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**Helping Educators Improve Schools Through Technology and Research.**

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# Summary of Independent Math Research

Regarding Accelerated Math®  
Math Management Software  
and Math Renaissance®  
Professional Development

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**Helping Educators Improve Schools Through Technology and Research.**

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# Introduction

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In 1990, the National Governor’s Association and the President adopted the National Educational Goals, a framework for educational improvement consisting of eight goals to be met by the year 2000. Goal Five states that by the year 2000 United States students will be first in the world in mathematics and science (National Education Goals Panel, 1995). However, recent test score results indicate that the United States has not achieved this goal. In the Third International Mathematics and Science Study (TIMSS), eighth grade students in the United States scored below the international average in math, and eighth-graders in 20 other countries scored higher in math than American eighth-graders (Beaton et. al., 1996). In the 1999 follow-up study, TIMSS-R, U.S. eighth-graders were still outperformed by eighth-graders in 14 other countries (Gonzales et. al., 2000).

In order for U.S. students to compete worldwide, math skills are becoming increasingly important. Nonetheless, our students still trail behind. Among the many factors impacting mathematics achievement, time on task—practice time—is one of the most important. Research demonstrates that increasing time spent on academic tasks boosts achievement, especially in mathematics (Cotton and Wikelund, 1989). Students learn more about a subject if they spend more time studying it—if they have more opportunity to learn (Berliner, 1990; Brophy, 1988). The TIMSS report agrees that time on task is important, but says that this time must be spent efficiently with students academically engaged in mathematics tasks. In other words, simply allotting more time to mathematics instruction and practice is not enough: the time must be used well.

In their *Principles and Standards for School Mathematics*, the National Council of Teachers of Mathematics (NCTM) concurs that time on task is important, but proposes that certain characteristics will make it more effective. For example, NCTM asserts that teachers need frequent formative feedback from a variety of assessment methods to diagnose learning problems promptly, and intervene with individualized attention (NCTM, 2000). Furthermore, the NCTM report contends that students learn more and learn better when they are able to take charge of their learning, set goals, are challenged by aptly chosen tasks, and can monitor their own progress (NCTM, 2000).

Math Renaissance and its learning information systems components, Accelerated Math and STAR Math, offer an effective way to manage time engaged in math tasks. Through a significant increase in available task-level information, teachers are able to individualize instruction, provide more meaningful feedback to students, and closely monitor academic progress. As a result, math achievement improves dramatically.

# Part 1: Internal Research

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## Study Description

The following is an overview of a recent School Renaissance Institute study conducted to examine Accelerated Math usage and test score gains of a national sample of students in a range of grades with a variety of backgrounds and math achievement levels. The Special Math Report is based on STAR Math and Accelerated Math data which was voluntarily supplied by schools across the country. The study includes data from 1,160 students enrolled in grades three through nine during the 1999–2000 school year at 20 different elementary, middle, junior high, and high schools.

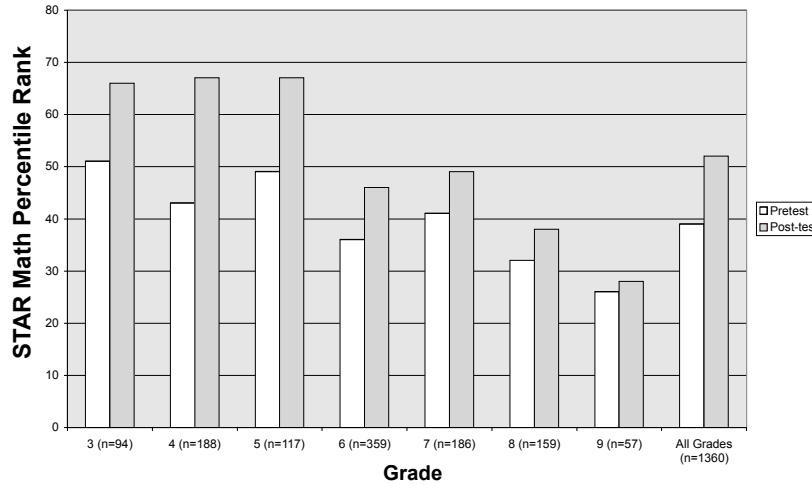
## Results

The study found that overall, these students experienced large gains in math achievement. Change in math achievement levels over the school year was measured using STAR Math, a computer-adaptive, norm-referenced mathematics test. STAR Math tracks student progress with normal curve equivalents (NCEs), percentile ranks (PRs), and grade equivalents (GEs). Both PRs and NCEs illustrate math progress. When students experience growth in achievement over time that is consistent with a national sample of students in their own grade, their PRs and NCEs will remain unchanged from one STAR Math testing to a later one. When students improve their math skills at a faster rate than their peers, their PRs and NCEs will increase over a school year.

STAR Math results for the students in this study demonstrate remarkable PR and NCE increases (See Figure 1). While the largest gains took place in grades three through six, strong gains were present up through ninth grade. Overall, students gained, on average, 13 percentile points during approximately three-quarters of a school year.

Figure 1

**Students Show Large Achievement Gains After Using Accelerated Math**

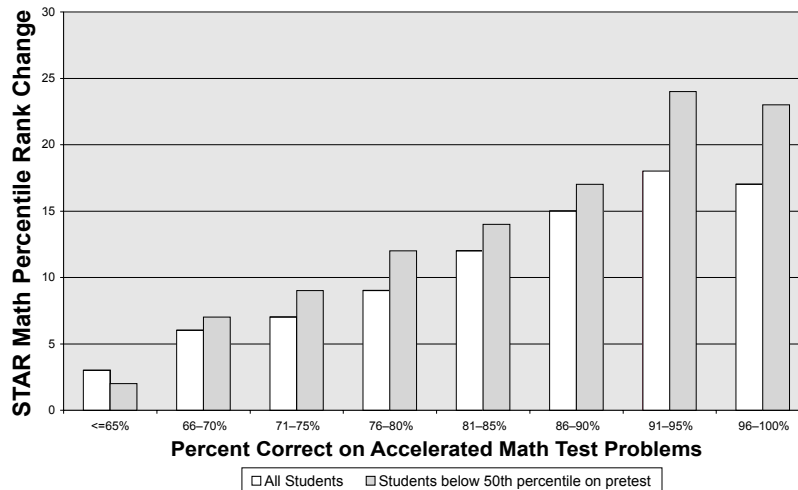


The study also found that students engaging in a greater quality and quantity of math practice using Accelerated Math experienced greater math achievement gains. The study measures the quality of math practice by how well students score on Accelerated Math problems that cover the objectives they are learning. Quantity of math practice is indicated by the number of problems attempted and the number of objectives mastered.

The results in figure 2 show that achievement gains increased as percent correct increased on test, practice, and review problems. Even students with low pretest scores showed greater gains on their post-tests when they maintained higher average percent correct on Accelerated Math test problems.

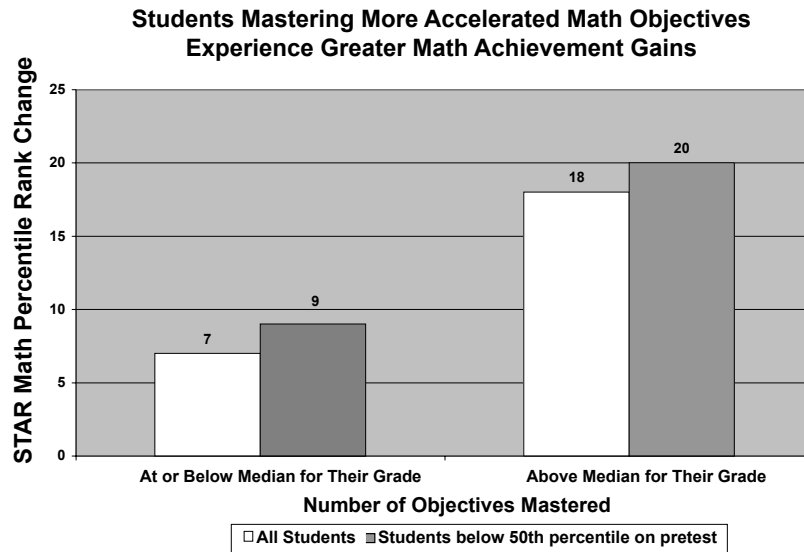
Figure 2

**Students with Higher Percent Correct on Accelerated Math Test Problems Experienced More Math Achievement Growth**



Regarding the quantity of math practice, the study found that increases in objectives mastered led to increases in math achievement (See Figure 3). Students who mastered more Accelerated Math objectives gained more than twice as much as students mastering fewer objectives. As with percent correct, students who initially scored at or below the 50th percentile on their pretests also greatly benefited from mastering more objectives.

Figure 3



The Special Math Report illustrates how students can benefit from sound implementation of Math Renaissance techniques. Overall, students in the study showed significant test score improvements over the school year. In fact, on average, students improved their math skills at an accelerated rate compared to a national peer sample. Yet, students whose practice approached the quality and quantity goals recommended by Math Renaissance experienced even greater gains.<sup>1</sup> The study indicates that students who scored higher on test, practice, and review problems and students who mastered a higher number of objectives experienced greater gains in STAR Math test scores, regardless of their initial math ability. This study strongly suggests dramatic possibilities for improvements in mathematics learning when students attain the quality and quantity goals provided by Math Renaissance.

<sup>1</sup>Math Renaissance currently recommends that students should maintain an average percent correct of 75% on practice problems, 80% correct on review problems, and 85% on test problems. In addition, the goal for quantity of math practice is for a student to complete a Standard Library in a school year (based on 36 weeks). Most students can accomplish this goal with a minimum of 30 minutes of daily math practice; more math practice can result in students advancing to the next library within the school year.

# Section 1: Elementary and Middle Schools

## Accelerated Math Implementation and Math Renaissance Improves Math Performance

Information submitted by Jonathan Lind and Ann Lubas  
Sudley Elementary School, Manassas, Virginia

### Renaissance Independent Research Reports

#### Study Description

Lind and Lubas gathered information for two fourth-grade Accelerated Math classes—17 and 23 students respectively—and one fourth-grade non-Accelerated Math control class of 27 students at Sudley Elementary. Lind and Lubas team-taught Accelerated Math classroom #1, while another instructor taught Accelerated Math classroom #2. A different teacher who did not use Accelerated Math or Math Renaissance taught the control classroom. The Stanford Achievement Test, ninth edition (Stanford 9)<sup>1</sup> was administered to all students in September 1998, and STAR Math was given in November 1998. The graph on the right shows the growth in math performance that occurred between the two testing dates.

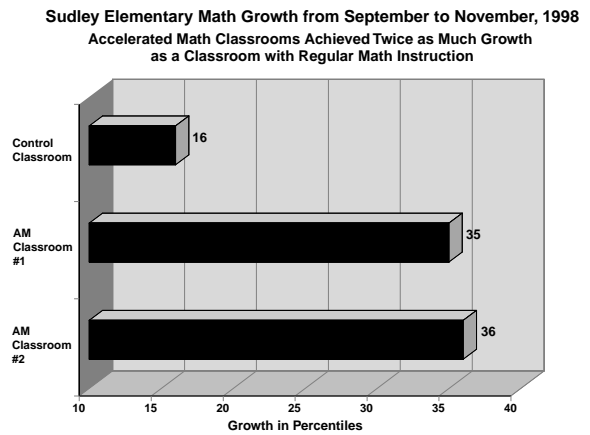
As shown in the graph, the growth in math performance for the Accelerated Math classes is more than double that of the control class. The score increases are especially noteworthy since they were obtained after just nine weeks of instruction.

Additional pretest/post-test information for an entire year was collected for the previous year’s fourth-grade classes. Increased math performance for the students who were instructed with Accelerated Math and Math Renaissance techniques is again demonstrated. The spring 1997 Stanford 9 figures serve as the pretest, and the spring 1998 STAR Math scores represent the post-test for 26 Accelerated Math/Math Renaissance students and 25 control students. As before, another fourth-grade instructor who did not use Accelerated Math or Math Renaissance techniques taught the control students. The Accelerated Math/Math Renaissance students were team-taught by Lind and Lubas. The table at right outlines the results.

#### Results

Accelerated Math and Math Renaissance yield results in both short and long windows of time. While significant gains occurred after one quarter, the results illustrate much larger increases in math performance

for students who have had Accelerated Math and Math Renaissance instruction over one full year. Greater-than-average growth for the control students was either nonexistent or only half that experienced by their Accelerated Math/Math Renaissance counterparts.



#### Sudley Elementary Fourth-Grade Math Results from Spring 1997 to Spring 1998

(In Percentile Rankings)

	AM/MR	Control
Stanford 9 (spring 1997)	56	36
STAR Math (spring 1998)	95	34
Difference (from 1997 to 1998)	+39	-2

#### School Profile

**Sudley Elementary School**  
Manassas, Virginia

Students: 476, K-12

Race/Ethnicity:

- Asian or Pacific Islander: 2%
- Black/African American: 8%
- Hispanic or Latino: 4%
- White: 86%

#### Educator Backgrounds

**Jonathan Lind** and **Ann Lubas** are fourth- and fifth-grade teachers at Sudley Elementary School in Manassas, Virginia. They have been certified as Reading Renaissance Model Classroom Teachers since February 1996, and have been using Accelerated Math and Math Renaissance techniques since September 1997.

<sup>1</sup>The Stanford 9 has a high +.71 correlation with STAR Math scores, thus offering validity for use of these two different instruments to measure growth in math performance.



# Fifth-Grade Students in North Carolina Show Remarkable Math Gains

Source: Kathy Leffler, fifth-grade math teacher  
Graham A. Barden Elementary School, Havelock, North Carolina

## Renaissance Independent Research Reports

### Study Description

Leffler began using Accelerated Math with her fourth-grade class in April 1999. She moved to fifth grade with the same group of students and continued using Accelerated Math during the 1999–2000 school year. She has a wide range of abilities in her class including a student who is mentally handicapped, students who are learning disabled, and students who are gifted.

When teaching math, Leffler starts each session by introducing a new objective. She uses manipulatives and cooperative groups to illustrate the objective whenever possible. Students then complete a related exercise from their assigned Accelerated Math library so that Leffler can check for understanding. If any students are having trouble with the objective, Leffler integrates a power lesson into the math session for those students. Finally, students receive daily practice sheets to complete during math time and for homework.

Leffler credits Accelerated Math with giving her more information about her students' strengths and weaknesses and giving her the flexibility to provide whole class, small group, or individualized instruction as needed. She believes that Accelerated Math helps students feel successful and that the challenge of applying for Renaissance Certification motivated all her students to work extremely hard to meet, and sometimes exceed, their weekly individual math goals.

To track her students' progress throughout the year, Leffler administered STAR Math at the beginning of the school year in August, halfway through the year in December, and again at the end of the school year.

### Results

During the period between the first and last STAR Math test administrations, Leffler's fifth-grade classroom achieved dramatically accelerated growth. The pretest and post-test results show that Leffler's 22 fifth-grade students improved, on average, by 2.5 years in just eight months. The class started at an average

grade equivalent of 4.7 and improved to an average grade equivalent of 7.2. This means that near the end of fifth grade, Leffler's students were scoring, on average, more than a full year ahead of their grade level.

### Graham A. Barden Elementary School Havelock, North Carolina

#### Eight-Month Gains for Fifth-Grade Classroom (22 students)

	Scaled Score	Grade Equivalent	Normal Curve Equivalent
Pretest Average	653	4.7	49.6
Post-test Average	762	7.2	67.2
Gains	109	2.5	17.6

### School Profile

#### Graham A. Barden Elementary School Havelock, North Carolina

Students: 385, K–5

Race/Ethnicity:

Socio-Economic Status:

American Indian or Alaskan Native: 1%

Title I

Asian or Pacific Islander: 2%

Free or reduced lunch: 56%

Black/African American: 23%

Hispanic or Latino: 6%

White: 68%

### Educator Background

**Kathy Leffler** has taught at Graham A. Barden Elementary School for the past five years. She received her bachelor's degree in education from Northern Illinois University and is currently working on her master's degree at East Carolina University. She is a Renaissance Master Educator in Reading, the highest honor School Renaissance Institute can bestow, and has the distinction of being the first Renaissance Model Educator in Math.

# Math Renaissance Implementation Significantly Increases Percentile Rankings in Tennessee

Sources: Patsy Owenby, Title I math teacher and Robert Taylor, principal  
Michigan Avenue Elementary School, Cleveland, Tennessee

## Renaissance Independent Research Reports

### Study Description

Michigan Avenue, a Renaissance Model School in reading, piloted Accelerated Math math management program during the 1998–1999 school year. At that time, Taylor and his staff effectively integrated Accelerated Math into the school’s existing math curriculum. In addition, Taylor, Owenby, and staff received Math Renaissance training. Many of the teachers successfully incorporated various intrinsic and extrinsic motivational strategies, such as classroom charts that track objectives mastered, point clubs, and competition between individuals or teams. Teachers discovered that individualized goal setting was easy to establish for the varying student skill levels.

To target these ranges of academic levels, Michigan Avenue implements power lessons (five to fifteen minute lessons) as a classroom instructional technique. For example, one fifth-grade classroom teacher has students in math libraries three through six. The teacher places them in groups according to the math libraries and then moves around the classroom, teaching short lessons applicable to each group. Peer tutoring and cooperative learning are also implemented. Following the power lessons, students tutor one another in order to master the relevant objective(s) taught. Accelerated Math has also proven successful with Resource (Special Education) students at Michigan Avenue, with one student even demonstrating the program to visitors.

### Results

Throughout their inaugural period, Michigan Avenue showed significant improvement in student achievement, attitudes, and enthusiasm. Additionally, STAR Math computer-adaptive assessment scores between the late October 1998 pretest and the early May 1999 post-test increased 19 percentiles for 226 students in grades three through five. Fourth-grade students achieved an especially significant gain—32 percentiles in six months.

STAR Math scores for 1999–2000 demonstrated a gain of 32 percentiles for 237 students in grades three through five. In particular, third-grade students gained a substantial 44 percentiles. Two-year percentile gains for grades three through five are illustrated in the table below. Owenby believes that Accelerated Math is one of the best math programs that has ever been developed. Second grade is now part of the program and plans are underway to include first grade in 2001.

**Michigan Avenue Elementary School  
Cleveland, Tennessee**  
STAR Math Percentile Rankings, 1998–2000

Grade	1998–1999 Pretest (10/98) & Post-Test (5/99) PR	1998–1999 Gain	1999–2000 Pretest (9/99) & Post-Test (5/00) PR	1999–2000 Gain
3	64/78	14	37/81	44
4	49/81	32	54/90	36
5	48/58	10	46/61	15

### School Profile

**Michigan Avenue Elementary School**  
Cleveland, Tennessee

Students: 518, K–12

Socio-Economic Status:

Rural, Title I  
Free or  
reduced lunch: 58%

Race/Ethnicity:

Black/African American: 7%  
White: 93%

### Educator Backgrounds

**Patsy A. Owenby** earned a master’s in elementary education from the University of Tennessee at Chattanooga and has taught third grade at Michigan Avenue School for more than 30 years. Currently, she is a Title I math teacher and the Accelerated Math coordinator for the school.

**Robert Taylor** earned a M.Ed. from the University of Tennessee at Chattanooga and has been an educator for 23 years. As principal, he was active in bringing Accelerated Reader and Reading Renaissance to Michigan Avenue School—now a certified Renaissance Model School.

# Tennessee Intermediate School Experiences Outstanding Results With Math Renaissance

Source: Roger L. Wilson, sixth-grade math teacher  
Dyersburg Intermediate School, Dyersburg, Tennessee

## Renaissance Independent Research Reports

### Study Description

Dyersburg Intermediate School installed Accelerated Math in January 1999. Wilson, along with 46 staff members, attended a Math Renaissance on-site seminar on August 2, 1999. Soon afterward, he pretested his students with STAR Math and began implementing Accelerated Math/Math Renaissance in his sixth-grade classroom. Using past Tennessee Comprehensive Assessment Program (TCAP) scores and STAR Math data, Wilson placed his sixth-grade students in the proper math libraries.

In order to target pertinent math objectives, Wilson starts each class with a 10 to 15 minute power lesson. Following these short lessons, student comprehension is assessed with either a short worksheet (four to five problems), or working a problem on the chalkboard. To diagnose and address specific problems, Wilson reviews the students' TOPS (The Opportunity to Praise a Student) reports, makes comments, and initials each copy. Students are further motivated and challenged by "enrichment" worksheets which Wilson distributes between assignments.

To keep his students motivated, Wilson employs various Renaissance methods such as peer tutoring, individual goal setting, grouping students who are working on common objectives, and posting a chart with number of objectives passed. Wilson believes the interaction and cooperative learning from peer tutoring has proven particularly successful.

### Results

After six months of Math Renaissance implementation, Wilson's sixth-grade classroom has achieved powerful results. Wilson reports that more than half of his 18-student classroom has mastered over 200 objectives. In addition, his students now enjoy math. Based on post-test STAR Math data, Wilson's class showed very significant gains on all metrics (see table).

**Dyersburg Intermediate School  
Dyersburg, Tennessee**  
Six-Month Gains for Wilson's Sixth-Grade Classroom  
(18 Students)

Scores	Class Average Pretest 8/9/99	Class Average Post-test 2/22/00	Gains
Scaled Score	695	824	129
Grade Equivalent (GE)	5.5	9.8	4.3
Normal Curve Equivalent (NCE)	37.7	70.7	33.0

### School Profile

**Dyersburg Intermediate School**  
*Dyersburg, Tennessee*

Students: 680, 4-6

Socio-Economic Status:

Rural I  
Free or reduced lunch: 40%

Race/Ethnicity:

Black/African American: 21%  
White: 79%

### Educator Background

**Roger L. Wilson** has taught in the Dyersburg City School System for 23 years. He received his B.S. degree in elementary education from Eastern Illinois University at Charleston (1973) and did his graduate work in education at the University of Tennessee at Martin.

Summarized from: *Changes in Mathematics Achievement and Instructional Ecology Resulting from Implementation of a Learning Information System*. Ysseldyke, J., Spicuzza, R., & McGill, S. (2000). National Center on Educational Outcomes, University of Minnesota, Minneapolis, Minnesota.

**Independent University Study**

**Study Description**

The purpose of this study was to determine the effects of Accelerated Math on student achievement and classroom ecology. Accelerated Math was utilized in combination with a district adopted math curriculum. During the period of February through June 1999, Accelerated Math and Math Renaissance techniques were implemented in nine fourth- through eighth-grade classrooms in a Midwest urban district with a special focus on fourth- and fifth-grade classrooms. The number of students in the experimental group (Accelerated Math students) was 205. The control group (non-Accelerated Math students) consisted of 184 students. In addition, a subset of 26 students, based on varying math skills (high, middle, and low), was chosen for intensive observation.<sup>1</sup> The researchers measured ecological classroom behaviors for this subset of students.

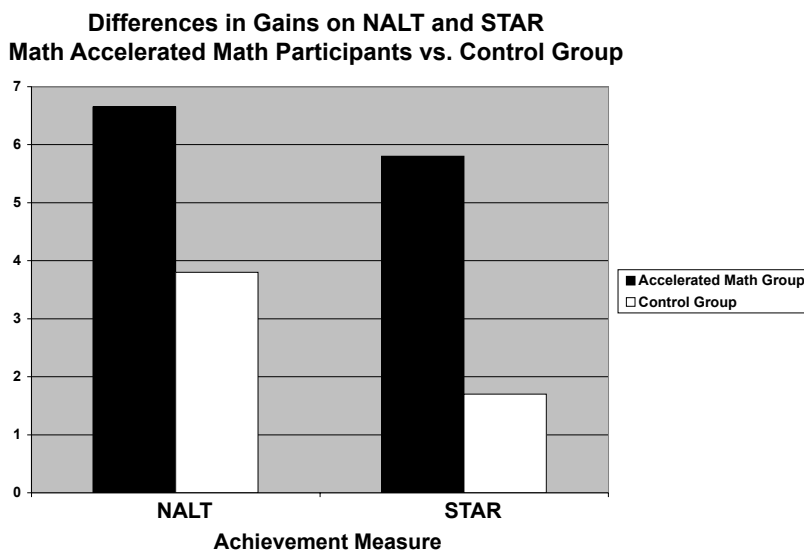
**Results**

On the Northwest Achievement Level Test (NALT) students in grades four and five using Accelerated Math gained an average of 6.65 normal curve equivalents (NCEs) while all fourth- and fifth-graders in the district gained an average of only 2.66 NCEs. The gain for Accelerated Math users is statistically significantly higher than the gain across the district.

The study also compared the NALT and STAR Math gains of students in the Accelerated Math treatment group to students in a representative control group. Students who received the Accelerated Math treatment significantly out-gained those who received the standard district curriculum only. For example, on STAR Math, the treatment group (N=187) gained 5.8 NCEs, while the control group (N=139) gained 1.7 NCEs. Data on the NALT and STAR Math comparisons are show in Figure 1.

*(continued on next page)*

Figure 1



<sup>1</sup>The varying math levels of high, middle, and low were determined by STAR Math test scores from December 1998. Students who scored in the 80th percentile were categorized as high, students who scored in the 40th to 60th percentile were identified as middle achievers, and those deemed low achievers scored below the 20th percentile.

## Independent University Study

Additional test score analysis compared the gains of students with differing initial skill levels. Among all the Accelerated Math participants, students in the top 20% gained 3.5 NCEs while students in the median group and the bottom 20% gained over 8 NCEs. In contrast, among all the students in the district, students in the top 20% experienced no NCE growth while students in the median group and bottom 20% experienced growth of only 2.6 and 3.3 NCEs, respectively (See Figure 2).

**Figure 2**

**Normal Curve Equivalent Scores on the Northwest Achievement Level Test (NALT) for the Entire District and for Accelerated Math Participants**

	District (N=15,502)			Accelerated Math Participants (N=187)		
	NALT 1998 (pretest)	NALT 1999 (post-test)	Gain	NALT 1998 (pretest)	NALT 1999 (post-test)	Gain
Top 1/5	70.9	70.9	0.0	64.2	67.7	3.5
Median	46.3	48.9	2.6	43.6	52.4	8.8
Bottom 1/5	28.2	31.5	3.3	26.3	34.4	8.1

Accelerated Math students spent significantly more classroom time academically engaged than students receiving only the district adopted curriculum. Students were receiving more individualized instruction with Accelerated Math and teachers were able to adapt instruction according to student needs. In addition, low-achieving Accelerated Math students had nearly the same amount of academically engaged time (36% of classroom time) as high-achieving non-Accelerated Math students (35%). The addition of Accelerated Math with the adopted curriculum produced a positive effect on student behavior, because students were spending more time on task. A full report of this study is available: L0373.

### School Profiles

(Note: schools are unnamed for confidentiality purposes)

Students: 415, 4-8

Socio-Economic Status:

Free or reduced lunch: 67%

English as a Second Language: 12%

Minority: 70%

Summarized from: *Enhancing the Learning of English Language Learners: Consultation and Curriculum Based Monitoring Systems*, Teelucksingh, E. (2000). University of Minnesota, Minneapolis, Minnesota.

## Independent University Study

### Study Description

This study compared the math performance of English Language Learners (ELL) using Accelerated Math along with Everyday Math (EM) to a group of ELL students who received the district adopted curriculum only (EM). Accelerated Math and Math Renaissance techniques were implemented in nine fourth- through eighth-grade classrooms in four schools in an unnamed urban school district from February through June 1999. STAR Math and the Northwest Achievement Levels Test (NALT) were used to measure achievement. STAR Math was administered in January and May 1999. NALT was administered in Spring 1998 and Spring 1999.

### Results

Among fourth- and fifth-grade students who received math instruction through Title I services, students using Accelerated Math (N=25) gained an average of 6.57 normal curve equivalents (NCEs) on the Northwest Achievement Levels Test (NALT) while students not using Accelerated Math (N=70) gained an average of 2.79 NCEs.

Across the four pilot schools in the district, ELL students using Accelerated Math (N=50) along with the district curriculum gained an average of 6.67 NCEs on the NALT while ELL students not using Accelerated Math in the four pilot schools (N=151) gained only 3.87 NCEs. On STAR Math, ELL students using Accelerated Math (N=49) gained an average of 4.79 NCEs, while ELL students not using Accelerated Math *lost* 2.55 NCEs. (Note: Release date is undetermined.)

### School Profiles

Note: Districtwide data are unavailable, demographics below are of focus group.

#### Accelerated Math group (N=26)

Socio-Economic Status:

Free or reduced lunch: 22

English Language Learners: 7

Race/Ethnicity

American Indian: 1

African American: 6

Hispanic: 17

White: 2

#### Control group (N=74)

Socio-Economic Status:

Free or reduced lunch: 41

English Language Learners: 18

Race/Ethnicity

American Indian: 0

African American: 12

Asian: 1

Hispanic: 32

White: 29

## Section 2: Middle and Junior High Schools

### Extraordinary Math Gains Reported by North Carolina Middle School

Source: Charlotte Crayton and Yvonne Wheeler  
Mac Williams Middle School, Fayetteville, North Carolina

#### Renaissance Independent Research Reports

##### Study Description

Mac Williams Middle School began using Accelerated Math and implementing Math Renaissance in the fall of 1999. Yvonne Wheeler, who teaches five sections of eighth grade, had attended a Math Renaissance seminar in October. Using STAR Math data, Wheeler placed her eighth-grade students in the appropriate Accelerated Math math libraries, ranging from third grade to algebra. She assigned her students the large math practice sheets and gave them 25–30 minutes in school to work on them. If they were unable to finish the practice sheet during the allotted time, they took them home to complete as a homework assignment. She scheduled mastery tests twice a week.

Wheeler had students monitor their own progress by completing personalized progress charts based on data from Accelerated Math. She used the Status of the Class Report to determine the content of the power lessons that she gave every day. In her classroom, math textbooks were used by students as a resource and reference guide. She also used the TOPS (The Opportunity to Praise a Student) Report to intervene immediately and individualize instruction. As an intervention technique, she used peer helpers and cooperative learning groups. The outcome of Wheeler's classes was nothing short of remarkable. The five-month percentile and grade-equivalent gains for all of her sections are shown in the following table.

**Mac Williams Middle School, Fayetteville, North Carolina**  
Five-Month Gains for Wheeler's Eighth-Grade Students

Section	# Students	Class Average Pretest PR & GE 8/19/99	Class Average Post-Test PR & GE 2/11/00	Five-Month Percentile Gain	Five-Month Grade-Equivalent Gain
1st	26	33 PR / 6.5 GE	53 PR / 8.6 GE	20	2.1
2nd	22	69 PR / 10.3 GE	91 PR / 13.1 GE	22	2.8
3rd	20	33 PR / 6.5 GE	67 PR / 10.5 GE	34	4.0
4th	23	27 PR / 6.0 GE	53 PR / 8.6 GE	26	2.6
5th	19	31 PR / 6.4 GE	50 PR / 8.3 GE	19	1.9

##### School Profile

**Mac Williams Middle School**  
Fayetteville, North Carolina

Students: 1200, 6–8

Socio-Economic Status:

Rural  
Title I  
Free or reduced lunch: 57%

Race/Ethnicity:

American Indian: 5%  
Asian or Pacific Islander: 1%  
Black/African American: 30%  
Hispanic or Latino: 1%  
White: 63%

##### Educator Backgrounds

**Charlotte Crayton** graduated from East Carolina University, Fayetteville, N.C., and has been an educator for 33 years. In her position as Title I Facilitator and Technology Coordinator, she has been instrumental in bringing Accelerated Reader, Reading Renaissance, Accelerated Math, and Math Renaissance to Mac Williams Middle School.

**Yvonne Wheeler** earned her degree from Campbell University, in Buies Creek, N.C., and has been teaching math and/or algebra for 10 years, grades 7–9. She also has been a presenter in cooperative learning and introduction to technology. Presently, Wheeler teaches eighth-grade general math and algebra. She received her Math Renaissance training in October 1999.

Summarized from *Using Accelerated Math to Enhance Instruction in a Mandated Summer School Program*. Spicuzza, R. & Ysseldyke, J. (1999). National Center on Educational Outcomes, University of Minnesota, Minneapolis, Minnesota.

## Independent University Study

### Study Description

Accelerated Math and Math Renaissance techniques were used with 139 students in grades six through eight during a 1998 six-week summer program in the Minneapolis Public Schools. Two middle schools within the Minneapolis Public Schools were chosen. Five classrooms participated and teachers submitted bids for involvement in the study. Notably, the classroom conditions were very demanding: the buildings were not air-conditioned and teacher selection was not based on reading or math skills and experience. This difficult environment remained unaltered so that outcomes would be based on “natural” settings.

### Results

The district’s Northwest Achievement Level Test (NALT) results indicate that Accelerated Math students gained an average of 5.75 normal curve equivalents (NCEs) immediately following the summer school intervention—a gain nearly twice that of the 3.2 NCEs achieved during the previous academic year. The NCE gain was greater during the 3 month intervention period, than the previous entire school year. Furthermore, very significant commensurate gains of 2.64 NCEs were documented on STAR Math during this six-week period. A full report of this study is available: L0342.

### School Profiles

Students: 139. 6–8

Free or reduced lunch: 67%

Minority: 70%

#### Site 1

A Spanish immersion school

Socio-Economic Status:

Limited English Proficiency: 37%

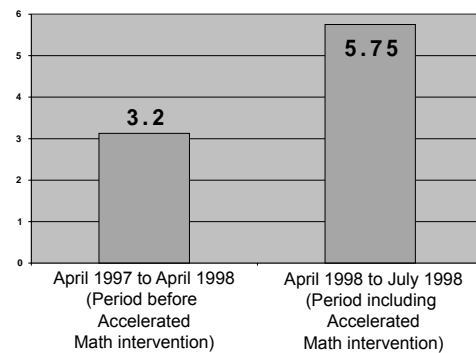
#### Site 2

Socio-Economic Status:

Limited English Proficiency: 39%

Special Education: 16%

**Minneapolis Public Schools, Minneapolis, MN  
Accelerated Math Intervention Helps Students Achieve 80%  
More Math Growth on Northwest Achievement Level Test**





## Section 3: High School

### Using Accelerated Math to Enhance Student Achievement in High School Mathematics Courses

Source: Terri J. Gaeddert, teacher and technology specialist  
Buhler High School, Buhler, Kansas

Summarized from: Gaeddert, T. 2001. *Using Accelerated Math to Enhance Student Achievement in High School Mathematics Courses*. Master's thesis. Wichita, KS: Friends University.

#### Renaissance Independent Research Reports

##### Study Description

This study evaluated the effectiveness of a learning information system, Accelerated Math, in high school pre-algebra, algebra, and geometry courses. For each subject, the study compared changes in student achievement, student attitudes, and parent attitudes of a class using Accelerated Math to a class receiving traditional instruction. The three-and-a-half month study included 50 students in the intervention (Accelerated Math) classes, 53 students in the control (traditional instruction) classes, and 3 teachers. The intervention and control classes for each subject had the same teacher and studied the same topics. Students in the control classes continued to receive instruction through the traditional method of teacher lecture followed by student assignments, while students in the intervention classes were enrolled in the appropriate Accelerated Math libraries and progressed at their own rate through the appropriate objectives. These students received most of their instruction in small groups or individually from the teacher.

At the beginning and end of the study, each student was tested with the Stanford 9 Achievement Test (SAT 9) and STAR Math computer-adaptive math test. SAT 9 is a paper-and-pencil norm-referenced test. Students in pre-algebra and algebra took Task 1, while students in geometry took Task 2. STAR Math is a computer-adaptive norm-referenced test that uses Adaptive Branching technology to accurately assess students' mathematics skills in 15 to 20 minutes.

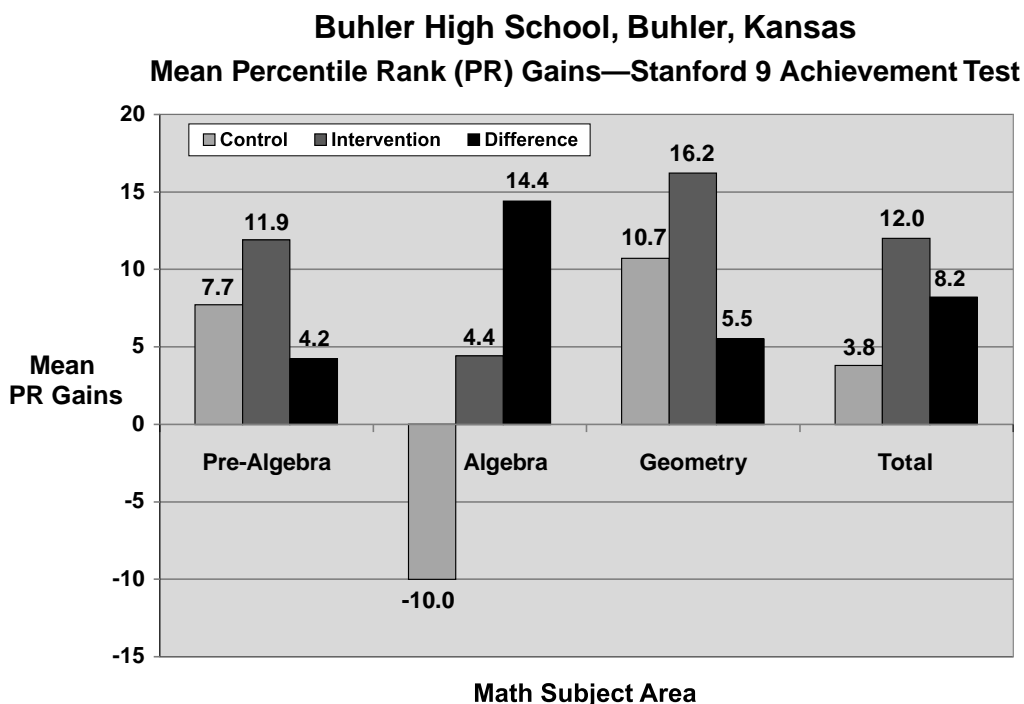
##### Results

Students in the classes using Accelerated Math scored about the same as students in the control classes on

the SAT 9 and STAR Math pretests. However, students using Accelerated Math experienced more improvement in SAT 9 and STAR Math test scores than students in classes using traditional instruction. Across all three subjects, students in Accelerated Math classes gained 12 percentile points on the SAT 9, while students in the control classes gained only 3.8 percentile points. Looking at grade equivalent scores on the SAT 9, students in Accelerated Math classes gained a full grade equivalent in just 3.5 months, while students in the control classes gained only 0.3 grade equivalents. Similarly, on STAR Math tests, students using Accelerated Math gained 9.5 percentile points while students in control classes gained only 1.2 percentile points. Differences in test score gains were particularly striking for students in algebra and geometry. The graph which follows shows percentile rank gains on the SAT 9 by class.

Students also responded to attitudinal surveys at the beginning and end of the study. The pretest and post-test surveys were identical except students using Accelerated Math answered four additional questions that specifically related to the Accelerated Math program. The surveys asked students to indicate their level of agreement or disagreement to statements about attitudes toward math. Overall, on the survey before Accelerated Math implementation, students in the Accelerated Math classes responded more negatively than students in the control classes to statements such as "I learned more math this year than last year" and "The pace of this class is just right." However, at the end of the three-and-a-half month study students using Accelerated Math showed more improvement in attitudes toward math than students in the control classes.

*continued on next page*



Parent surveys also indicated positive attitudes toward Accelerated Math. Before implementation of Accelerated Math, 25% of parents of intervention group students and 33% of parents of control group students agreed with the statement, “My child is learning math better this year than last year.” After Accelerated Math implementation, 56% of parents of intervention group, 40% of parents of control group students agreed with the statement.

The author of this study concludes that using a computer managed learning system, in particular Accelerated Math, can be beneficial for high school students. Students in the intervention group showed greater gains in basic mathematical skills as well as algebraic and geometric skills. Furthermore, students and parents believed they did better with Accelerated Math than they did with traditional instruction. In light of these positive findings, the author recommends further research in more schools as well as with more advanced high school courses.

**School Profile**

**Buhler High School**  
*Buhler, Kansas*

Students: 777, Grades 9–12

Socio-Economic Status:  
 Free or reduced lunch: 13%

Race/Ethnicity:  
 Asian or Pacific Islander: 1.4%  
 Black or African American: 1.7%  
 Hispanic or Latino: 2.3%  
 White: 94.6%

**Educator Background**

**Terri Gaddert** has 10 years of experience teaching mathematics in grades 9–12. She received her bachelor’s degree in secondary education from Chadron State College, Chadron, Nebraska, in 1987. She has presented Applied Mathematics workshops to teachers and administrators in several states. She has been involved with business partnerships, provided technical mathematics training for company employees, and written problem-solving tests for state competitions. In addition to teaching, Gaeddert is currently serving as a technology specialist for her school, and will receive her Master of Arts in Teaching from Friend University, Wichita, Kansas, in 2001.

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