

Mathworks 2015 Annual Report

ENGAGING MINDS

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Foundations



Mathworks at Texas State University | 2012 Annual Report

Building Foundations



Mathworks at Texas State University | 2012

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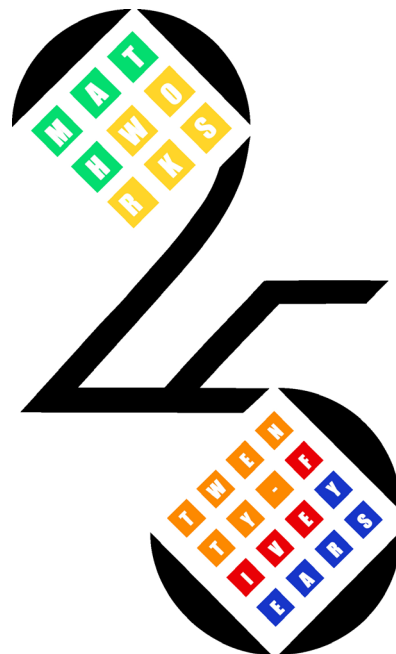


MEMBER THE TEXAS STATE UNIVERSITY SYSTEM

MATHEMATICAL MINDS

DURING 2015, TOGETHER WE:

- ENGAGED MORE THAN 330 STUDENTS IN DEVELOPING THEIR MATH ABILITIES DURING OUR 2015 SUMMER MATH PROGRAMS
- FIELDDED A TEAM IN THE ANNUAL PRIMARY MATH WORLD CONTEST AND WERE CROWNED BACK-TO-BACK WORLD CHAMPIONS
- CONDUCTED ORIGINAL MATH, MATHEMATICS EDUCATION, AND SCIENCE RESEARCH, ENGAGING FACULTY, GRADUATE STUDENTS, UNDERGRADUATES, AND HIGH SCHOOL STUDENTS
- IMPACTED STUDENTS ACROSS THE STATE OF TEXAS WITH THE *MATH EXPLORATIONS* CURRICULUM, GIVING STUDENTS EARLY ALGEBRA LEARNING OPPORTUNITIES
- SURPASSED \$3M OF OUR \$6M MATHWORKS LEGACY CAMPAIGN GOAL, PROVIDING ONGOING SUPPORT TO ALL STUDENTS TO PURSUE MATHEMATICAL LEARNING OPPORTUNITIES
- CELEBRATED 25 YEARS OF EXCELLENCE IN MATHEMATICS EDUCATION.



FROM THE DIRECTOR

Dear Friends of Mathworks:

What an exciting year we have planned for 2015. Before looking forward, we want to share our accomplishments from 2014. More details are within this Annual Report, with some of the highlights being:

- We celebrated the 25-year anniversary of the Honors Summer Math Camp with an alumni reunion weekend on July 4, including a wonderful talk by Admiral Bobby Ray Inman. In the fall, a Mathworks Banquet was held to recognize and thank our friends and supporters, with talks given by alumni and UT Professor Mike Starbird.
- The Junior Summer Math Camp program included 12 undergraduates working as teaching assistants, receiving early experiences in classroom teaching. In addition, a group of four Mathematics Education Ph.D. students worked on research and development related to Mathworks programs.
- Our Primary Math World Contest team finished first in the world in Hong Kong for the second year in a row!
- Silicon Labs and 3M provided crucial support for the HSMC and its research teams. A research symposium was held at 3M's Austin campus, and a Silicon Labs-mentored research team was recognized as a semifinalist in the Siemens Competition.
- 50% of all students across our 2014 summer math programs were females. 40% of students were from low-income families, and were awarded scholarships to attend the Mathworks summer math programs. By providing opportunities to students throughout their K-12 years, we are helping them build a solid mathematical foundation for future degrees and careers.
- The Mathworks Algebra Project (MAP), a partnership supported by the Meadows, Sid W. Richardson, and KDK-Harman Foundations, enabled us to research and develop a replicable model for the Mathworks curriculum, identifying the "critical elements of success" for school districts to implement our middle school math curriculum, *Math Explorations*. In addition, classroom videos and activities developed through MAP are being integrated into Texas State University's mathematics courses for pre-service teachers.

Thanks to recent donations from the RGK Foundation, the KLE Foundation, Sarah & Ernest Butler, and numerous alumni, parents, and friends, we were able to announce the completion of Jeff and Gail Kodosky's generous \$1.5 million match challenge two years ahead of schedule. We have now surpassed the \$3M mark of our \$6M endowment goal and continue to make progress under the guidance of the Mathworks Steering Committee. Students are already benefiting from the endowment, as more than 100 camp participants received scholarships to attend our annual summer math programs in 2014.

We hope you will share this report with family and friends. It has been a tremendous 25 years, and we are hopeful for what the future holds as we continue to work together to inspire all students with the joy of mathematical exploration and discovery

All best wishes,



Max Warshauer
Director, Mathworks
Regents Professor of Mathematics

Mathworks 2015 Annual Report ENGAGING MINDS

MISSION

Mathworks is a center for innovation in mathematics education at Texas State University. Our mission is to research and develop model programs and self-sustaining learning communities that engage K-12 students from all backgrounds in doing mathematics at a high level.

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Max Warshauer, Director
Terry McCabe, Associate Director
Patricia Amende, Accountant
Michelle Pruett, Program Specialist

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BUILDING A RESEARCH FOUNDATION



The three pillars of Mathworks - Summer Math Programs, Teacher Training, and Curriculum Development - provide a rich environment for developing and investigating new ideas in mathematics teaching and learning. Mathworks has established a research base that supports and enhances these core programs, and continues to explore ideas that make Texas State University a leading institution for innovation in mathematics education.

Mathworks is building a research foundation that links theory to practice. Hiroko Warshauer coordinates graduate research projects; Alex White lends his data analysis expertise; Sharon Strickland, Terry McCabe, Max Warshauer, and other mathematics faculty are deeply involved with curriculum development and teacher training. Recent highlights of these projects include:

- The Mathworks Algebra Project (MAP), supported by the KLE, Meadows, KDK-Harman, and Sid W. Richardson Foundations, led to the following accomplishments:
 - 12 undergraduate students received early classroom teaching experiences during the 2014 Junior Summer Math Camp. This “Mathworks Fellows” program is developing a pipeline of students to enter the teaching profession
 - 4 Mathematics Education Ph.D. students worked on curriculum development with faculty, resulting in publications in scholarly journals and presentations at national mathematics and mathematics education

conferences

- 2 Mathematics Education Ph.D. students worked with faculty to integrate Mathworks “guiding principles” and teacher noticing into Texas State’s undergraduate mathematics courses
- 1 Mathematics Education Ph.D. student is working on a thesis examining the impact of summer programs such as the Honors Summer Math Camp on the long-term degree and career trajectory of under-represented female students
- A research project about the use of journals to support active learning in the University’s undergraduate Honors College program was an outgrowth of ideas practiced in the Mathworks Honors Summer Math Camp program. Max Warshauer, Hiroko Warshauer, and graduate student Christina Starkey made a presentation at the annual Joint Mathematical Meetings (JMM) in San Antonio on “Using Journals to Support Student Learning: The Case Of An Elementary Number Theory Course”. Their preliminary findings show how implementing student journals for math courses can encourage productive feedback for students as well as provide instructors insights into improving their teaching.

"This was successful beyond expectation in providing what graduate students in mathematics education badly need but rarely find: experience that goes beyond the university classroom and into the field. The summer program allowed me access to and participation with middle-school students, educators with various levels of experience in the field, professional development programs, and curriculum design. In addition, with daily guidance from seasoned academicians, I was given the opportunity to write for publication in academic journals, practice videography for scholarly research, create and implement a coding rubric for videos, and plan for presentations in various seminars and conferences."

- Mathematics Education Ph.D. student working with Mathworks during the summer of 2014

- We engaged 13 research mentors for the HSMC program, matching them to teams of 2 or 3 students conducting math or science research. The mentors included Texas State faculty, St. Edward's University faculty, 3M researchers, and a Silicon Labs digital design engineer. The students experienced the scientific research process and had the opportunity to share their work during a visit to the 3M Austin campus in July. The students also submitted their research to the nation-wide Siemens Competition in Math, Science, & Technology.
- Max Warshauer was an invited keynote speaker in August 2014 in Indonesia at an International Conference on 'Recent Research and Issues in Mathematics, Sciences, Technology, Education, And Their Applications' at the State University of Makassar, where he talked about "Mathworks, Math Problems, and Math Education Research."
- Hiroko Warshauer's research about productive struggle was published in the Journal of Mathematics Teacher Education and in the National Council of Teachers of Mathematics (NCTM) journal Mathematics Teaching in the Middle School. Her research has implications for the way teachers and students can interact to foster sense-making and perseverance in doing mathematics. Here is an excerpt from her journal article: "Raising awareness that struggling to make sense of mathematics is a natural part of 'doing mathematics' can contribute to students and teachers recognizing that this phenomenon is a valuable part of learning with understanding."
- Mathworks hosted a Math Education Symposium in September 2014 attended by more than 30 teachers, administrators, and students. The symposium included a graduate student panel as well as an opening talk given by Gail Burrill, former president of the National Council of Teachers of Mathematics (NCTM).
- Mathworks faculty, assisted by graduate and undergraduate students, began revising the Junior Summer Math Camp curriculum and developing a replicable model, a "Math Camp In A Box," that can be used at other locations. This revision will align the JSMC curriculum to the school-year *Math Explorations* curriculum, creating multiple entry points from the summer program to the school-year instructional materials.



IMPACTING SCHOOL-YEAR CLASSROOMS

Math Explorations middle school math curriculum

There is an achievement gap when it comes to algebra proficiency. The results on the most recent Algebra I End Of Course (EOC) exam show: 96% of Asian students met the standards, 90% of caucasian students met the standards, while only 77% of Hispanic students met the standards. In addition, one out of every four low-income student did not pass the Algebra I EOC. This means that more than 55,000 students from low-income families did not meet the minimum standards in Algebra I. Completion of this course has been shown to be strongly correlated to future college entrance and completion rates.

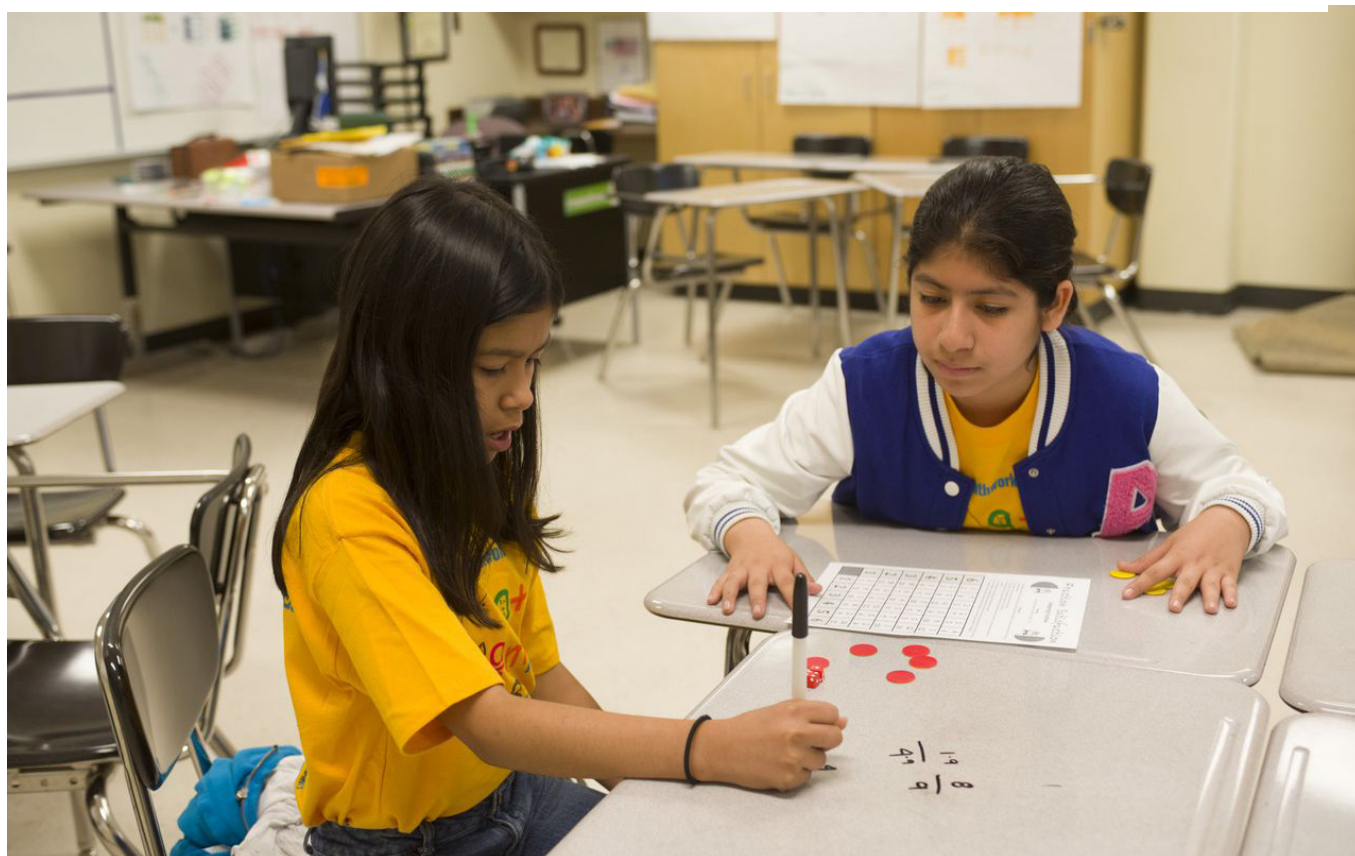
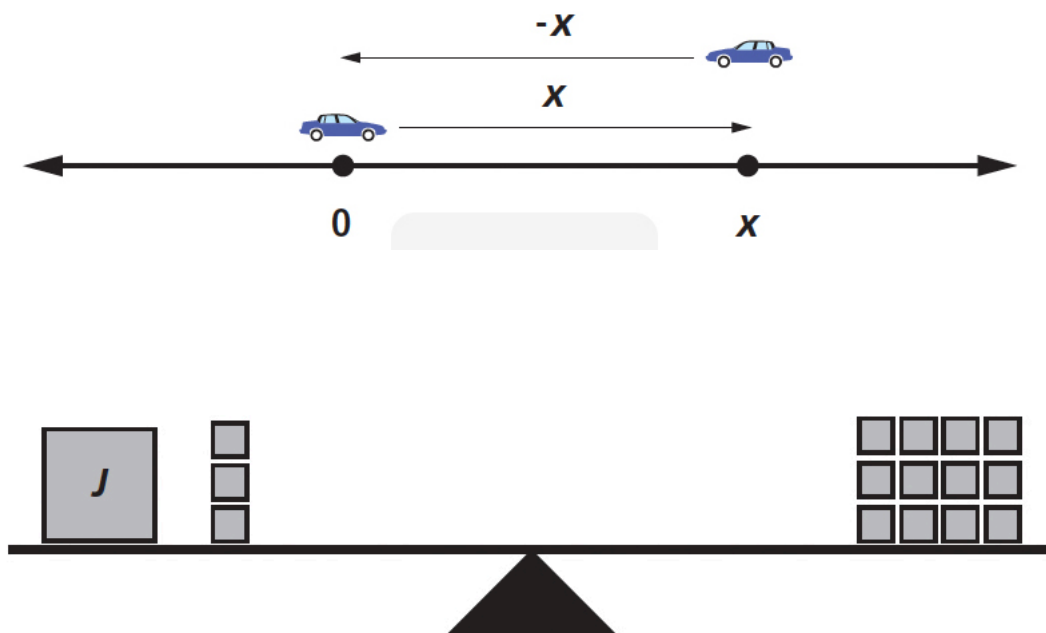
There is a critical need for high quality instructional materials and pedagogy to raise the mathematics achievement of students of all socioeconomic backgrounds. *Math Explorations* is a full school-year curriculum aligned to the Texas Essential Knowledge and Skills (TEKS) standards. The instructional materials include a student textbook, student workbook, and teacher edition for each of the 6th, 7th, and 8th grades. Algebraic concepts are woven throughout each grade, providing students the foundation they need for success in algebra.

Math Explorations is on the state adoption list under Proclamation 2014 of the Texas Education Agency. This means that the content has been certified to meet the state's math standards for the middle school grades.

We are now focusing on implementing the curriculum at a number of districts across Texas. Our ultimate goal is to have the majority of 8th grade students completing Algebra I, given that they have a strong pre-algebra preparation in the 6th and 7th grades.

However, student success in mathematics involves more than a textbook or standards. We also engage teachers in professional development, advise schools, and provide the scope and sequence in the context of mathematical learning. *Math Explorations* is designed to provide learners of all backgrounds a focused, rigorous, and well-sequenced curriculum.

Math Explorations uses visual models and hands-on activities to tie theory to practice. Algebraic concepts are woven in throughout the three textbooks for 6th, 7th, and 8th grades. The curriculum provides all students opportunities to build a solid mathematical foundation before taking Algebra I.





ENGAGING STUDENTS OF DIVERSE BACKGROUNDS

Half-day Junior Summer Math Camp program

We hosted more than 170 students in the 2014 half-day JSMC program in San Marcos. Thanks to the support of foundations and corporations, we were able to award 100 camp scholarships, providing mathematical learning opportunities to students of diverse backgrounds. In addition, 50% of the students were from minority backgrounds, underlining our commitment to engaging demographic groups traditionally under-represented in the STEM fields.

We are fortunate to partner with the San Marcos CISD in hosting this annual summer math program for the greater San Marcos community. We also received in-kind support from numerous local businesses to hold a Parent Open House, where parents could see their student's learning in action.

This past summer marked our second year of holding a camp in north Austin, using Texas State's Round Rock facilities. We had 60 students attend the Round Rock Junior Summer Math Camp and we expanded our level offerings to four total. This program provides the greater Austin community with a summer math program, addressing the need for intensive, exciting math-focused programs for young students during the summers.

The KDK-Harman Foundation issued a "Summer STEM Learning Report" analyzing all of their grantee's projects, and the JSMC program was highlighted as one of the successful case studies the Foundation staff had observed over the summer. This external evaluation of the JSMC underscores the need to sustain model programs in order to continually reach out to students of all backgrounds.



"I think this experience is one that every kid should have. It really develops how you think about math"

- Sherlyn, 5th grader

"This program is different because you learn how to actually solve a problem and the technique behind it, instead of just answering questions."

- Kazy, 8th grader

"My kids enthusiastically looked forward to going to camp each day, and they learned a lot of problem solving and analysis skills. Both already have mentioned they hope they can return next year."

- Parent of students in the 2014 JSMC

PROVIDING IMMERSIVE EXPERIENCES

Residential Junior Summer Math Camp program



The Residential JSMC provides an immersive experience for middle school students to do in-depth mathematics. The program includes 40 middle school students from diverse backgrounds and brings them together to work on creative problem solving. Students are taught by university faculty and mentored by undergraduate camp counselors.

During the 2014 program, we also hosted four visiting students from Indonesia. This international exchange arose from Mathworks' participation in the Primary Math World Contest and has resulted in a fruitful partnership between Mathworks and a nation-wide math program in Indonesia.

Students develop their creative and critical thinking skills, and work through challenging questions in topics including Number Theory, Combinatorics, Geometry, Probability, Algebra, and Logic. In the nightly study group sessions, students exchange ideas and discuss different approaches to solving a wide variety of challenging questions.

In addition to developing their mathematics abilities, students have the opportunity to experience campus life. There is scheduled free time each day during which students can choose to relax, or exercise at the University Student Rec Center.

As part of the Residential JSMC program, we train a team of four students to compete in the annual Primary Math World Contest (PMWC) in Hong Kong. These students were chosen from the more than 350 individuals who participated in the 2013 Mathworks Math Contest (MMC). The MMC is a free statewide contest for any interested middle school student, and is administered in the fall.

The Residential JSMC provides engaging opportunities for middle school students to learn and explore mathematics together. Research shows that the middle school years are crucial in inspiring and sustaining long-term interest in STEM subjects, and the JSMC addresses the middle school pipeline by creating a learning community that immerses students in doing mathematics.

“This program opened my eyes about math. I realized that as hard as math can get, there is always a fun solution to it! I also learned to keep trying to solve difficult problems in different ways.”

- Lillian, 7th grader

“Mathworks changed my view of math in general. It showed me all the different types of math that I never even knew existed. It has also helped me think broader and approach a problem in multiple ways.”

- Olivia, 8th grader

“The teachers at Mathworks are special because they have taught me that getting to the solution of a problem is more important than the solution itself. The classes have taught me not only how to get an answer, but why it works.”

- Elizabeth, 8th grader



Back to back world champions: Mathworks students Claire Zhou, Hannah Liu, Vincent Huang, and Jonathan Shoemaker at the Austin Airport with their trophies from the 2014 Primary Math World Contest. The four students attended the Residential Junior Summer Math Camp program and then participated in the international math contest in July, competing against more than 40 teams from around the world. The team achieved first place overall, which marked a back-to-back first place finish for Mathworks. Accompanying the team were Alexandra Eusebi from Kealing Middle School in Austin and Dean Stephen Seidman of the College of Science & Engineering at Texas State University.

DEVELOPING TOMORROW'S PROBLEM-SOLVERS

Honors Summer Math Camp program

The HSMC is an intensive six-week immersion doing mathematics and working on research. Students develop rigorous reasoning and critical thinking abilities applicable to future degrees and careers in almost any field. During the 2014 program, we celebrated our 25-year anniversary. Starting in 1990 with 12 students, the program has stabilized to include 60 students, 15 camp counselors, and numerous faculty engaged in teaching courses and mentoring research projects.

Some highlights from our 2014 program included:

- A visit to the 3M Austin campus, where HSMC students presented their research projects to 3M scientists and researchers. 3M researchers mentored 2 of the 12 research projects undertaken during the 2014 HSMC.
- Silicon Labs sponsorship of student camp scholarships and camp counselors. In addition, Silicon Labs sponsored the entrepreneurship component, where students had the opportunity to present original business projects to a panel of seven judges. A Silicon Labs research scientist also mentored one of the research projects, which was recognized as a semifinalist in the Siemens Competition.
- Two research teams were recognized in the 2014 Siemens Competition in Math, Science, and Technology, with one team advancing to the regional finalist round at MIT, as one of the top 30 teams in the country.
- 40% of the students attended the program on a need-based camp scholarship, thanks to the support of foundations and corporations.
- We engaged nine Texas State faculty in mentoring research projects, and they guided students in doing original research.
- We had a number of guest speakers over the summer, including Ed Burger, President of Southwestern University; Admiral Bobby Ray Inman; and Kandyce Bohannon, software engineer at 3M.





THE HSMC: Sparking and sustaining long term interest in STEM

“My school has very limited resources, but because of this program I am able to take part in activities that I never thought to be available to a high school student. Along with the amazing opportunities of learning from university professors and conducting research, I have spent six weeks with 60 other high school students that have a passion for math and science. We have an environment where we can openly share ideas and collaborate with one another to achieve a common goal. Before this program, I had an interest in math and science. Now, I have a passion.”

- Cecily, 11th grader from Buda

“My math knowledge was very limited until I came here. I now strongly believe that math can help solve any type of problem in the world. Is it not only about the numbers and the equations, it is about never giving up.”

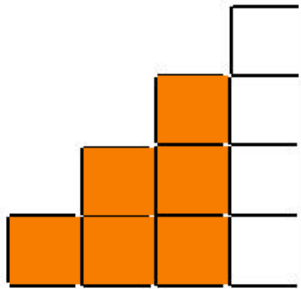
- Priscilla, 10th grader from El Paso

“One thing that stood out to me at this program was that the work here is not based on how fast it is performed, or how many questions are done, but rather how much effort and thought is placed. This taught me that sometimes it is better to take your time on a question and think deeply about it rather than rushing through. This program also encouraged me to keep thinking even when I feel completely stuck on a problem. Even when I have no idea what to do next, there is always a possible way to solve the problem with the tools I have.”

- Michelle, 10th grader from the Rio Grande Valley



ENGAGING THE MINDS OF THE FUTURE



Mathworks Endowment Campaign

\$6M GOAL

\$3.6M raised as of January 2016

Describe impact of endowment on students and teachers. Talk about what the endowment disbursement supported.

Donate today to the Mathworks Legacy Campaign

With your support, together we can help:

- Provide mathematical learning opportunities to students of all backgrounds
- Provide professional development opportunities to mathematics teachers in middle schools
- Provide research opportunities to Mathematics Education Ph.D. students who can make an impact on the future of mathematics education

How to donate:

- Make a check out to
"Texas State University - Mathworks"
601 University Dr., ASBS #110
San Marcos, TX 78666
- Donate online at txstate.edu/mathworks

Endowment Donations

September 2014 - August 2015

Alumni Donations

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Marisol Castillo

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OPERATIONAL FUNDING DONATIONS

We thank the following organizations and individuals for their financial and in-kind support during the past fiscal year. Together we are developing and nurturing the young minds of the future!

Operational and in-kind support September 2014 - August 2015

3M Company
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Angie Rao
H-E-B Tournament of Champions
KDK-Harman Foundation
Kinder Morgan Foundation
Kodosky Foundation
Lions Club of San Marcos
Meadows Foundation
Rhino Graphics
San Marcos CISD
Sarah Yager Legacy Scholarship
Sid W. Richardson Foundation
Silicon Labs
Summer STEM Funding Collaborative
Texas State University
Texas Workforce Commission Summer Merit Program grant
Time Warner Cable - Connect a Million Minds
Jim Smith

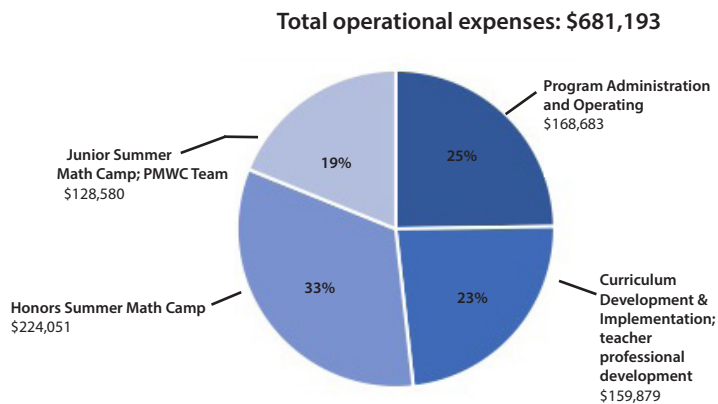
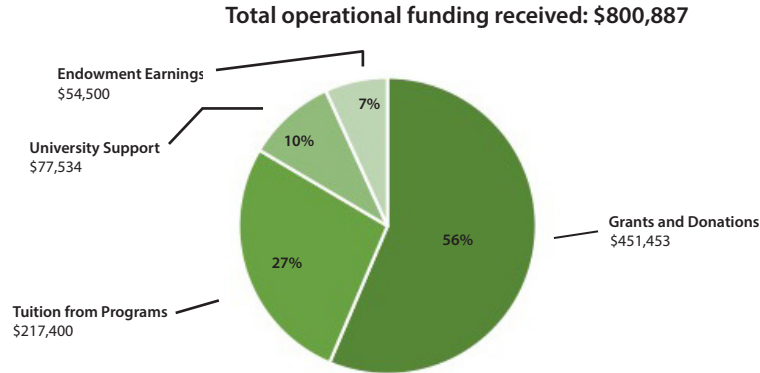
The Meadows
Foundation



"My daughter really enjoyed camp last year, and it's really benefitted her. She went from being a 'C' student to a low 'A' student, getting 90s and 91s in math. Her brother saw how much she enjoyed it last year, and is really excited to go this year!"
- Parent of a student in the 2015 JSMC program

FINANCIALS

September 2014 - August 2015



Thanks to your continued support, we have provided mathematical learning opportunities to students of diverse socioeconomic backgrounds. Your support has helped us impact K-12 students, undergraduate students, graduate students, and middle school math teachers. Mathworks programs are continually raising the bar of achievement for all students, and it is only with your help that we can continue to engage and nurture minds.

Grants and donations currently make up more than 50% of our operating income. The amount of “soft funding” is variable from year to year. Nonetheless, we remain committed to ensuring that students can attend Mathworks programs regardless of their financial backgrounds.

Our current challenge is to build up an endowment that will provide funding in perpetuity to give students of all backgrounds opportunities to develop their critical and creative thinking abilities. Thanks to your generosity, we have established a solid foundation for the endowment fund, and continue to seek the support of friends old and new to partner with us to research and develop high quality mathematics education programs for years to come.

Thank you for your support of Mathworks and for partnering with us to provide mathematical learning opportunities to all students.

What you can do right now to help: share this report with family and friends!

Mathworks at Texas State University

Mathworks is a center for innovation in mathematics education at Texas State University. Our mission is to research and develop model programs and self-sustaining learning communities that engage K-12 students from all backgrounds in doing mathematics at a high level.

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