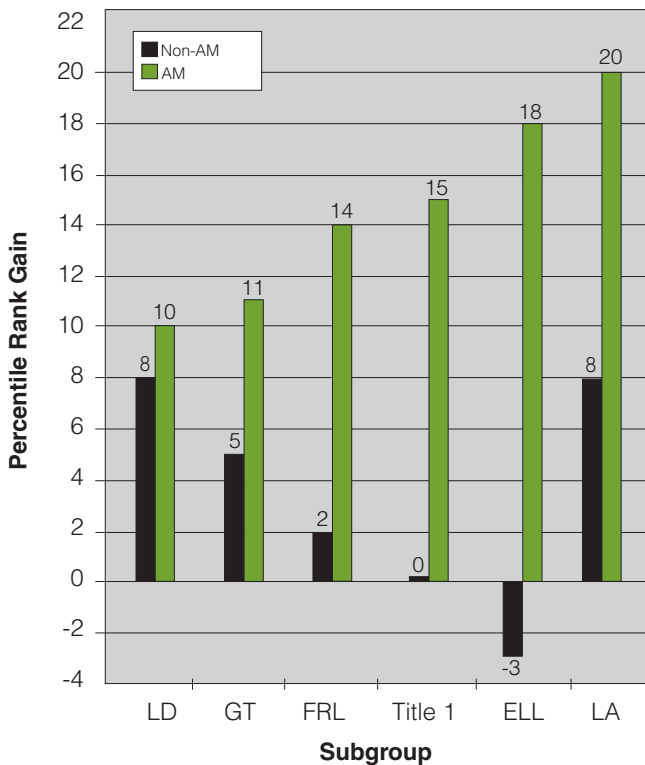
Accelerated Math educators reported qualitative improvements in their classrooms as well—teachers spent more time providing individual instruction, students spent more time academically engaged, and students enjoyed math more and took responsibility for their work. Eighty percent of Accelerated Math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

For more information

Article: Available by request to research@renlearn.com

Report (L1645): <http://doc.renlearn.com/KMNet/R001288803GBE8AC.pdf>

Math Achievement Gains by Subgroup



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

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

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

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: <http://doc.renlearn.com/KMNet/R003475520GEEA02.pdf>
 Article: Available by request to research@renlearn.com

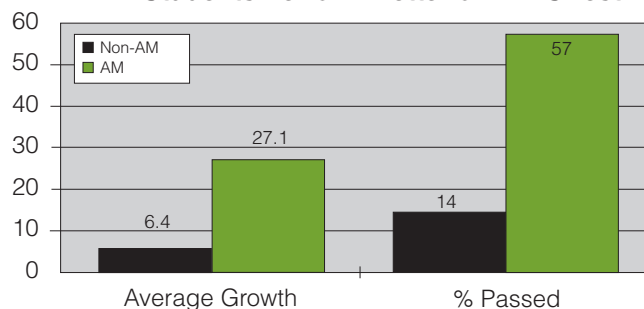
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Robert M. Springer, Ph.D., is the vice president of education for SaddleBrooke Community Outreach. He directs a math and reading tutoring program with about 150 tutors at seven schools ranging from 3rd grade to high school.

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.

AM Students Perform Better on AIMS Test



Accelerated Math With AM 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.

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

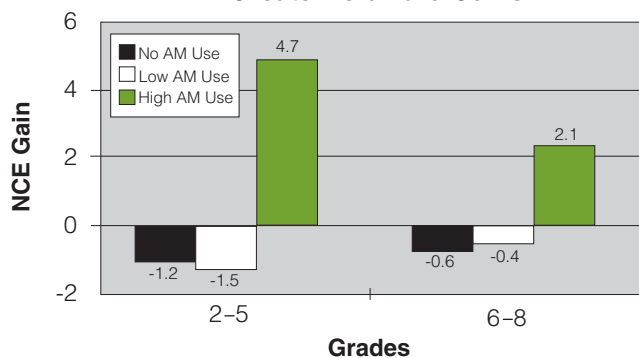
Summary: <http://doc.renlearn.com/KMNet/R003499920GE7223.pdf>
 Article: Available by request to research@renlearn.com

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.

High AM Implementation Leads to Greater TeraNova Gains



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.

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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

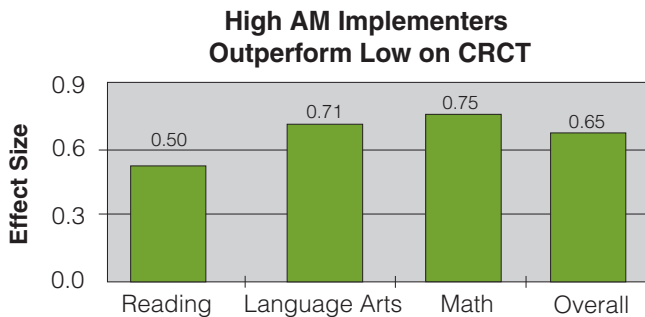
Of the 4 Title I schools in the sample, 2 were located in urban areas and 2 were located in rural areas. One school in each area was either a high or low implementer of Accelerated Math and Accelerated Reader. Results from the CRCT indicated that students in the 2 high-implementing schools outperformed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

For more information

Summary: <http://doc.renlearn.com/KMNet/R003878819GG9143.pdf>

Article: Available by request to research@renlearn.com

Report: <http://www.eric.ed.gov/PDFS/ED474261.pdf>



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

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.

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.

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

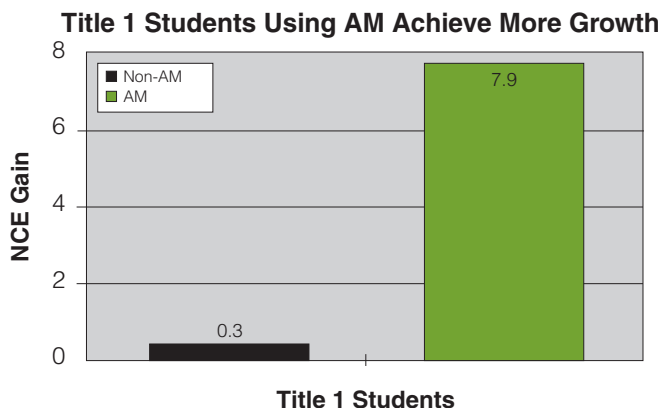
Results

The students in this study were a subset of students who participated in a large national experiment by Ysseldyke and Tardrew, 2003 (see p. 2). 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://doc.renlearn.com/KMNet/R003544112GE9A10.pdf>

Article: Available by request to research@renlearn.com



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.

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 p. 2). 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 using Accelerated Math.

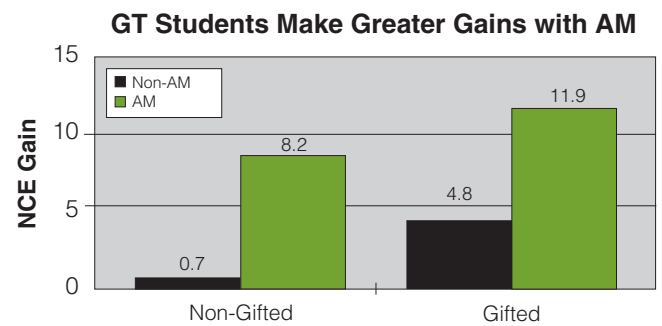
For more information

Summary (L2256): <http://doc.renlearn.com/KMNet/R003557125GFD88E.pdf>
 Article: Available by request to research@renlearn.com

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.

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

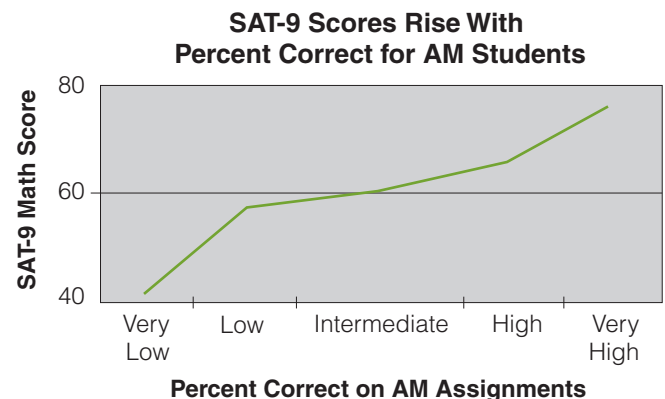
In this longitudinal study at an urban, Title I school, students with a high level of engagement with Accelerated Math, as measured both by number of problems attempted and average percent correct, gained significantly more on the math portion of the SAT-9 than students with lower levels of engagement 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://doc.renlearn.com/KMNet/R004079426GJ598A.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.



Accelerated Math Helps Minnesota Students Surpass District on NALT

About the Authors

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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.

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

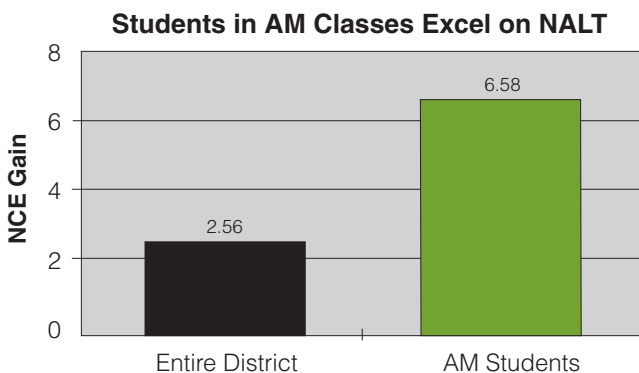
Results

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://doc.renlearn.com/KMNet/R003556912GE515F.pdf>

Article: Available by request to research@renlearn.com



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 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.

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

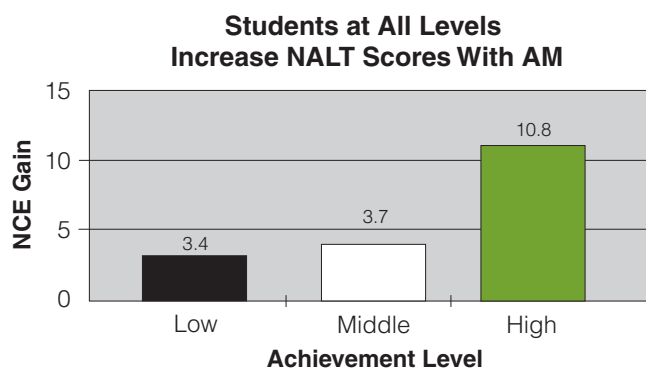
Results

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 achievement 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: <http://doc.renlearn.com/KMNet/R003711127GF6B41.pdf>

Article: Available by request to research@renlearn.com



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.

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

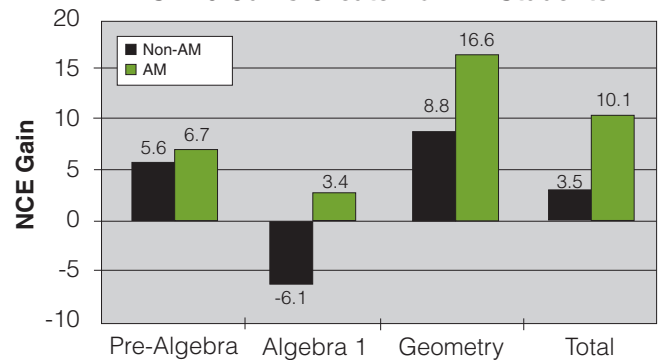
Summary: <http://doc.renlearn.com/KMNet/R001182407GD4B68.pdf>

Report: <http://www.eric.ed.gov/PDFS/ED463177.pdf>

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.

SAT-9 Gains Greater for AM Students



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

Spicuzza, R., Ysseldyke, J., Lemkuil, A., Kosciolk, 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.

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: <http://doc.renlearn.com/KMNet/R001181703GD4955.pdf>

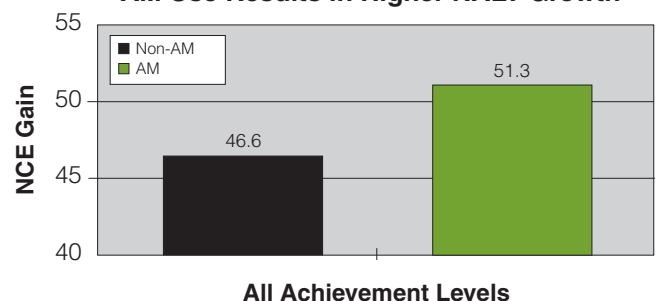
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AM Use Results in Higher NALT Growth



Accelerated Math Equals 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.

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 AM Best 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 equivalent (NCE) on the NALT compared to ELL students from the control group who gained 3.9 NCEs.

For more information

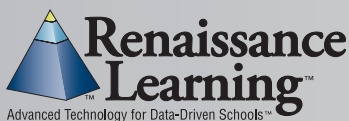
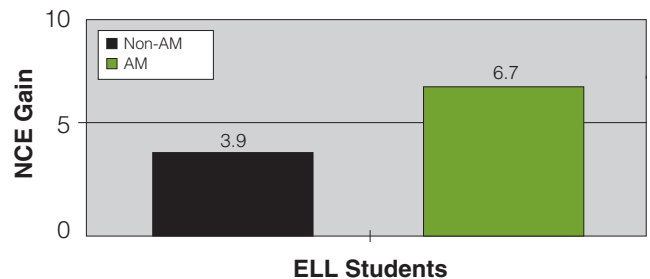
Report: <http://www.cehd.umn.edu/NCEO/onlinepubs/archive/AssessmentSeries/CBAreportELL.pdf>

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ELL Students Make Greater Strides on NALT With AM



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