

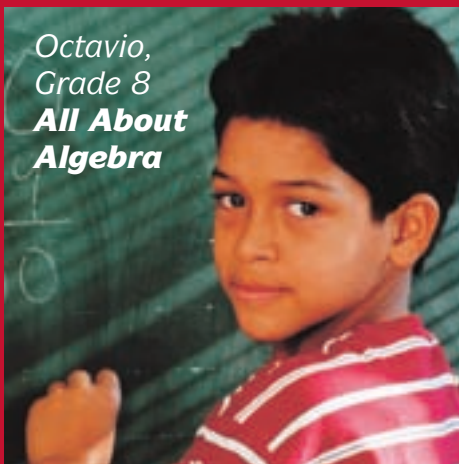


ADVANCING STUDENT ACHIEVEMENT®

A program of THE ACTUARIAL FOUNDATION

Students and Mentors: A Powerful Combination

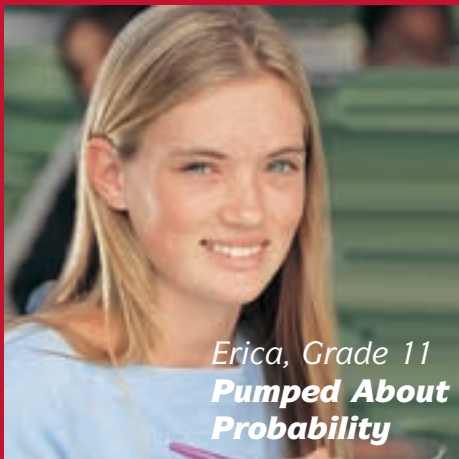
Students achieve with ASA grants



Octavio,
Grade 8
**All About
Algebra**

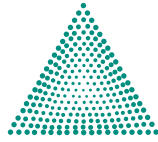


Katie, Grade 5
**Having Fun
With Fractions**



Erica, Grade 11
**Pumped About
Probability**

BEST PRACTICES GUIDE



THE ACTUARIAL
FOUNDATION®

It is in this spirit of giving that we can provide students with enrichment opportunities that can help them succeed in their educational and professional endeavors. Through mentoring programs, we hope to instill in young people the importance of contributing in their communities so that the concept of giving back continues from generation to generation.

The Actuarial Foundation thanks the following organizations for their generosity in funding the production of this guide.



 **ERNST & YOUNG**
Quality In Everything We Do



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**TOWERS
PERRIN**

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Inspiring a New Generation Math-Skilled



“They come here to help us learn about math so we’re prepared for the grown-up world.”

— *James Whitcomb
Riley Elementary
School student*



of Thinkers

Caring adults have a significant impact on children. They nurture and promote children's academic and social growth, serve as positive role models, and are the people whom youngsters often turn to when they need advice, comfort, or direction.

It is not surprising that schools build on the value of caring adults through educational mentoring programs. Mentoring has proved historically to have a powerful effect on student aptitude, attitude toward school, educational and social engagement, and decisions regarding higher education and careers. Academically focused mentoring has often closed the achievement gaps between underachieving and high-performing students.

Drawing on the success of educational mentoring, The Actuarial Foundation, a nonprofit philanthropic organization, created Advancing Student Achievement (ASA), which awards grants to teachers who want to implement mentor-based mathematics programs in their classrooms. In addition to providing generous funding, ASA recruits actuaries to volunteer to work with teachers and students, enhancing not only the students' academic achievement but their appreciation for math's practical applications as well. The connection between classroom instruction and the real-world support of actuaries provides a valuable extension to any school's basic math curriculum.

This guide will describe the impact mentoring can have in your math classroom and will explain how you can apply for an ASA grant, which will give your students the chance to learn and use mathematics creatively in ways that improve and enrich their math skills.

The guide is divided into three sections:

- ★ The first section uses case studies and independent research to highlight the specific ways in which mentoring can affect the lives of students.
- ★ The second section offers profiles of successful ASA-funded mentoring programs that employ very different – yet effective – approaches to math enrichment.
- ★ The third section directs you to the ASA Web site, where you can review the ASA's grant application process and find answers to frequently asked questions and other useful grant information.

We hope you will take advantage of The Actuarial Foundation's unique grant program and give your students the opportunity to make a real-world connection to math.

What Is an Actuary?

Actuaries are professionals who provide expert advice and relevant solutions for business and societal problems that involve economic risk. An actuary working for an insurance company might calculate how much a company would charge for a new type of car, homeowners, or health insurance. He or she may have to figure out how much money needs to be invested in a pension fund today so that years from now, when the employees retire, there will be funds to pay them benefits.

An actuary could work in finance, marketing, manufacturing, or in the development of new products. For example, an actuary might determine how a company should invest its money based on risk and potential return.

Actuaries have diverse roles and responsibilities within their organizations. Some of these responsibilities include product development and pricing, financial advising and planning, risk management, pension plan design, implementation and funding, and asset management and investment.

Mentoring Has a Measurable Impact on Student Learning



“My chief want in life is someone who shall make me do what I can.”

– *Ralph Waldo Emerson*

A mentor is someone who sets a positive example and offers support, friendship, guidance, and reinforcement. Although mentoring relationships are often informal, they can significantly influence the paths that young people choose to follow.

Mentoring has proved to be a valuable tool for helping young people succeed in school. Each year, more than half a million American youth are involved in volunteer mentoring programs.¹ As you will read below, data has clearly shown that students engaged in educational mentoring – whether they are underachieving or underperforming – enjoy positive academic returns.

The need for academic improvement is great, particularly in mathematics. Just over one quarter of 4th to 8th graders are performing at or above proficient levels in math; twelfth grade math scores have not significantly improved since 1999.² American students’ mathematics performance lags behind students from other developed countries. In the 2004 Program for

International Student Assessment, 15-year old U.S. students performed 24th out of 29th in a test of real-life math application problems among member countries in the Organization for Economic Cooperation and Development.

As an instructional practice, mentoring is one tool that can be used to address the mathematics shortfalls of U.S. students. It not only can help students meet the demands of the academic performance standards mandated by No Child Left Behind and other high-stakes tests, but it can also provide benefits that can be measured in several other key educational areas.

Mentoring improves student attendance and attitudes toward school

The continued presence of a mentor has a positive impact on children who otherwise may have little in the way of positive adult interaction. The understanding and support of a concerned adult, coupled with his or her high expectations for the student, can lead to dramatic changes in both student attitudes and behaviors.

Consider Big Brothers Big Sisters, the largest youth mentoring organization in the U.S. This organization pairs adult mentors with at-risk youth ages 5 to 18. The relationship between “Big” and “Little,” as the mentor and youth are called, focuses on friendship. Bigs and Littles interact in a variety of ways, both in school and in the community. Mentors and youths discover ways to make school and learning fun through programs such as these.

For example, a study by Public/Private Ventures found that 64 percent of Little Brothers and Little Sisters developed more positive attitudes toward school and skipped 52 percent fewer days and 37 percent fewer classes than their peers who did not have mentors.³

Mentoring helps students improve their grades

The encouragement provided by mentors, combined with the positive examples they set, can build students’ academic confidence and skills. Thus, mentored students often do better in school, indicated by improved grades. Philadelphia’s Sponsor-A-Scholar (SAS) program, for example, has been successful in raising the grade point averages of the disadvantaged students it serves.

The SAS program matches at-risk youth with adults who mentor them for five years – from ninth grade through the first year of college. Mentors offer guidance and academic support in the form of after-school classes and college preparation activities. An independent longitudinal study of 434 public high school students in Philadelphia found that SAS students in the 10th grade had an average GPA of 78.8, compared with 77 of those in the control group. Similarly, SAS students in the 11th grade had a 78.1 average GPA versus 76.2 in the control group.⁴

Mentoring increases students’ knowledge and skills in key subject areas

Students who have partnered with mentors often demonstrate increased content knowledge and skills in key subjects, such as math and reading. This improvement stems directly from the one-on-one time provided through a mentoring relationship that includes individual assessment for comprehension of material. For instance, the national Helping One Student To Succeed (HOSTS) program pairs adult mentors with low-achieving students to help improve their reading, vocabulary, writing, and other comprehensive learning skills. Students entering the program are usually reading one or more grade levels below their peers. To address this discrepancy, HOSTS mentors meet one-on-one with students several days a week, delivering custom teacher-designed lesson plans and recording the students’ progress.

In 1999, a multi-state evaluation of 213 students in the HOSTS program showed an average reading level gain of between 1.3 and 1.5 years, just within the first year of the program. The study also demonstrated marked improvements in Normal Curve Equivalent (NCE) scores pre- and post-intervention.⁵

Just the Facts

The effectiveness of mentoring has been confirmed by numerous program evaluations and research initiatives. Some of the best compilations of these data include the following sources:

- ★ Inquiry Response on High School Student Mentoring Programs, Principals’ Partnership (<http://www.principalspartnership/mentoring.doc>)
- ★ Mentoring: A Promising Strategy for Youth Development, Child Trends (<http://www.childtrends.org/Files/MentoringBrief2002.pdf>)
- ★ Why Mentoring? The Connecticut Mentoring Partnership (http://www.drugsdontwork.org/cmp_whyment.html)
- ★ Research Corner, National Mentoring Partnership (http://www.mentoring.org/program_staff/index.php?cid=63)

Students who are mentored are more likely to pursue higher education

Because a mentor can serve as an embodiment of the value of post-secondary success, students involved in mentoring are better able to relate to such opportunities and thus have a greater likelihood of going on to higher education. A case in point is found in the national Career Beginnings mentoring program, created in 1986 to expand the post-high-school options of urban high school students across the country from low-income families.

Career Beginnings mentors serve as role models and actively assist promising youths in planning for the future – whether upgrading their higher education choices or helping non-college bound students find better jobs. In its second year, 53 percent of graduating students who participated in the program were enrolled in college, compared with 48.5 percent of a control group who were not involved in Career Beginnings. Nationwide, only 40 percent of 18 to 20 year old high school graduates from low-income families were enrolled in college during the same period.⁶ Also of note, participation in Career Beginnings influenced some graduating students who would have attended vocational schools to choose two or four year colleges instead.

Mentoring can shape a young person's career goals

Mentoring has been shown to influence a young person's career direction. In fact, 90 percent of students who participated in Career Beginnings reported that the program had been helpful in moving them toward their career goals. Mentors may represent a particular profession of interest, introduce students to a profession they might not have considered otherwise, or introduce students to industry professionals. By sharing the specific skills and requirements required of these career choices, the mentor can provide a real-world perspective of those professions.

“In each of our Advancing Student Achievement projects, actuaries are participating as interested, committed school resources that place highly honed management, communication, interpersonal, mathematics and financial skills at the service of children's learning.”

– Eileen C. Streu, CAE
Director, The Actuarial Foundation

In addition, a mentor may simply be able to help students develop the math, problem solving, and communication skills that they will need to succeed in the workplace. An ASA student participant explained how her classroom mentors shaped her career choice: *“When I grow up, I wish to be a vet. The actuaries show me how much math it takes to be a vet.”*

Although this section has focused on academic measures of success, mentoring has also been shown to positively affect student outcomes in the areas of health, safety, social and emotional development. This includes reductions in the use of illegal drugs, cigarettes, and alcohol; incidents of lying and disruptive behavior (both in and out of school); carrying weapons; and sexual promiscuity.

Mentoring vs. Tutoring

Mentoring and tutoring both affect student lives in positive ways. Tutoring focuses primarily on helping students improve their grades. Mentoring, on the other hand, focuses on building a relationship between mentor and student – often a long-term relationship. This structured partnership not only enhances a student's academic performance, it can also have a positive effect on the student's behaviors and attitudes about school, life, and the future.



How to start your own ASA Mentoring Program



“When you see students talking about math outside the classroom, you know you’re doing something right.”

– Kimberly Rimbey
Math Specialist,
Mathematics for
Life creator
Echo Mountain
Elementary School,
Phoenix, Arizona

As the above information shows, mentoring can make a real difference in academic and social outcomes for students. So, how can you start to leverage this tool in your own math classroom and beyond? How do you design your own program? Where can you find the resources?

The next section provides descriptions of successful math mentoring programs from which you can draw lessons and inspiration from the work of other ASA grant recipients. You will also find detailed information on applying for an ASA grant, which can open the doors to funding and to a network of professionals interested in serving as mentors in mathematics programs.

The Advancing Student Achievement approach to mentoring is unique. By combining the best of educational and career mentoring models, ASA encourages student appreciation of mathematics, improves their math achievement, and heightens their interest in math-related careers.

An ASA grant gives teachers the flexibility to design original programs that leverage the value of mentors to meet the individual needs of their students, thereby achieving the greatest impact. Grants range from \$700 – \$32,000 depending upon the school’s particular needs.

ASA supports a variety of approaches to math education. Past grantees have started with fundamental principles, but have turned out very different programs. Elements of successful ASA-funded programs have included professional development opportunities for teachers, workshops that enable parents to support their children’s math achievement, and after-school programs that extend school-day math initiatives.

On the following pages, you will learn more about successful ASA-funded programs and how to apply for a grant to support your own innovative math initiative.

Taking the Lead

Once a grant is awarded through Advancing Student Achievement, the Actuarial Foundation recruits actuaries to serve as mentors for the program. The Foundation also connects the teacher with an individual who serves as the *lead actuary*. The lead actuary’s role is critical throughout the duration of the ASA program. He or she typically recruits additional actuaries as volunteer mentors, manages their involvement with the program, and works closely with the teacher to maximize the return of the mentors’ involvement.

Advancing Student Achievement: **Models of Success**



Introduction

The designs of the Advancing Student Achievement (ASA) mentoring programs are many and varied. Each ASA program represents a unique philosophical approach to teaching mathematics, determined by the grade level, structure, and demographics of the school in which it is to be implemented. The Actuarial Foundation considers many different program models for funding as long as actuaries are a component of the program plan. Many of these programs are also replicable. The case studies that appear below showcase successful, original ASA mentoring programs that incorporate unique components with their own unique names. They may even inspire the projects you will design.



Case Study: Elementary School

Echo Mountain Elementary School, Phoenix, Arizona

Program Administrator	Kimberly Rimbey, Math Specialist
Grade Level	Grades K–6
Program Title	<i>Mathematics for Life</i>
Grant Award	\$16,400 – applied toward teacher stipends, manipulatives, and program supplies
Program Goals	<p><i>Mathematics for Life</i> is a three-pronged program that was developed to enhance the mathematics skills and proficiency levels of the 1400 students at Echo Mountain Elementary School (EMES). The initiative's goals are to help these high-risk, underperforming students:</p> <ul style="list-style-type: none">★ Improve their scores on the yearly Arizona Instrument to Measure Standards (AIMS) mathematics exam★ Improve their math grades★ Prepare for more complex mathematical skills and concepts <p><i>Mathematics for Life</i> originated at Arrowhead Elementary School, also in Phoenix, Arizona, where it had demonstrated success and impact on student math achievement at grades PreK through sixth.</p>

Program Structure

Mathematics for Life engages disadvantaged students in hands-on, practical, and fun learning activities. Its three program components include:

- ★ **Math Academies** – Extended in-class workshops for all of the school's students, which present grade-appropriate content and concepts in a dynamic setting
- ★ **Math Clubs** – Weekly two-hour after-school meetings in which teachers and students actively review and explore the concepts presented in the academies
- ★ **Professional Development** – Informal sessions that help teachers plan their math academy lessons and learn how to integrate mentors into the student experience

Additional information on each program component appears below.

Math Academies

The math academies partner EMES' mathematics teachers and specialists with actuaries who volunteer from local companies. Together, the teachers and actuaries deliver theme-based lessons, drawn from state academic performance standards and aligned with the classroom curriculum.

Mechanics

- ★ Normally, the Foundation would recruit the lead actuary and the other actuarial mentors for the program, but in this case, the lead from the original program at Arrowhead and several other mentors agreed to continue mentoring at the new school. In thanks for volunteering, all mentors receive appreciation gifts at the end of the year.

An Academy for Parents

The original *Mathematics for Life* program at Arrowhead Elementary School included a monthly parent academy. Teachers conducted five informal 90-minute classes—taught in English and Spanish, and offered in the morning or evening—for parents with children in the math academy.

During the first 60 minutes of each parent academy, parents were taught strategies to help their children understand the math concepts they were learning in the math academy; childcare was provided during that time. Parents and their children then spent the final 30 minutes of the session together, sharing and practicing math skills. Parent academy participants also received materials to supplement the work their children did in the math academy.

The program was so successful that the Paradise Valley Unified District took over the parent academy program. The District now financially supports its replication at EMES and other schools in the district.



Lesson Plans Online

Click on Echo Mountain's Success Story to link to sample math academy lesson plans!

www.actuarialfoundation.org/grant/howwill.html

Program Structure (continued)

- ★ The volunteers participate in a teacher-led orientation to help them become versed on the logistics of *Mathematics for Life*, as well as on its curriculum and instructional methodology. They also review sample lesson plans that demonstrate the concepts that will be covered in the math academies.
- ★ At the beginning of the year, the EMES math specialist maps out a schedule of the topics that will be covered in each math academy, corresponding with the mathematics concepts being taught in classrooms during the same timeframes. Topics are determined on the basis of state-required instruction and concepts that appear on the AIMS exams.
- ★ Teachers and math specialists collaborate to create theme-based lessons prior to academy day, ensuring that the lessons are applicable to state standards and that they incorporate a real-world element that students can understand. Often, teachers and mentors work on individualizing the lessons to reflect different learning abilities among the students. Themes introduced during the program's first year included:
 - *The Echo Mountain Math Mall* taught students combinations
 - *The Design Center* taught students the famous four-color map problem
 - *The Game Factory* taught students probability
- ★ In the first year of *Mathematics for Life*, the math academies were held once per quarter during the school day, from 9 a.m. to noon, in grades 3 and 4. In its second year, there will be an increase to seven total math academies, with an expansion of the program to other grade levels.
- ★ The 30 actuaries who volunteer for the program rotate among the scheduled academies throughout the course of the school year; between 8-20 volunteers are present for each academy.
- ★ On the day of the academy, students rotate through three different activities in three different classrooms. Teachers and actuaries lead the same lesson with each group of students they see. There are typically two rotations with three lessons each and one or two actuaries per class.
- ★ Depending on the lesson theme, the actuaries may teach a lesson themselves, supplement a lesson that a teacher has taught, or work with small groups of students to help them understand difficult concepts.
- ★ The last academy of the year is a special full-day math academy – Career Day – which runs from 9 am until 3 pm. On this day, actuaries and other community volunteers participate in a career fair; each volunteer gives a five-minute presentation about his or her career and how mathematics comes into play in that career field. Each class attends the career fair individually for an hour at a time, and then returns to their class to reflect on what they learned and complete a career “passport” that allows them to rate each career they learned about. In addition to learning more about what actuaries do, students learn about other careers that use math – from dentists to policemen to chefs.

Math Clubs

The math clubs serve as follow-ups to the math academies. They help reinforce the concepts learned in each math academy and are open to all students who participate in *Mathematics for Life*.

Mechanics

- ★ The after-school math clubs take place one time per week, in the weeks between each math academy.
- ★ In these afternoon sessions, teachers extend the themes and topics that students studied during the most recent math academy. The objective is to improve on these students' individual math skills, while still having fun.
- ★ There is typically just one teacher per math club session, although larger math clubs have relied on two teachers. The teachers rotate this duty and receive stipends for participating, based on the District's hourly rate for professional pay.

Program Structure (continued)

Professional Development for Teachers

Teachers involved with the *Mathematics for Life* program are offered professional development opportunities that leverage the concepts taught through the math academies with effective instructional practices.

Mechanics

- ★ The sessions are both informal and voluntary for *Mathematics for Life* teachers, and typically occur during grade level meetings.
- ★ The EMES math specialist leads each planning session. At the start of the program, the specialist discusses the role that mentors can play in delivering the concepts taught in the math academies. At subsequent sessions, the specialist works with teachers on lesson plan development, review, and tweaking of existing math academy lessons.
- ★ Additional opportunities throughout the year include workshops, study and planning groups, and action research.

Evaluation

Various informal and formal evaluation tools are used to determine the success and impact of *Mathematics for Life* on students' overall performance in mathematics:

- ★ The AIMS and Terra Nova Dual Purpose math exam, given yearly in April (The state releases the results of the exam in August and reports aggregate math scores at school, district, and state levels.)
- ★ The Standard Aligned Measures administered by the Paradise Valley Unified District
- ★ Tests administered by *Mathematics for Life* teachers after each math academy
- ★ Pre- and post-program student evaluations that help measure any changes in student attitudes toward math
- ★ Student attendance records

Participating teachers and mentors also complete end-of-year program evaluations. The data collected in these evaluations help the *Mathematics for Life* coordinator assess where to make program improvements.

Results and Impact

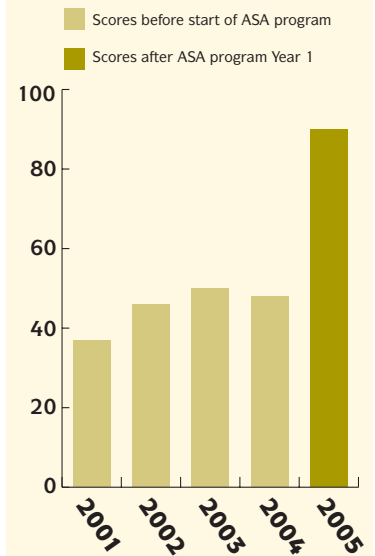
In its first year, the *Mathematics for Life* program generated enthusiasm not only among the Echo Mountain students, but also among district personnel. Parent responses to *Mathematics for Life* were favorable as well: Up to 45 parents attended district-sponsored Parent Academies.

Test scores further indicate the success of the program. Ninety percent of 3rd graders met or exceeded the state standards on the 2005 AIMS exam, compared with 48% in the previous year. Eighty-two percent of 4th graders met or exceeded the state standards in 2005. (The 4th grade exam was only given in 2005, so no comparative data is available.)

Teachers note that students seem to understand and retain math concepts because of the creative activities in which they participate during the math academies. Mentors believe that the best indicators of the program's success and their own impact on students are the students' reactions. One mentor shared this anecdote: One day, while walking across campus with students from his academy lab, a third grader running late to the program ran up to him, gave him a hug, and said: "You're the math guy! Today is math lab!"

Echo Mountain Primary Schools Third Grade AIMS Scores

(% of students meeting or exceeding the state standard)



Math Clubs at Echo Mountain

Students attend the math clubs on a voluntary basis. The clubs have become so popular that students are on a waiting list to attend.



Case Summary: Elementary School

Anna B. Kelso Elementary School, Houston, Texas

Program Administrators	Donald Burken and Stephen Wilborn, Math Teachers
Grade Level	5th grade
Program Title	<i>Soaring Eagles</i>
Grant Award	\$10,500 – applied toward commercial math games and student prizes

Program Summary

Soaring Eagles is a weekly game-oriented enrichment program developed to promote 5th graders’ achievement in and enthusiasm for math. The program helps students:

- ★ Grow their comfort level and enjoyment of math.
- ★ Enhance their mathematical problem-solving skills.
- ★ Meet or exceed performance expectations defined by state and national math standards.
- ★ Improve their scores on the Texas Assessment of Knowledge (TAKS) and the Stanford 9 (SAT 9) tests.

Soaring Eagles sessions take place one time per week in the school’s 5th grade classes. Teachers present activities and games that align with the standard math curriculum. They address skills related to topics in measurement, algebra, and geometry; reinforce basic computational skills, such as rounding; and focus on solving multi-step problems. The teachers incorporate commercially produced games purchased with the ASA grant, including:

- ★ *Snap It Up!*[®] – addition and multiplication card games
- ★ *Stratedice* – a series of problem-solving games using dice
- ★ *24*[®] *Game* – a kit of math card games
- ★ *Presto Change-O*⁷ – a money and math game

Mentors remain with the same class of 20-25 students throughout the program in order to build strong relationships. During each session, the mentors circulate among small, collaborative student groups as they work on the assigned games. The roles of the mentors are to:

- ★ Clarify math concepts
- ★ Guide student problem-solving strategies
- ★ Monitor student responses to problems
- ★ Award prizes to students during special sessions

Results & Impact

In 2004, *Soaring Eagles* students’ results on the Stanford 9 test underscored their mathematical progress. The median test grade was 7.8, compared with 5.6 among the previous year’s 5th grade classes. The national individual percentile rank for the entire 5th grade rose from 58% to 76% in 2003. In problem solving, 56% of the students ranked within the national average, compared with 50% of 5th grade students the year before. Also, 42% placed above the national average, compared with 22% of 5th graders the previous year.

Soaring Eagles teachers observed that student attitudes toward math changed for the better. Students were enjoying mathematics, were excited about participating in the math games with their mentors, and demonstrated more confidence in their mathematical abilities. Parents also reported that their children enjoyed completing math homework and that their self-esteem and school attendance increased.

“At first, I didn’t really know how to do multiplication and division. Then, they started bringing these games and I started getting better at [them]. [The games] have helped with word problems, and homework, too.”

– Anna B. Kelso
Elementary School
student

Case Summary: Elementary School

Propel Charter School, Homestead, Pennsylvania

Program Administrator Sandra Grassel, Math Coach

Grade Level K–6th grade

Program Title *Advancing Student Achievement at Propel*

Grant Award \$16,050 – applied towards a scanner, testing materials, mentor training, math club materials, membership in *Odyssey of the Mind*, transportation, presentation materials, and project supplies

Program Summary Propel Charter School’s math mentoring programs are designed to help both underachieving and gifted students in grades K – 6 achieve the following goals:

- ★ Enhance achievement in and appreciation for mathematics
- ★ Meet and surpass math achievement goals established by the Propel Board
- ★ Deepen comprehension of mathematical concepts and applications
- ★ Improve scores on the Group Mathematics Assessment and Diagnostic Evaluation (G-MADE)

Propel’s Advancing Student Achievement program consists of the following three components:

- ★ Mentors provide **small-group mentoring support** to groups of students who require supplemental math assistance. Using manipulatives and games, mentors help the students practice their math skills and improve their understanding of key math concepts in these one-hour weekly sessions. In addition, all students participate in 20-minute weekly math mentoring sessions.
- ★ K-6 students participate in a weekly **After-School Math Club**. During the first 30 minutes of each session, students – grouped by grade level – complete math homework with the assistance of mentors and the math coach. For the remaining hour, mentors engage students in supplemental grade-appropriate math games, activities like *AfterSchool KidzMath*™⁸, projects, and computer-assisted learning.
- ★ Fourteen students participate in *Odyssey of the Mind*⁹, an international program that provides student teams with competitive creative problem-solving opportunities. Mentors assist with this weekly program, which is open to all gifted, regular, and special education students.

Results & Impact

In its first year, 126 students out of 305 participated in Propel’s mentoring programs. The school’s math coach reports that teachers are constantly volunteering new students for the programs, and there is a waiting list for the *Math Clubs*. This high enrollment is indicative of the success and popularity of these programs.

In addition, Propel’s *Odyssey of the Mind* teams participated in a regional competition, representing the first and only charter school and the first and only urban school in the competition. One team achieved second place, earning them a spot in the state finals.

Results from the G-MADE demonstrate tremendous growth. Of the 304 students in grades K-6 who took the test in the 2004-05 school year, 291 students showed an increase in skill level. The average increase across grade levels was 1.5 years.



One day we were playing a game that involved rolling two dice, and then using that result to color in squares that formed a rectangle of size defined by the two dice. After rolling a 4 and a 5 and coloring in a 4 x 5 grid, I asked the little girl how many squares she’d colored in; she counted 20. Then I asked her what 4 times 5 was, and her eyes got big, and she said, ‘so that’s what multiplication is!’”

– *Propel Charter School mentor*



Case Summary: Elementary School

Prosperity Heights Elementary School, St. Paul, Minnesota

An Evolving Success...

Since its 2001 inception, *Solve It!* has experienced various structural and programmatic changes resulting from variations in school and program leadership, program assessments, mentor availability, and academic expectations. However, the program remains true to its original experiential and project-based approach. Because of the strength of this design, *Solve It!* has been able to evolve to meet the school's changing mathematics needs, whether expanding to other grade levels or meeting new academic mandates. And all along, student and mentor enthusiasm for the program remains high.

Program Administrator	Jennifer Anderson, Technology Teacher
Grade Level	5th grade
Program Title	<i>Solve It!</i>
Grant Award	\$26,000 – applied toward computers and related components, math games and manipulatives, a color printer, teacher stipends, training materials, and supplies

Program Summary *Solve It!* was developed for 5th grade students at Prosperity Heights, a small community school located in a larger metropolitan area with a diverse population. The program pairs project-based problem solving with the real-world guidance of mentors to stimulate student interest in mathematics and science.

Every week, students work one-on-one and in small student groups with the mentors. The program sessions run for one hour in the school's two 5th grade mathematics classrooms, reaching a total of 60 students. At the start of the year, students and mentors play hands-on games taken from *Everyday Mathematics*, a commercial curriculum that teaches basic math concepts. For the remainder of the year, the math teachers present different *Solve It!* projects that help students meet Minnesota Graduation Standards.

In one project, students grouped the contents of a bag of Skittles by color. They counted the number of pieces per color, and then calculated the total along with the fraction, decimal, and percentage of each color in the bag. Working with mentors, the students used computers to record their data and create graphs related to the probable color composition of other bags of Skittles.

Additional elements have included:

- ★ Tossing coins and recording the results to predict the outcome of future tosses, which taught concepts in probability.
- ★ Creating a simple machine with LEGOs, using levers and pulleys, to teach weights, measurements, and mathematical relationships.
- ★ Exploring Fibonacci numbers and then using basic math skills to discover patterns in numbers.

For each project, mentors assist the students with data collection, analysis, and presentation, in addition to reinforcing the math skills they need to complete the projects.

At the end of the year, mentors, *Solve It!* students, and their parents participate in a morning of math games. Parents are able to witness for themselves how math games and other *Solve It!* activities have helped their children develop a real interest in math. Parents are encouraged to take home a bag of math games and supplies so they can continue to play the games at home and further support their children's math enrichment.

After implementing the ASA program, 90% of students are at or above the required math skills level for 5th grade. Seventy percent of *Solve It!* students received an evaluation of developing, proficient, or superior on the Minnesota Graduating Standards Test. A full 90% of the students completed the performance package rubric, which is an impressive increase from 50% in years past. One-hundred percent of students received a rating of developing, proficient, or superior on the rubric.

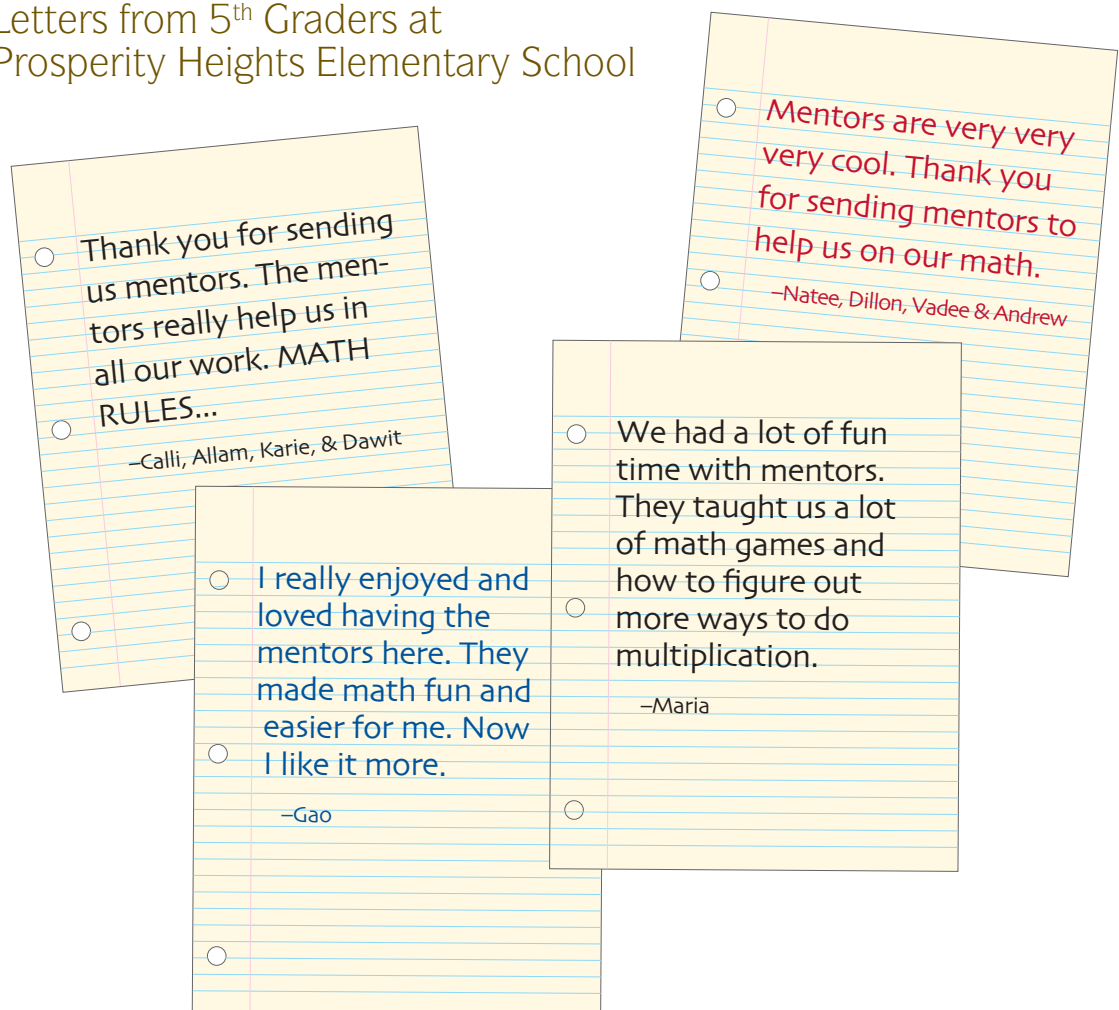
Teachers have reported that student behavior is excellent on days when the mentors come to the classrooms. In fact, 98% of students reported that they looked forward to the hour of math with their mentors and that they had an easier time understanding difficult concepts with a mentor in their group. Program assessment also demonstrated overall positive student behavior and active involvement in *Solve It!* In addition, 90% of the groups received certificates for team cooperation points on each project

The family math session had a high parental turnout. Parents who attended were eager to meet the mentors and to participate in what their children were learning. This event helped to increase parent support of the program.

“My grandma says nothing is better than math, school, and family... Math means everything to me, even more than other subjects. I love math. I think when I grow up, I want to be like you guys.”

– excerpt from a *Solve It!* student’s letter to his mentors

Letters from 5th Graders at Prosperity Heights Elementary School





Case Summary: Elementary School

James Whitcomb Riley Elementary School, Milwaukee, Wisconsin

Weighing In... Online

Weighing in on Math maintains a Web site where the program’s mentors can view schedules and read through lesson plans prior to *Weighing in on Math* sessions. Visit the site at: www.rileyactuaries.com/index.htm.

“[The students] begin to grasp the sense of invincibility that knowledge and problem solving skills bring. As mentors, when we see this confidence growing, we leave with more personal energy than we had when we arrived.”

— *Weighing in on Math* lead actuary

Program Administrators	Greta Plicka, Program Implementer; Karen Shapiro, Program Coordinator
Grade Level	4th grade
Program Title	<i>Weighing in on Math</i>
Grant Award	\$11,000 – applied toward teacher stipends, training costs, teacher guides, field trips, math games, and administrative costs

Program Summary *Weighing in on Math* is an in-school math and financial literacy program created for 4th graders at Riley Elementary, a school serving a predominately at-risk population. The students work in small groups with mentors to learn real-world math concepts and business skills that help to strengthen their mathematical reasoning abilities and boost their confidence in solving math problems.

Students voluntarily participate in the program, which runs from 11:00 a.m. to noon on Tuesdays. There are six sessions in the fall, followed by ten sessions in the winter. Each session starts with a 15-minute math game, followed by 45 minutes dedicated to mentor-led financial literacy lessons, as follows:

- ★ The fall sessions start with basic topics in finance and banking (checking accounts, savings accounts, interest, and credit). Students also take a field trip to a bank in this timeframe.
- ★ During the winter sessions, students study small business principles and learn to use computers to explore profit and loss concepts using Microsoft Excel. The students then create a business plan that incorporates the concepts they learned into a practical application.

Mentors also discuss their careers with students periodically throughout the year.

The *Weighing in on Math* curriculum, developed by the mentors, is compatible with the Wisconsin Model Academic Standards in Math for 4th graders. The school’s program implementer helps to coordinate the lessons and also monitors the progress of the students.

Weighing in on Math culminates at the end of the year with a banquet, attended by parents and mentors. In this forum, the students have an opportunity to present their business plans and results.

Results & Impact *Weighing in on Math* has proved popular since its inception. In 2004, twenty-one 4th grade students, representing four classrooms of 84 students total, voluntarily participated in the program.

The end-of-year oral presentations serve as the primary assessments of student learning. These presentations have reflected a high-level understanding of the financial literacy concepts acquired during the course of the program. Riley’s program implementer attributes much of this success to the relationships between the mentors and students, which enhance learning and create an appreciation of math.

At the end of the year, *Weighing in on Math* students complete an interest survey that evaluates what they liked and didn’t like about the program, what they want to learn more about, and how they will apply what they’ve learned. When asked what they would tell their friends about the program, one student responded, “It’s a really good program. It’s good for your life.”



Case Study: Middle School

Helen Keller Junior High School, Schaumburg, Illinois

Program Administrator Gail Green, Science Teacher

Grade Level 7th and 8th grades

Program Title *Girls in Engineering, Math, and Science (G.E.M.S.)*

Grant Award \$13,150 – applied toward laptop computers, a color printer, transportation, teacher stipends, LEGO Mindstorms systems and related materials, meeting and training expenses, and supplies

Program Goals *Girls in Engineering, Math, and Science (G.E.M.S.)* is an after-school club for academically-diverse 7th and 8th grade girls. The primary goals for girls who participate in the *G.E.M.S.* program are as follows:

- ★ To further their knowledge and skills in math, science, and engineering
- ★ To increase their confidence and competency in hands-on math and science activities and problems
- ★ To explore math, science, and engineering careers, particularly in those areas in which women are typically underrepresented

Although *G.E.M.S.* had been in place since 2001, the school saw a clear need to increase the program's mathematical focus and student participation rate, and thus turned to Advancing Student Achievement. The *G.E.M.S.* program is now supported by ASA, which also gives the school the opportunity to involve female mentors from local corporations to help students achieve program goals.

Program Structure Girls in 7th and 8th grades voluntarily join *G.E.M.S.* and are granted membership on a first-come, first-served basis. Up to a maximum of 20 girls can participate each year. This model allows for a diverse group of girls who have varying levels of interests in math, science, and engineering, and who may demonstrate different ability levels in these subject areas.

Mechanics

- ★ *G.E.M.S.* consists of 20 weekly after-school sessions, with 10 sessions held during the fall and 10 sessions held during the winter. Each session lasts an hour and a half and is focused on a particular 10-week unit of study. Occasionally, club members also use their lunch study periods to conduct experiments that require daily data collection for report preparation.
- ★ The winter unit typically focuses on the *LEGO MindStorms Robotics Invention System*¹¹. During this unit, groups of four girls each build a functioning robot and program it using a computer. If they are able to finish their robot before the 10 weeks are up, the groups are challenged to modify and change the functionality of their robot. This unit allows the girls to develop programming, logical, and visual analysis skills, and to further their abilities working with a computer.

The Gender Gap

The *G.E.M.S.* program at Keller Junior High helps to address the math and science achievement gaps that usually begin to appear among girls at the middle-school level. Intervention at these grade levels can be critical, as evidenced by the results of many national testing indicators. For example, the 2000 National Assessment of Educational Progress (NAEP) reported that although 64% of 4th grade girls scored at or above basic science levels on the NAEP science assessment, this percentage dropped significantly to only 57% of 8th grade girls and 51% of 12th grade girls who scored at or above basic science levels. Boys scored higher than their female counterparts at each of the three grade levels.¹⁰

“G.E.M.S. has taught me a great many things that I will be sure to use in math and science class, and further on in my future.”

– *G.E.M.S. student, Helen Keller Junior High School*

“I believe that participation in the G.E.M.S. club helped the girls gain the confidence that they will need to be more successful in the classroom. The teachers even commented that they felt that the girls were becoming more assertive in answering questions and participating in experiments during their classes. I believe that students of all levels benefited from their involvement.”

– Actuary and G.E.M.S. mentor

Program Structure (continued)

- ★ The second unit is one that the girls in the *G.E.M.S.* program suggest themselves. The *G.E.M.S.* teachers feel it is essential to hold the girls’ interest in the club each year by letting them decide what to focus on during the fall unit. Each unit must be interdisciplinary and typically focuses on topics in materials science, such as food packaging, sports materials, or biodegradable materials. Any topic that is explored requires students to analyze their experimental results.
- ★ During the two years of the ASA grant, the club’s two teacher sponsors develop and tweak units that can be used in future years.
- ★ Female mentors are asked to volunteer for one year and receive about two hours of training with the club’s two teacher sponsors. During the training, mentors are introduced to middle-school science and math curricula. They also become familiar with specific unit topics and learn how to use tools, such as the LEGO MindStorms kits.
- ★ Before each *G.E.M.S.* session, the club teacher sponsors come up with one or more mathematics problems drawn from periodicals, math activity books, or Web sites, and send it to the mentors. The mentors lead the first 20 minutes of each session, which includes problem-solving and socializing activities. They then coach the girls as they work through the different mathematics skills involved in the unit. Perhaps most importantly, the mentors serve as professional role models throughout the course of the unit.
- ★ Also built into the *G.E.M.S.* program are opportunities for both field trips and guest speakers. During one LEGO MindStorms unit, for example, students visited the engineering department at Northwestern University to learn more about robotics. In the past, guest speakers have come to the club to discuss various careers with the girls. Speakers have included the parents of two club members, the mentors themselves, an engineer from a local company, and a physicist.

Evaluation

The *G.E.M.S.* teacher sponsors use two evaluation tools to gauge the impact and success of the *G.E.M.S.* program.

- ★ *Surveys* – Created by *G.E.M.S.* teachers, the surveys measure the girls’ pre-unit and post-unit levels of interest and confidence in mathematics and science.
- ★ *Pre- and post-assessment tests* – Also created by *G.E.M.S.* teachers, these assessments measure the girls’ science and math competencies and skills.

The teacher sponsors in the *G.E.M.S.* program also evaluate the program structure, and discuss ways to improve the program and its operation. For example, a 2003 year-end program report recommended allotting less time for session warm-up activities and having girls first complete a simple robot before advancing to more complex robotics projects.

Results & Impact

The program’s second-year survey of nine of the 14 *G.E.M.S.* members showed increased interest and confidence for three girls, no change for two girls, and a decrease for four girls.

The pre- and post-assessment tests of the same nine girls surveyed in the above example showed a small increase in science and math competencies and skills for six of the girls, no change for one girl, and a slight decrease for two girls.

Additionally, an informal measure of the success of the program was the girls’ attendance rates. *G.E.M.S.* teachers have been encouraged by those rates among participants – in 2005, the winter session reached a meeting attendance rate of 95.8%. Teachers also noted that the girls’ attitudes toward math problems changed for the better over the course of the program. They became more confident and more competitive as the *G.E.M.S.* sessions progressed.

Case Summary: Middle School

Calvin Coolidge MicroSociety School, Hillside, New Jersey

Program Administrator Dr. Ellen Decker, Principal

Grade Level 5th and 6th grades

Program Title *Math a la Mode*

Grant Award \$32,335 - applied toward math games, manipulatives, teacher stipends, magazine and newspaper subscriptions, family/parent events, field trips, arts and crafts supplies, and calculators

Program Summary *Math a la Mode* is an extensive mathematics enrichment program developed for 125 5th and 6th grade students at Calvin Coolidge, a school with a diverse and largely disadvantaged population. Each component is designed to address different math focus areas, including but not limited to measurement, geometry, probability, and graphing/statistics. With the introduction of *Math a la Mode*, school staff and administration are committed to achieving the following objectives:

- ★ Increase student interest in and enjoyment of mathematics
- ★ Utilize adult math mentors to support and motivate students, thus improving their math achievement
- ★ Cultivate increased parental involvement
- ★ Enforce the role that mathematics plays in students' everyday lives and introduce them to future careers that use mathematics

Math a la Mode is comprised of the following program elements:

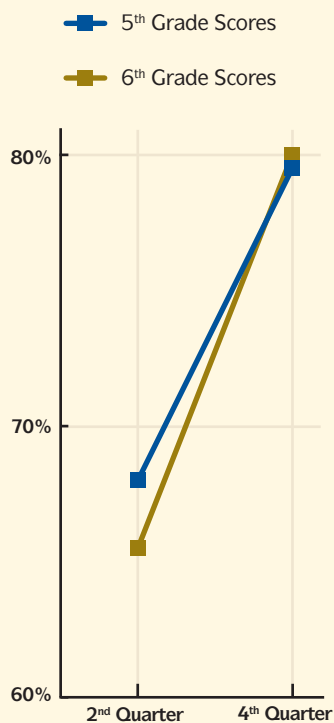
- ★ **Math Project Clubs** involve groups of 6-12 students, and take place weekly before school and during early morning classes. Each club has a different focus. They include:
 - Create a Math Board Game is an in-school component of a larger initiative called the *MicroSociety*¹², a state-sponsored program that engages students in the creation of a miniature “society” where they establish and run a business. During this *MicroSociety* activity, student groups work with mentors to develop board games with a literacy and math focus. Student peers pay “micro money” to play the games, which include spinners, pegs, and other standard board game components. Games such as “Quick Math Journey” involve number facts, probability, fractions, decimals, and geometry.
 - *The Spatial Odyssey* engages students in math-centered art activities designed to strengthen their geometric and spatial skills. For example, students examine or draw pictures with embedded geometric shapes. Mentors work one-on-one with students to clarify math concepts and assist with completion of the activities.
- ★ During classroom-based **Learning Centers**, mentors assist students with graded interdisciplinary projects. Each 5th and 6th grade class has centers with mandatory in-class group or individual work. Students independently explore topics that extend curricular topics being taught in the classroom, enabling the teacher to reinforce the students' math skills. The projects have included:
 - Reading trade and recreational mathematics books that connect math with literacy. More than 50 titles are available, including *The Grapes of Math*, *Sir Cumference*, *The Math Curse*, and *The Greedy Triangle*.



Key Participants

The principal at Calvin Coolidge serves as *Math a la Mode*'s program coordinator. She depends on the support of math teachers, mentors, and pre-education service university students to implement and facilitate the different components of the program. Mentors meet with the program coordinator and teachers at the start of the program, and periodically throughout the school year, to learn more about their roles in the program and to share their experiences.

Math a la Mode: Student Score Improvements in 2005 Assessment Tests



Program Summary (continued)

- Exploring Internet math Web sites on classroom computers. Often, these include game sites that students use to practice and reinforce math skills. Or, students use the Internet to research and write biographies about famous mathematicians.
- ★ Mentors assist students, in class, with supplemental math problems and games taken from **Everyday Mathematics**¹³. Coolidge uses this commercial research-based curriculum as its primary means of addressing New Jersey Core Curriculum Content Standards in mathematics. Mentors assist students with problem-solving activities, such as “Fraction Attraction,” a game that requires groups of 3-5 students to find equivalent fractions and place them into a puzzle-like format.
- ★ Up to three **Family Math** evenings take place throughout the year. Parents meet the teachers and mentors, and learn what their children do in the classroom to improve their math skills. The families play math games together and participate in other activities that mirror those that their children do in school.
- ★ All 5th and 6th graders participate in field trips to businesses such as **local banks**, where they meet with vice presidents and loan officers. During one bank trip, students opened savings accounts.
- ★ Mentors lead whole-class and small-group discussions about actuarial and other math-related **careers**, and show them different math-related materials and tools used in the workplace. These sessions take place periodically throughout the school year.
- ★ Additional *MicroSociety* “businesses” tying into the *Math a la Mode* program include the **school bank** and **newspaper**. Mentors are invited to attend Thursday afternoon whole-class sessions to assist students with their involvement in the different businesses of *MicroSociety*, as well as provide guidance on **student government fundraising** skills.
- ★ Special weekly programs designed for **gifted and talented students** also benefit from the involvement of mentors. These 40- to 80-minute sessions take place in addition to regularly scheduled Tuesday math classes and address probability, percentages, number facts, and other concepts. Between 5 and 8 gifted students take part in activities such as *Stock Market* and *Game 24*, derived from the Hillside School Enrichment Program¹⁴ curriculum.

Results & Impact

Students participating in *Math a La Mode* have demonstrated marked improvement in their mathematical competencies. In the principal’s 2005 analysis of 5th graders’ academic progress, average assessment scores showed an increase from 68% in the 2nd quarter to 79.5% in the 4th quarter; 6th grade scores increased from 65.5% to 80% over the same period.

The students’ enthusiasm for mathematics has greatly increased since the program’s inception, as evidenced by their active engagement in individual and group activities, and their positive feedback about their relationships with the mentors. In addition, parental involvement increased by 15%, as measured by attendance records from PTA meetings, Family Math evenings, and other scheduled events.

Five mentors participated during *Math a la Mode*’s first year. Their participation was greatly appreciated, and they were honored in an end-of-year recognition ceremony.

Case Summary: Middle School

De La Salle Middle School at St. Matthew's,
St. Louis, Missouri

Program Administrators Jeff Susor, Phil Kirshman, and Rosemary Hufker, Administrators;
Fran Endicott Armstrong, Ph.D., Program Coordinator

Grade Level 6th-8th grade

Program Title *Math ALIVE: Actuaries Lend Inspiration to Value Education*

Grant Award \$21,499 – applied toward coordinator, teacher stipends, project administration, manipulatives, facility rentals, and a laser printer

Program Summary *Math ALIVE* engages 6th-8th graders at this urban school in a self-paced hands-on mathematics lab that helps them to:

- ★ Improve math achievement
- ★ Enhance conceptual understanding of mathematics
- ★ Further understanding of math's place and value in everyday life
- ★ Strengthen mathematical problem-solving abilities

All 6th-8th grade students take part in *Math ALIVE*. It runs in the afternoon one time per week per grade, as part of the school's extended day program. An average of 14-17 students, two mentors, and a teacher are present in each session. Students continue in the program until they graduate from 8th grade.

At the start of each session, students receive activity worksheets written by the program coordinator or derived from commercially produced materials. The activities present concepts such as algebra, decimals, and exponents in a fun, engaging format. In one activity, students work with algebraic problems using the Hands-On Equations Learning System¹⁵. The system includes game pawns, which represent unknowns, and numbered cubes, which represent constants. Students physically manipulate the pawns and cubes to solve linear equations and check their solutions.

During other activities, students gather demographic-type data about their middle school peers to explore statistics; create scale drawings of a park to work through two-dimensional measurement; and design carnival games to determine the probabilities of winning.

If students have questions or need guidance, a mentor works with them one-on-one, clarifying concepts and suggesting creative problem-solving strategies. Students advance to subsequent activities once they have firmly grasped and mastered a concept and its application. Mentors assist in determining whether students have mastered a particular set of concepts by checking the activity worksheets.

Results & Impact

After the program was implemented in the 2003-04 school year, a comparison of pre- and post-program math assessments showed marked improvement in math competencies for all *Math ALIVE* students. The average growth in grade equivalency was 1.5 years for 6th graders, 1.7 years for 7th graders, and 2.2 years for 8th graders.

Student and mentor surveys from the same year demonstrate the program's popularity. Students said they had fun with the activities and games, and all 16 mentors expressed interest in continuing their involvement with *Math ALIVE*.



“Using mathematics manipulatives in a guided discovery mode — under the guidance of knowledgeable mentors — is designed to enable students to shift from trying to do mathematics by obedience to learning mathematics by understanding.”

— Fran Endicott
Armstrong, Ph.D.,
Math ALIVE
Program
Coordinator



Case Summary: Middle School

Monroe Middle School, Omaha, Nebraska

Program Administrators Mary Solberg, Math Teacher; Amy Gordon, Project Leader

Grade Level 8th grade

Program Title *Monroe MathMagicians: Making Magic with Numbers*

Grant Award \$17,138 – applied toward instructor stipends for planning and meeting time outside of regular class hours, calculators, manipulatives and games

Program Summary *Monroe MathMagicians: Making Magic with Numbers* engages all 8th grade pre-algebra students in hands-on learning activities, and partners underachieving 8th graders with mentors to bolster their mathematical proficiency. Success is measured primarily on the basis of test scores from the Omaha Public Schools standardized Criterion-Referenced Test (CRT) and the national standardized California Achievement Test (CAT).

MathMagicians is comprised of two separate components:

- ★ During the school's five 8th grade pre-algebra classes, which serve 20 to 25 students each, teachers use hands-on and experiential learning tools to reinforce lessons, increase student comprehension, and practice pre-algebra concepts and applications. These tools include *AlgeBlocks*, a commercial product that enables students to physically build algebraic expressions and equations; integer playing cards that can be displayed on an overhead projector; and graphing calculators that can be used for statistical problem solving.
- ★ The second component serves about 24 underachieving students who demonstrate average performance but do not pursue higher-level math classes. Seventh grade teachers identify the students who are most likely to benefit from mentoring in the 8th grade, although the program is not mandatory. These students meet with mentors in class once or twice each month. The mentors often supplement teacher-led lessons and explain how the concepts being studied are used in their own careers. The mentors are also available to assist with assignments or activities related to a lesson.

Key Participants

Several individuals help to administer the *MathMagicians* program. They include:

- ★ The program coordinator and a math teacher work with other participating teachers to set program achievement goals, discuss ways to best utilize mentors in the classroom, decide how to meet program objectives, and plan lesson activities.
- ★ A lead actuary coordinates the mentors' schedules and plans activities with the program coordinator.
- ★ 5 additional math teachers design lessons and activities, and co-plan—and occasionally co-teach—with mentors.

"I really liked using the game Make 7. I didn't even know that I was adding and subtracting integers until my teacher pointed it out."

– Monroe Middle School student

Results & Impact

During the 2004-2005 school year, there were notable improvements in *MathMagicians* students' math scores on the CRT and the CAT. Two-thirds of the 8th graders who received supplemental math support achieved the highest possible score (Advanced) on the CRT, and more than half improved their scores on the CAT from the previous year.

Several of the *MathMagicians* students from the same year not only passed pre-algebra with a high grade, but they exhibited such dedication and enthusiasm for the class that they were recommended to move to an honors algebra class for the following year.

In addition to the quantitative data, surveys have shown that the program has successfully raised students' enthusiasm for math. Teachers reported appreciating the myriad materials the program provided, as well as the opportunity for their students to benefit from the real-life math connection that mentors bring to the classroom.

Case Summary: Middle School

Prairie View Middle School, Sun Prairie, Wisconsin

Program Administrators Craig Brandl, Math Teacher; Andrew J. Doll, FCAS, Lead Actuary

Grade Level 6th–8th grade

Program Title *Discovery Math Club*

Grant Award \$23,187 – applied toward stipends, field trip costs, Math Club materials and manipulatives

Program Summary The *Discovery Math Club* is a unique mentor-based program developed for the academically diverse 7th graders at Prairie View Middle School. Students participate in math-focused activities as varied as assembling an electronic circuit and orienteering through a corn maze. The objective of the program is to increase student interest in and attitudes about mathematics.

In twice-weekly after-school sessions, *Club* members participate in collaborative projects that build their mathematical problem-solving skills. Each project involves a fun, experiential activity that explores a concept related to budgeting, probability, investments, shopping, statistics, or other grade-appropriate topics. One project, called *BizWorld*, challenged the students to create a small business. In doing so, they learned the fundamentals of entrepreneurship, economics, and money management.

Other projects have included:

- ★ Assembling and testing an electronic circuit, to practice ordering and measurement skills
- ★ Navigating through a corn maze, to learn coordinate graphing and directional skills
- ★ Building and launching rockets, to build estimating and geometric skills

Students work through the activities with the assistance of mentors and teachers. The mentors play a key role in helping the students develop their appreciation for the importance of mathematics in everyday life.

At the end of the year, the mentors accompany students and teachers on two field trips that serve as a reward for participation in the *Discovery Math Club*. The field trips serve a second purpose – getting the students to apply the math skills learned during the school year. Students visited a bowling alley, for example, not only to bowl a few games, but also to practice calculating bowling scores manually and to realize the role that math plays in everyday life.

Results & Impact

As many as 40 students participate voluntarily in *Math Club* during the school year. These participants complete math interest surveys at the start and end of the school year, regarding their attitudes toward math. In 2003, 22% of *Math Club* participants who attended at least six meetings demonstrated a greatly improved attitude toward math; 55% showed a slightly improved attitude.



Supplemental Support

Mentors at Prairie View Middle School also participate in informal weekly sessions – both in-class and after-school – that target 6th-8th grade students who require supplemental math assistance. Typically, mentors present these students with curriculum-driven lessons, or help them work through classroom assignments to further their understanding of the math concepts they are studying.

“We have had a difficult time keeping my child challenged in school. Math club activities helped focus his attention. Thank you.”

— parent of a Discovery Math Club member



Case Summary: Middle School

Willis A. Sutton Middle School, Atlanta, Georgia

Program Administrator Teresa R. Winer, FSA, Program Author and Lead Actuary

Grade Level 6th–8th grades

Program Title *Math Club Online*

Grant Award \$12,000 – applied toward teacher stipends; Web site research, development, and maintenance; student and mentor learning/instructional materials, supplies, and administrative fees

Program Summary About 40 students in grades 6 through 8 benefit from the mentor-based programs developed at Sutton Middle School. *Math Club Online*, the school’s core mentoring program, engages participants in math enrichment activities to achieve the following objectives:

- ★ Improve and sustain students’ interest and achievement in mathematics
- ★ Enable students to enhance, apply, practice, and share learned math skills
- ★ Encourage students to showcase their involvement in the program via the Web

The Club is made up of an academically diverse group of 6th to 8th graders. Their objective is to generate ideas and content for the Club’s Web site (www.mathclubonline.org) to appeal to other students, tutors, teachers, and other readers who are interested in math. During the first year, students researched and identified student-friendly mathematics Web sites that feature math puzzles, games, and problem-solving activities. With assistance from the program instructors and mentors, the students “tested” each site and then catalogued it for inclusion as a link on the Club’s Web site. In doing so, participants actively practiced and extended their math skills and proficiencies.

Participants voluntarily meet in the computer lab one time per week for an hour after school. Six students are involved in each of two sessions: one in the fall and another in the spring. In subsequent years, students will be charged with expanding the Web site to include features such as:

- ★ Descriptions of other community math mentoring programs
- ★ Information for individuals interested in volunteering for math mentoring programs
- ★ Information about math-related careers
- ★ Test-prep strategies and practice test exercises

A science teacher and a math teacher from the school manage the mentoring programs and serve as principal instructors, while the math department head helps teachers recruit students for the Club. The lead actuary recruits additional mentors to work with students one-on-one and in small groups.

The Club’s Web site was designed and is maintained by a volunteer.

Reaching Out

As an extension of their involvement with Sutton’s ASA program, mentors also participate in out-of-school and summer mentoring sessions for 6th–8th graders who require supplemental math support. Prior to these one-hour sessions, the students let their teachers know in which areas they need help. This enables the mentors to present relevant curriculum-driven lessons (often focused on pre-algebra and algebra), review homework assignments, and assist with test preparation when needed.

The mentors have also been recruited to participate in *Atlanta’s Reach for Excellence*¹⁶ program. Actuaries occasionally serve as guest speakers at the program’s Saturday and summer sessions, talking about the actuarial field and other math-related careers, as students consider their educational pursuits.

Results & Impact

Math Club Online's Web site is still in its developmental phase but it has an active online presence and has logged over 760 hits to date. Participating students indicated that they enjoyed practicing math skills on the web and were pleased that they could create a site that helps their peers with math.

Testimonials from those receiving supplemental math support and their families have indicated the strength of the mentoring relationships in that setting as well. One parent stated:

“My daughter came to some of the Wednesday morning sessions. I know [the program] helped her. She was really struggling in the winter with math but she ended up bringing her grade up to a B in the spring. One day in class, when [the teacher] asked for an answer to a question, she was the only kid who knew the answer.”





Case Summary: Middle School

Taos Municipal Schools (TMS), Taos, New Mexico

Program Administrators	Dr. Rosa Herrera, Director of Instruction; William M. Waugh, Jr., MAAA, Lead Actuary
Grade Level	3rd–8th grade; 11th–12th grade; college students
Program Title	<i>Discovery Academy</i>
Grant Award	\$25,000 – applied toward Advanced Placement student mentor and instructor stipends, academic testing, transportation, supplies, and food

Reaching Out

The scope of the Discovery Academy is broad. Its programs touch hundreds of students across the school district who struggle not only with math, but with other subject areas as well. In addition, it presents unique opportunities for high-achieving high school and college students to not only build their career skills but also to experience the unquantifiable rewards that come with helping younger students improve their educational proficiencies.

Because of the greater financial needs that come along with a program of this size, the Academy has been backed financially by a number of public and private organizations in addition to The Actuarial Foundation. What these organizations have in common is their interest in helping to provide students with enrichment opportunities that help them succeed. Their support has paid off in the form of high participation rates, active engagement by high school and college students, improved student test scores, and better attitudes about education in general.

Program Summary

Discovery Academy is a unique year-round mentoring program that serves three distinct student groups: academically at-risk 3rd–8th graders, 11th and 12th grade Advanced Placement Math students, and college students. Students in the younger grades receive cross-curricular support – from both actuarial mentors and the older students to increase opportunities for next-grade success in math and reading. The program encourages participation from select Advanced Placement and college students by providing them a stipend for their roles as Teacher Assistants; these students also benefit from a mentored curriculum that imparts essential financial knowledge to help them successfully make the transition to the working world.

During each *Discovery* session, an instructor – with the help of mentors and three to four trained student Teacher Assistants – presents an engaging research-based lesson to a group of about 20 students, separated by grade level. The lessons are focused on math and reading, and are aligned with the school’s curricula. In addition to the remediation provided in these sessions, the program also includes fun enrichment activities involving cooking, drama, music, and participation in *Odyssey of the Mind*¹⁷, an international program that engages students in team-based creative problem solving.

Teacher Assistants participate in sessions conducted by the mentors specifically for them. These sessions utilize the *Money Math Learning Series*¹⁸, an Actuarial Foundation textbook that includes topics such as interest rates and loans, credit and debit cards, and mutual funds and taxes.

At the end of the Summerbridge Academy, Discovery’s summer program, Teacher Assistants build their career skills by creating and presenting to the TMS school board a comprehensive final statistical report on the program. The report includes the number of participating students, attendance rates, student/teacher ratios, and academic assessment data.

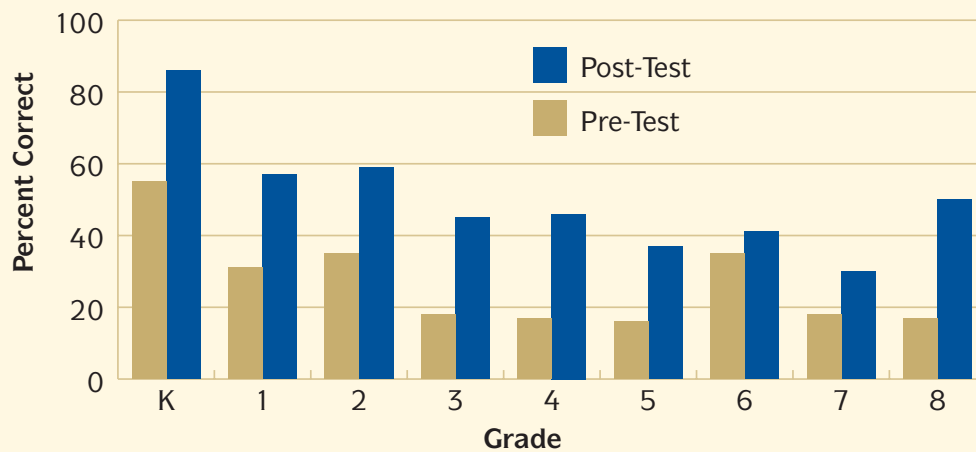
The two-hour Discovery Academy sessions take place after school in each of the District’s four elementary schools and middle school. The Academy is open to all TMS elementary and middle school students, but targets those in need of remediation. The six-week Discovery Summerbridge program is held at the middle school in morning sessions from Monday through Thursday.

The participation of 3rd-8th grade students in Discovery Academy is voluntary, so the enrollment data for the program speaks to its success and popularity. There were 250 students, including the student Teacher Assistants, who participated during the 2004 school calendar year, and 120 students who participated in the Summerbridge program. These 120 students filled all available slots in the program, with an additional 26 students on a waitlist. More than 65% of Summerbridge students reported enjoying the program, and 73% of their parents stated that they would recommend the program to others.

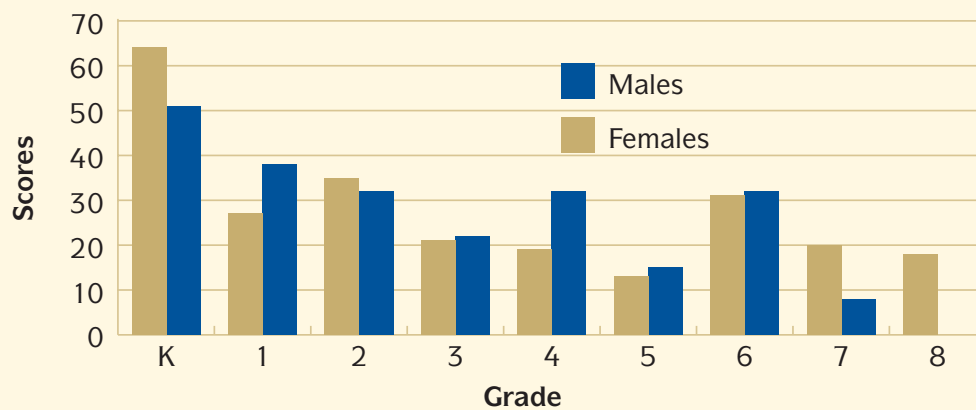
In the Academy's first two years, 4th and 5th grade participants showed a median improvement in class test scores of 10%. In 2004, Discovery Academy middle school students demonstrated an 11.6% gain on ACHIEVE, a TMS district-wide interim academic assessment exam, compared with a 7.5% improvement gain for non-Discovery students. In addition, Summerbridge 3rd-8th grade students demonstrated a 13%-14% improvement in their math and reading scores, as evidenced by the pre-test and post-test results on the Discovery Academy STAR Math and Reading test.

Teacher Assistants from the Discovery Academy often return in subsequent years and through college, to participate in the program. The assistants gain instructional skills, career preparation, financial knowledge, and employment that can, and often does, continue throughout college.

Mathematics Progress by Grade K-8



Mathematics Post Test K-8 Gender Comparisons by Grade





Case Summary: Middle School

Ticonderoga Middle School, Ticonderoga, New York

Program Administrators Robert Porter, Math Teacher; Brian Sann, FSA, Lead Actuary

Grade Level 6th grade

Program Title *Sixth Grade Math Club*

Grant Award \$1,500 – applied toward supplies and games, admission to special events, transportation, and snacks for club participants

Program Summary The *Sixth Grade Math Club* engages academically advanced sixth graders in hands-on learning experiences, both in and out of the classroom. Its primary purposes are to:

- ★ Provide enrichment for advanced mathematics students
- ★ Encourage students to attend college and pursue math and/or science-oriented careers

An actuarial mentor develops and teaches lessons, which are neither curriculum- nor standards-based. Instead, they serve to build student interest in real-world mathematics and demonstrate how mathematics is used in everyday life. Activities have included:

- ★ Calculating *The Flintstones'* federal income tax
- ★ Bidding on a construction project, while exploring concepts related to profit margins, competitive pricing, and expenses
- ★ Determining the rates a dentist should charge patients, based on considerations of personnel salaries and benefits, overhead, and the cost of malpractice insurance

Guest lecturers have included college math and science professors who occasionally teach lessons. The club runs during the last 42-minute period of the school day on Tuesdays – a time dedicated to elective activities such as band, chorus, sports, and other club activities. Between 15 and 18 students are selected for participation in the *Math Club*.

In addition, *Math Club* students take field trips to nearby colleges throughout the year. Here, they meet with professors to find out about math and science-related careers, learn about the college admissions process, tour the campuses, and eat in campus dining halls along with college students. *Math Club* students have also visited area businesses, such as International Paper, for a first-hand view of math applications in industry.

Results & Impact

Math Club students' enthusiastic interest and regular program attendance demonstrate its impact and value. A 2004 year-end survey showed that students enjoyed the sessions and that their awareness of math and science possibilities was increased. Many *Math Club* participants have requested that the program be extended to 7th graders, so that they can participate for a second year.

What a Little Inspiration Can Do

The Advancing Student Achievement program at Ticonderoga Middle School is atypical of most other grant programs supported by the Actuarial Foundation, for two reasons:

- 1) The school is located in a small, rural community without a large pool of potential mentors.
- 2) The concept for the *Math Club* was conceived by a local actuary.

The program is just as successful as its larger counterparts, and it serves as an example of how one person's vision – teacher or otherwise – can translate into an engaging, successful, and impactful program. It also demonstrates that the Actuarial Foundation considers all types of program models for funding through its Advancing Student Achievement program.

“I want to work with NASA. I love to watch rockets take off. I know there's a lot of math involved.”

— *Sixth Grade Math Club student, Ticonderoga Middle School*



Case Study: High School

North Atlanta High School, Atlanta, Georgia

Program Administrator	Patricia Daniel, Math Teacher
Grade Level	9th through 12th grades
Program Title	<i>Traveling Mathematics Team</i> and <i>Research Club</i>
Grant Award	\$11,650 – applied toward teacher stipends, entry fees, transportation to tournaments, food incentives, study materials, and software
Program Goals	<p><i>The Traveling Mathematics Team</i> and <i>Research Club</i> were developed for mathematically talented and motivated 9th-12th grade students at North Atlanta High School, an urban school with an ethnically and economically diverse population. Because of budgetary restrictions, these gifted students previously were not offered many opportunities to engage in higher-level mathematical thinking and problem-solving skills.</p> <p>Each program has a unique goal:</p> <ul style="list-style-type: none">★ The goal of the <i>Traveling Mathematics Team</i> is to prepare students to compete successfully in various regional mathematics competitions by solving non-routine types of math problems★ The goal of the <i>Research Club</i> is to help students plan and conduct research using statistical methods <p>Mentors are the key participants in helping students achieve these goals. Mentors who wish to work with non-routine problems and prepare students for competitive mathematics tournaments are assigned to work with the <i>Traveling Mathematics Team</i>. Mentors who wish to develop long-term, one-on-one relationships with students are assigned to work with the <i>Research Club</i>.</p>

Program Structure

Students on the *Traveling Mathematics Team* practice for and compete in city, regional, and state math tournaments. Students in the *Research Club* develop and pursue long-term research projects. A description of each program follows below.

The Traveling Mathematics Team

Students involved in the after-school *Traveling Mathematics Team* work together to prepare for and compete in mathematics tournaments. Most tournaments take place on college campuses, thereby also exposing *Math Team* members to higher education settings and motivating them to pursue mathematics at the college level.

Students enter the programs in one of two ways:

- 1) Some students are referred by teachers who believe that they demonstrate outstanding performance in their coursework and/or show academic promise.
- 2) Other students opt into the program because they have a personal interest in advancing their mathematical knowledge, regardless of academic placement.

Competition Results

In the first year of the *Traveling Mathematics Team*

- ★ One North Atlanta student placed in the top 24% at the University of Georgia Tournament. (A total of 370 students competed in the tournament.)
- ★ North Atlanta's team took fifth place out of 25 schools in the Berry College tournament; one student placed 6th individually, out of 200 students.
- ★ Four North Atlanta students placed in the top tier of the Georgia Institute of Technology tournament, which hosts about 400 students.
- ★ The junior team placed first and the novice and senior teams third in a citywide math tournament series of about 12 schools.



Figure 1

The following is a problem taken from the Canadian Open Mathematics Challenge, 2002:

In a sequence of numbers, the sum of the first n terms is equal to $5n^2 + 6n$. What is the sum of the 3rd, 4th, and 5th terms in the original sequence?

- A) 123 B) 155
C) 210 D) 98

Correct answer: A) 123

“I feel that providing the experience and helping these gifted children become academic leaders is equally important as winning competitions.”

- Traveling Mathematics Team teacher

Program Structure (continued)

Traveling Mathematics Team members are academically, socially, and behaviorally diverse. What they have in common is that they participate because they want to be team members and are willing to spend extra time solving math problems and attending tournaments.

Mechanics

- ★ The project sponsor and lead actuary meet with mentors in an orientation session to outline the project goals and to present activities and concepts.
- ★ The *Traveling Mathematics Team* meets twice per month after school, for two-hour sessions, from October through April. About eight students from each grade level are members of the team, making a total of about 32 team members.
- ★ Each session serves to prepare students for the tournaments by solving problems dealing with the math concepts typically addressed during the competitions. Students are grouped by subject areas as follows:
 - Algebra I – Novice (9th graders)
 - Geometry and Algebra II – Junior (9th, 10th, and 11th graders)
 - Advanced Algebra and Trigonometry, Pre-Calculus, and Calculus – Senior (10th, 11th, and 12th graders)
- ★ During the after-school sessions, students in each subject-area group study math concepts and address problems that go beyond those found in a typical classroom. Thus, under the guidance of the mentors, students develop new problem-solving strategies to solve the non-routine problems typically found in tests given at various tournaments. The concepts often include combinations, permutations, non-Euclidean geometry, sequences, series, and limits. For an example, see **Figure 1**.
- ★ The project sponsor searches for city, regional, and state math tournaments through organizations such as the Georgia Council of Teachers of Mathematics and the Georgia Math League, and then submits the applications and fees for participation to the event sponsors, typically one month in advance.
- ★ The team typically competes once per month. The tournaments take place on Saturdays between 8 a.m. and 3 p.m., and generally involve:
 - *Individual tests* – 25 multiple-choice questions with a time limit between 60 and 90 minutes.
 - *Group tests* – Four questions that a four-person team works on together, with a time limit between 30 and 60 minutes.
 - *Ciphering* – 10 to 20 questions, delivered to the students on paper or via an overhead screen. The students have two minutes to answer each question.
- ★ Among other expenses, the ASA grant helps pay for transportation to the tournaments, often involving a van rental or use of a school bus. Teachers who chaperone the students to the tournaments receive a stipend based on the rate established by the Atlanta Public Schools.
- ★ In addition to competing, the team also has the opportunity to tour the campus they are visiting. The project sponsor often arranges meetings or lunches with some of the college’s mathematics majors and/or graduates of North Atlanta High School, who are willing to spend an hour with the students to discuss college life and futures in mathematics.
- ★ In 2005, the team also participated in an online tournament sponsored by the Math Forum at Drexel University involving teams from around the country.

The Research Club

The Research Club is an after-school program that is open to students participating in the International Baccalaureate (IB) program, a component of the International Baccalaureate Organization (IBO), which promotes academic excellence through rigorous study and assessment. Mathematical research is a mandated component of the IBO curriculum in the junior year; the Research Club is a structured forum in which students may pursue their IB research projects with the assistance of mentors.

Program Structure (continued)

Mechanics

- ★ About 30 11th grade students voluntarily take part in the *Research Club*, which meets twice per month from 3:15 p.m.-5:15 p.m between October and April. Because these meetings take place on different days from the *Math Team* meetings, a student can be a member of both.
- ★ *Research Club* students work individually on a yearlong investigative research project. Each project involves the selection of a question, followed by the collection, recording, and appropriate analysis of data to answer the question.
- ★ During an initial planning phase, the *Research Club* meets several times as a full group to flesh out project ideas with the mentors and teachers. Typically, the projects are based on students' personal interests.
- ★ Students begin work on their projects by gathering data and sharing their findings with the mentors and teachers, who help them choose the appropriate data analysis tools and techniques. The mentors also work with students in a computer lab to find additional data on the web, record the data in a spreadsheet program, and analyze the data with descriptive statistical techniques including graphs, numeric summaries, verbal descriptions, regression lines and equations, and inferential techniques such as hypothesis tests and confidence intervals. The mentors continue to help students analyze their data through project completion.
- ★ Students report to the group to share ideas and project progress during the course of their investigations. This process often includes peer critiques.

Evaluation

The following evaluation tools are used to measure the impact of the *Traveling Mathematics Team*:

- ★ Student surveys of their experiences in the program
- ★ Student performance in math tournaments

The following evaluation tools are used to measure the impact of the *Research Club*:

- ★ Project grades
- ★ Student logs documenting the progress of their research projects
- ★ Teacher assessment of research projects
- ★ Non-objective ratings of projects exhibited at local mathematics competitions. These ratings are based on scoring rubrics from the IBO that define the number of points to be awarded for individual parts of a project. For example, a student's rating on the data analysis portion of a research project can be awarded a whole number from 0 to 6, where 0 represents no attempt to carry out any mathematical processes, and 6 represents carrying out mathematical processes correctly and accurately.

Results & Impact

Traveling Mathematics Team participants have indicated that they enjoy the math team, desire additional practice, and want to participate in more tournaments. In the first year of the program, Math Team students placed in many tournaments.

Students in the *Research Club* greatly appreciated the mentors' assistance in moving their investigations along; most students did not know how to undertake research until the mentors explained and demonstrated data collection and analysis techniques. Students who took advantage of mentoring relationships through the *Club* had better IB project grades than their counterparts who were not members of the *Club*. (Every IB student project is graded externally as part of the student's IB diploma.)

Research Club

Research projects that students in the club have investigated include the following questions.

- ★ If a basketball team has a greater free throw average than its opponent, is it more likely to win the game?
- ★ Does the height of a racehorse predict its number of wins?
- ★ How does the arch of a ballerina's foot relate to performance?
- ★ Is the ethnicity of a county related to the proportion of votes for Republicans and Democrats?
- ★ Did the accuracy of polls predicting the 2004 Presidential Election improve as the election grew closer?
- ★ Are unemployment rates and interest rates related?
- ★ Does labeling CDs with parental warnings influence sales?



Case Study: High School

A Matter of Attitude

Actuaries have had an obvious impact on Vanguard students' attitudes about math. Program author Yotam Hod described their influence:

"Just conversing with the actuaries helps students see firsthand how important it is to understand math concepts. Seeing that a professional understands the same concepts that they are learning reinforces the idea that what they are learning has purpose in real life."

"When I was confused or the teacher was busy helping students at another table, the actuary was there to help."

- Mathematics Incorporating Technology student

Vanguard High School, New York City

Program Administrator Yotam Hod, Math Teacher

Grade Level 9th grade

Program Title *Mathematics Incorporating Technology (MIT)*

Grant Award \$15,889 – applied toward laptop computers, a projector and related audio/visual equipment, remote devices, software, and professional development stipends

Program Goals *Mathematics Incorporating Technology (MIT)* uses advanced technology to enhance the quality of mathematics instruction at Vanguard High School, a public school in Manhattan's Upper East Side. There are two goals of the *MIT* program:

- 1) Increase the number of 9th graders who pass the New York State Math A Regents Exam (In the January 2004 mathematics exam, 61% of the school's 9th to 11th grade students scored below the minimum requirement for earning a New York State diploma.)
- 2) Improve students' abilities to meet New York State and New York City mathematics and technology performance standards

The author of the *MIT* program designed it to incorporate the recommendations of the National Council of Teachers of Mathematics, which suggest that instructional technology is an essential tool for teaching and learning mathematics.¹⁹

Program Structure

Mathematics Incorporating Technology employs technologies that allow educators to present key mathematical concepts in an engaging, fun, and creative format. Vanguard's ASA grant enabled the mathematics team to supplement their existing PowerPoint software with laptop computers for the teachers, classroom projectors, and the *Qwizdom*[®] Interactive Learning System²⁰, which includes:

- ★ *Computer software* that allows teachers to create customized PowerPoint-style lessons and interactive quizzes.
- ★ *Remote devices* that allow students, working individually or in small groups, to input quiz responses directly into the system.
- ★ *An educator remote* that allows a teacher to manipulate the presentation, as displayed by means of a digital projector.

Actuaries from several New York City corporations volunteer to serve as *MIT* mentors and help assist teachers and students to implement and utilize technology in the classroom. *MIT* classrooms are project-based, rather than lecture-based, thereby making it easy for mentors to work one-on-one and with small groups of students.

Program Structure (continued)

Mechanics

- ★ At the start of the school year, the author of the *MIT* program and its lead actuary conduct an orientation for the 15 to 21 actuaries who volunteer as mentors for the program. The orientation provides an overview of the goals, objectives, and logistics of the program. The orientation also allows teachers the opportunity to discuss the specific math and technology concepts on which *MIT* will focus. Before participating in the program, the actuaries who will serve as mentors spend one class period observing teachers and students who will be using the program.
- ★ The three ninth-grade mathematics teachers develop the interactive lesson plans. Using templates from *Quizdom* or PowerPoint, the lessons may include presentations, real-time videos, and interactive games. The lessons focus on the core competencies tested on the NYS Math A Regents Exam: numbers and operations, uncertainty, measurement, coordinate and plane geometry, problem solving, and algebraic equations, patterns and functions.²¹
- ★ *Mathematics Incorporating Technology* runs every day of the school year. *MIT* mentoring sessions occur twice per week during 80-minute class periods. Teams of two actuarial mentors are present for each of these two sessions, on a rotating basis. Approximately 100 students, representing all six of Vanguard's 9th grade mathematics classes, take part in the program with 18 to 25 students present during each *MIT* class period.
- ★ At the start of any given mathematics class, the teacher uses a projector to present a challenge problem taken from a previous Math A Regents exam. Students are given 15 minutes to work on the problem. The challenge problem is often followed by an interactive *JEOPARDY* type game. Every student must answer the question using his or her remote control. Student responses are thus captured in real-time, making it possible for a teacher to gain instant snapshots of student understandings. After each question, one student is called upon to provide an explanation for the correct answer.
- ★ After this interactivity, the teacher moves on to the day's lesson, which can be dynamically presented, typically using a PowerPoint format. During or after a particular unit, students are assigned a project that requires them to synthesize all of the information they have learned and make it more tangible. For example, one project required students to collect data on the 2004 Presidential Election. Students created tables, graphs, and charts using their computers, and then presented their findings to the rest of the class by means of PowerPoint slides they had made.
- ★ During an *MIT* mentoring class, one actuary assists students in small groups or one-on-one with the day's activities, specifically by reinforcing the math concepts and strategies that the technology offers. The second actuary on the team observes the teacher and students to gauge the success of a lesson. The mentor's feedback can then be used if necessary to improve the lesson and suggest ways to use the technology more efficiently.
- ★ Follow-up process sessions for mentors in the program occur every semester as needed. During these forums, mentors have a chance to reflect on their classroom experiences and discuss with teachers ways to improve the *MIT* program.



Evaluation

Results from the Math A Regents Exam are used to evaluate the impact of the *MIT* program on student math achievement. At present, there are no formal in-class assessment tools set up to measure improvements in student performance. However, *MIT* students complete an evaluation at the end of the year that allows them to comment on their experiences with mentors and with the new technologies employed in the classroom.



Results & Impact

After the *MIT* program was implemented, teachers reported that students were more actively participating in class. They also had greater opportunities to use technology in their classwork. The students completed projects that involved electronic data presentation and complex math problem-solving through the use of databases.

There was a slight decrease in the 9th grade Math A Regents Exam results from 2004 to 2005. However, Vanguard teachers noted that factors such as the proficiency levels of the 9th grade students (in comparison with the previous year's 9th graders) and the difficulty of the 2005 exam are not factored into the results.

Teachers, students, and mentors alike have expressed their excitement about participating in the *MIT* program and continuing on with the program in the future.



Grant Information

Are You Ready to Apply for an ASA Grant?

As demonstrated by the preceding case studies, The Actuarial Foundation's Advancing Student Achievement (ASA) grant initiative supports a variety of program models, with the sole unifying theme being the use of actuaries as mentors. By providing actuaries as positive role models, ASA builds on proven educational and career mentoring programs that promote student appreciation of mathematics, improve student achievement, and boost student interest in math-related careers and/or post-high school study.

Teachers who apply for ASA grants are free to design programs that address their students' particular needs. ASA funding supports innovative approaches for implementing a variety of teaching techniques and engaging students in relevant learning experiences. Funded programs support the achievement of curricular mandates as defined by state and national guidelines, provide opportunities for students to explore math-centered professions, and involve students in fun activities that nurture their appreciation and enjoyment of mathematics and encourage their continued study of the subject. In addition to building knowledge and interest in math, ASA programs help students develop and foster computational skills, problem-solving abilities, and interpersonal communication.

The Actuarial Foundation hopes that you will take advantage of the opportunity to broaden and enrich your students' mathematical experiences by submitting a grant idea for funding consideration.



Visit our web site for:

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www.actuarialfoundation.org/grant/index.html

Footnotes

- 1 <http://www.naesp.org/ContentLoad.do?contentId = 529>
- 2 2003 National Assessment of Educational Progress results
- 3 “Making a Difference: An Impact Study of Big Brothers Big Sisters.” (1995) http://www.ppv.org/ppv/publications/assets/111_publication.pdf
- 4 “Sponsor-A-Scholar: Long-Term Impacts of a Youth Mentoring Program on Student Performance.” (1999) <http://www.aypf.org/rmaa/pdfs/SponsSchol.pdf>
- 5 “HOSTS – Helping One Student To Succeed.” (2002) <http://www.ecs.org/clearinghouse/18/86/1886.htm>
- 6 “Career Beginnings Impact Evaluation: Findings from a Program for Disadvantaged High School Students.” (1990) <http://www.mdrc.org/publications/229/full.pdf>
- 7 These and other games can be found on Web sites such as: <http://www.learningresources.com> and <http://www.educationalllearninggames.com>.
- 8 <http://www.kidzafterschool.org>
- 9 <http://www.odysseyofthemind.com/>
- 10 <http://nces.ed.gov/nationsreportcard/science/>
- 11 <http://mindstorms.lego.com/eng/products/ris/index.asp>
- 12 <http://www.microsociety.org/>
- 13 <http://everydaymath.uchicago.edu/about.shtml>
- 14 <http://fcserver.nvnet.org/~devine/>
- 15 <http://www.borenson.com/html/brochure.html>
- 16 <http://www.reachforexcellence.org/>
- 17 <http://www.odysseyofthemind.com/>
- 18 http://www.actuarialfoundation.org/youth/money_math.htm
- 19 http://www.nctm.org/about/position_statements/position_statement_13.htm
- 20 <http://www.camcor.com/qwizdom/index.html>
- 21 <http://www.emsc.nysed.gov/ciai/mst/pub/matha&b.pdf>



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