



## Annual Report 2011 - 2012



**MATHEMATICS**  
**UA SCIENCE**



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## About the Institute

### Our Vision

The Institute was created in 2006 by William McCallum, Distinguished Professor of Mathematics at the University of Arizona. The principal mission of the Institute is to support local, national, and international projects in mathematics education, from kindergarten to college, that pay attention to both the mathematics and the students, have practical application to current needs, build on existing knowledge, and are grounded in the work of teachers.

### The Need

Mathematics is crucial for innovation in science, technology and engineering, competitiveness in a global workforce, and informed participation in democratic government. Three decades of reports, from the Department of Education's A Nation at Risk (1983) to the National Academies' Rising Above the Gathering Storm (2006) offer ample evidence for the need to improve mathematics education in the United States.

### Our Approach

The problems of mathematics education cannot be solved by one group alone. Taking its cue from pioneering collaborations of recent years, the Institute includes participants from communities that are sometimes worlds apart: mathematics departments, colleges of education, school systems, government agencies, business, and commercial and non-profit education organizations. It engages mathematicians, statisticians, scientists, education faculty, teachers, parents, business people, and policy makers in collaborative work in which each group plays a key role and for which each group takes responsibility.

### Our Goal

Our long-term goal is to become a permanent, high-level institute that builds capacity for collaboration, stores institutional knowledge about collaboration, and influences professional cultures towards collaboration on a critical concern of our time: the mathematical education of our future scientists, engineers, workers, citizens and leaders.

### Funding

The Institute of Mathematics and Education is supported by funds from the University of Arizona College of Science, grants from the National Science Foundation, the Intel Foundation, the Gates Foundation, the Brookhill Foundation, and collaborative arrangements with other institutions. The Institute is seeking support from private foundations and donors in order to expand the range of its programs and help sponsor its ongoing activities. If you are interested in supporting the work of the Institute, please visit [our webpage](#).

# Ongoing Programs

## The Intel® Math Program

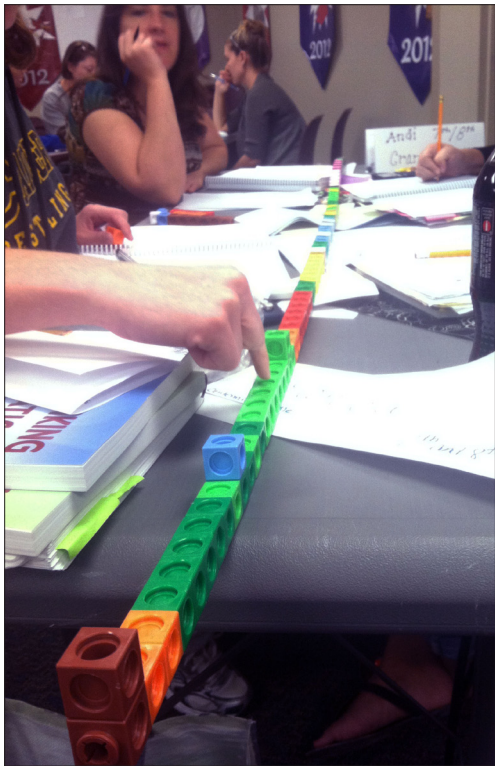
JOCELINE LEGA, PI

AUBREY NEIHAUS, PROGRAM MANAGER

### THE HISTORY OF THE INTEL MATH PROGRAM

The Intel Math Program was adapted from the Vermont Math Initiative, developed by Dr. Ken Gross. It consists of eighty hours of professional development for K–8 teachers in mathematics. The course provides teacher participants with the opportunity to dive deep into the content of the K–8 mathematics curriculum through problem solving. The sequencing of the problem sets offers many opportunities to make connections across the K–8 mathematics curriculum, both horizontally and vertically. In December 2009, the Institute became the National Training Agency (NTA) for the program, taking on the responsibility to manage the program nationally with support from the Intel Foundation.

### THE INSTITUTE AS THE NATIONAL TRAINING AGENCY



As the National Training Agency (NTA), the Institute continues to work to scale the program nationally through the promotion and the development of quality assurance measures. This past year, Intel Math was featured at the annual conferences of the Association of Teachers of Mathematics in New England and the National Council of Supervisors of Mathematics. The program was also featured in Math Science Partnership solicitations in Arizona, Michigan, and New Hampshire, as well as in the Improving Teacher Quality program solicitation in Arizona.

To respond to the demand for Intel Math trained instructors created by these grants, the NTA hosted three separate instructor trainings. This included one through a partnership with the Arizona Department of Education (held in Phoenix, March 2012) and one through a partnership with the Michigan Department of Education (held in Saint Ignace, June 2012). The third instructor training provided support to instructors in the remaining states and was held in Baltimore in May 2012. Forty-five mathematicians and mathematics educators were trained as Intel Math Instructors, and are ready to deliver the course in 2012-2013.

We anticipate that in 2012-2013, Intel Math will be delivered to 51 cohorts spanning eleven

states. New states for 202-2013 include Florida, Wisconsin, and Michigan. The program is expected to reach a projected 1,469 teachers in 2012 – 2013. Partners for these courses include the Arizona Department of Education, the Massachusetts Department of Education, the New Hampshire Department of Education, the Connecticut Department of Education, the Michigan Department of Education, the Illinois Math Science Partnership, the Pennsylvania Math Science Partnership, the Wisconsin Math Science Partnership, the Worcester Catholic Diocese, and the Silicon Valley Leadership Group. The total number of teachers reached by the Intel Math Program since 2007 will be over 4,000 by Spring 2013.

In May 2012, the Institute of Education Sciences released a solicitation for research firms to submit proposals outlining a national evaluation study on the Intel Math Program and its follow-up program, the Mathematics Learning Communities. In August, the American Institute for Research in Washington, DC was awarded funding to conduct this research in 2012-2014.

## **Graduate Students and Teachers Engaging in Mathematical Sciences (G-TEAMS)**

JOCELINE LEGA, PI

G-TEAMS (Graduate Students and Teachers Engaging in Mathematical Sciences) is a 5-year, \$2.95M, NSF-funded Graduate STEM (Science, Technology, Engineering, and Mathematics) fellows in K-12 Education program that pairs University of Arizona graduate students in the mathematical sciences with K-12 teachers and their students. The program provides an innovative and dynamic opportunity for graduate students and teachers to collaborate on the development of novel, rigorous, and relevant material for K-12 mathematics courses. Run by the Institute for Mathematics and Education and the Department of Mathematics at the University of Arizona, G-TEAMS builds on a long-standing relationship between these two units and schools in the Tucson area. Fellows are recruited from the graduate programs in Mathematics, the interdisciplinary programs in Applied Mathematics and in Statistics, as well as other mathematical sciences graduate programs at the University of Arizona. They work with teachers on the development of new course materials, on ways to promote algebraic thinking in K-8 grades, and on strategies to facilitate transitions between elementary, middle, and high school.

G-TEAMS promotes STEM disciplines to underrepresented K-12 student populations and fosters a synergistic relationship among fellows, teachers, and K-12 students. Fellows learn to communicate mathematical ideas to diverse audiences, implement a range of teaching techniques, and increase their understanding of K-12 educational issues. Teacher partners are involved in professional development workshops and appreciate how mathematical concepts may be applied to a variety of situations. By interacting with individuals who are planning a career in the mathematical sciences, K-12 students learn about the wide variety of possibilities offered by STEM disciplines.

## Tucson Math Circle

IBRAHIM FATKULLIN, ORGANIZER

The Tucson Math Circle, run and co-organized by mathematics Associate Professor Ibrahim Fatkullin and graduate students Megan McCormick, David Love, Steven Rosenthal, Gleb Zhelezov, Shane Passon, Amy Veprauskas, and Jeremy Birrell, challenges pre-college students to sharpen their problem-solving skills in an informal setting. Student participants work on interesting problems and explore a variety of mathematics topics together with graduate students from the University of Arizona. The goal is to share the excitement about mathematics and learn through engaging activities without formal tests and examinations.

The circle meets weekly during the Fall and Spring semesters, each academic year. In 2011-12 the Circle problems covered various topics in abstract algebra, game theory, probability, graph theory, and mathematical physics. The problems were often related to the research areas of the participating graduate students, but chosen to be very accessible and entertaining for the students. Examples include the Chinese remainder theorem and its applications, the Rubik's cube, mathematical card tricks, riddles, and games with strategies that involve graph theory and logic. We also talked about the mathematics of catapults and did some experiments with a real trebuchet.

## Center for Recruitment and Retention of Mathematics Teachers

CODY PATTERSON, DIRECTOR

The Center for Recruitment and Retention was founded in 2000 by Fred Stevenson, a professor of mathematics at the University of Arizona, with generous financial assistance from Ashby Lohse. Stevenson began the Center as a project to boost the morale of school mathematics teachers in Tucson and support them in their work.

Over the last twelve years, the Center has evolved into a program that supports teachers across the K-12 spectrum and in all phases of their careers. The Center has forged partnerships with eleven school districts in the Tucson area, five private schools, and Pima Community College.

The ***Tutoring in the Schools Program*** endeavors to recruit talented UA undergraduates into the teaching profession while providing classroom support for local teachers. Each semester, fifteen undergraduates work with students in local classrooms while taking a course on effective mathematics tutoring. Students who complete the program often report that the experience has heightened their interest in becoming mathematics teachers.

The ***Teacher Induction Program*** is a year-long mentoring program for first and second-year mathematics teachers. Inductees are paired with experienced teacher coaches who observe their teaching and offer advice and moral support. Participants also attend monthly workshops in which they discuss key mathematical content, instructional practices, classroom management strategies, and other issues relevant to first-year teachers.

**Teacher Workshops** focusing on critical content areas are offered throughout the year for elementary, middle, and high school teachers. Workshops are taught by University faculty, local teachers, and education consultants. Workshops often discuss how teachers can incorporate technology and hands-on activities into their teaching and ways to design instruction for the new Common Core State Standards. These workshops include the new Herbst Enrichment Mathematics Seminars (HEMS), made possible by generous support from Lee and Arthur Herbst. HEMS workshops bring teachers together for a full-day exploration of a content area in depth. These workshops are taught by successful local teachers and focus on the connection between mathematics content and classroom practice.

In 2011, the Center received a generous grant from the United States Department of Education and established the Southern Arizona Inducting New Teachers (SAINT) Program. SAINT will recruit fifty recent college graduates and mid-career professionals to participate in the Teach Arizona Master of Education Program, earn teaching certificates, and teach in high-need middle and high schools in Tucson. In addition to receiving financial assistance, program participants will receive coaching and support from the Center during their first three years of teaching.

The Center is funded through financial partnerships with local school districts, private schools, and postsecondary institutions, the University of Arizona College of Science, publishing companies, and a number of generous individuals and foundations who wish to support the work of mathematics teachers in southern Arizona.



## **Tucson Teachers' Circles**

VIRGINIA BOHME, CAROLYN WRIGHT, ORGANIZERS

The Tucson Teachers' Circles were founded in the Summer of 2007 with the idea to bring together both teachers and university faculty members to meet one evening a month to engage in problem solving related to the night's theme. Middle school and high school mathematics teachers who are interested in exploring engaging, accessible topics in mathematics and who strive to incorporate a problem solving approach in their classrooms are encouraged to participate. Participants gain access to a variety of resources, membership in a dynamic community of mathematics educators, and a renewed sense of appreciation for the fascinating world of mathematics. Rich mathematics discussions ensue as they enjoy a catered dinner and have opportunities to share classroom experiences, best practices, and challenges. Participants earn recertification credits for their involvement.

The Tucson Teachers' Circles have been well attended over the years by local teachers. As one of the most successful of the satellite Teachers' Circles communities, the Tucson Teachers' Circles are being studied by the American Institute for Mathematics. The variety of willing, inspiring, mathematician presenters has been an excellent enticement for teachers to attend.

## **Arizona Teacher Initiative (ATI)**

DAN MADDEN, PI

CODY PATTERSON, DIRECTOR

The Arizona Teacher Initiative, established in 2007 by a 4.8-million-dollar grant from the National Science Foundation, gives K-8 teachers the opportunity to earn a Master's degree in mathematics teaching and leadership while deepening their understanding of mathematics content and current research on effective mathematics teaching. Teachers in the program take courses in mathematics and pedagogy for two years, and spend a year completing an action research project in which they investigate a problem of practice in their classrooms.

*This program is featured on page 14 of the present report.*

## Illustrative Mathematics

WILLIAM MCCALLUM, CHAIR

KRISTIN UMLAND, CO-CHAIR

Illustrative Mathematics, supported by the Gates Foundation, seeks to help mathematics teachers understand the Common Core State Standards in Mathematics and build a community of teachers, mathematicians, and mathematics educators who work to improve their own teaching and learning through the sharing of resources and peer feedback.

*This program is featured on page 12 of the present report.*

## Untangling KnoTSS

REBECCA MCGRAW, PI

The Untangling KnoTSS (Knowledge for Teaching Secondary School) program was funded by a 3-year, \$788K National Science Foundation Discovery Research K-12 grant and recently ended on August 31, 2012. The principal investigator was Rebecca McGraw. The program investigated the nature and processes of collaborative work between mathematicians and mathematics educators. Untangling KnoTSS brought together teams of mathematicians and educators who co-taught courses aimed at building an integrated knowledge of mathematics content and pedagogy. The project documented different approaches to collaboration, along with the methods and practices associated with those collaborations, and student learning outcomes.

During 2011-2012 project staff analyzed data and presented findings at mathematics education conferences, participants published a book chapter on their experiences, and a doctoral student completed a dissertation based on analysis of one of the collaborations. Publications related to this project are listed below.

- Prasad, P. V., McGraw, R., & Blackburn, C. (2011). *Integrating content and pedagogy in secondary teacher preparation: Collaborating across disciplinary boundaries* (p. 1476-1484). In Wiest, L. R., & Lamberg, T. (Eds.). (2011). *Proceedings of the 33rd Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Reno, NV: University of Nevada, Reno.
- Thompson, D. R., Beneteau, C., Kersaint, G., & Bleiler, S. K. (2012). *Voices of mathematicians and mathematics teacher educators co-teaching a mathematics course for prospective secondary teachers*. In J. M. Bay-Williams (Ed.), *Professional collaborations in mathematics teaching and learning: Seeking success for all* (Seventy-fourth NCTM yearbook). Reston, VA: National Council of Teachers of Mathematics.
- Bleiler, S. K. (2012). *Team-teaching experiences of a mathematician and a mathematics educator: An interpretative phenomenological case study*. Unpublished doctoral dissertation.

## 2011-2012 Events

### **Ad-hoc Committee on Teachers as Professionals – Common Core Toolkit Authors Workshops**

SEPTEMBER 17, 2011, DECEMBER 10, 2011 & MARCH 10, 2012,  
INSTITUTE FOR MATHEMATICS & EDUCATION

The Common Core Toolkit is a professional development day for teachers that can be added to scheduled district professional development. It is available in three different grade bands, grades K-5, 6-8, and 9-12 and includes facilitators for an eight hour day focused on four goals: to understand the Standards for Mathematical Practice, to understand the language used in the standards, to trace progressions through the standards, and to look in depth at tasks aligned to the standards. In this series of three workshops, teacher authors of the Common Core Toolkit came together to review each others' materials for the toolkit in each different grade band. The toolkit materials are available for interested schools, districts, and states by applying on the **Institute website**.

### **Mathematics Educator Appreciation Day (MEAD)**

JANUARY 21, 2012, TUCSON HIGH MAGNET SCHOOL

The Mathematics Educator Appreciation Day (MEAD) Conference is the largest conference for mathematics teachers in the state of Arizona. The 2012 conference featured keynote speaker Dr. Phil Daro, one of the lead authors of the Common Core State Standards in Mathematics. The 8th annual conference offered nearly 70 different sessions to mathematics educators grade 4 through 14 and was the largest to date with over four hundred in attendance. Presentations focused on mathematical content, interactive lessons, applications of technology in the classroom, and ways of supporting special-needs students and English language learners.

The conference is, in part, made possible by the collaborations established between the Center for Recruitment and Retention of Mathematics Teachers and ten local school districts plus four individual schools. The Center would like to thank MEAD breakfast sponsor Glencoe/McGraw Hill and the luncheon sponsor Pearson Prentice Hall. Sincere thanks are also extended to Tucson High Magnet School and the Office of the Pima County School Superintendent.

## **Planning Workshop for Professional Development on the Common Core State Standards in Mathematics**

FEBRUARY 17-19, 2012, INSTITUTE FOR MATHEMATICS & EDUCATION

This two and a half day workshop provided the opportunity for participants from across the nation to deepen their understanding of the Common Core State Standards in Mathematics. Participants selected a mathematical topic and prepared future professional development for a particular grade band. Following this work, participants returned home equipped to lead professional development on the Common Core. Materials developed during the workshop are available on the **Institute website** and include eight professional development units for elementary school, three for middle school, and two for high school teachers.

## **Mathematicians in Mathematics Education (MIME)**

APRIL 15-17, 2012, INSTITUTE FOR MATHEMATICS & EDUCATION

The workshop, aimed at the general audience of university mathematicians who wish to become involved in helping solve problems in mathematics education, oriented mathematicians on the following key issues: the core mathematics of K–12, the mathematical knowledge of teachers, the nature of the educational system, the variety of curricula, and mathematics education research.

A particular focus this year was directing participants to undertake productive work supporting assessment, professional development, and curriculum work around the Common Core State Standards in mathematics.

## Focus on the Common Core State Standards in Mathematics

MAY 25-27, 2012, NEW ORLEANS, LA

This two-and-a-half day workshop catered to an audience of teachers, administrators, and district-level personnel transitioning to the Common Core State Standards in Mathematics. It gave participants a greater understanding of the Common Core in general as well as in depth knowledge on a specific part of the standards. Features of the program included perspective from lead author Bill McCallum as well as breakout sessions developed and led by teachers themselves. Participants engaged in creating their own professional development focused on the major work of a specific grade band or developed classroom activities around a particular task. The emphasis was put on the shift in the Common Core that asks teachers to dive deeper into fewer topics at each grade level. Materials developed at this conference are available online on the **Institute website**.



## 2012-2013 Events

### **Implementing the Common Core State Standards in Mathematics**

OCTOBER 12-14, 2012, BERKELEY, CA

This workshop was intended for an audience of teachers, administrators, and district-level personnel transitioning to the Common Core. The conference focused on the implementation of the standards, and on the development of activities that could immediately be implemented in a classroom or during teacher training, and that were based on a task or set of tasks aligned to the Common Core.

Participants left this three day conference with a greater understanding of the Common Core in general as well as an in depth knowledge of self-selected focus areas within the standards. Materials developed at this conference are available online on the **Institute website**.

### **Mathematics Common Core in the Classroom**

MARCH 1-3, 2013, SYRACUSE, NY

This conference will continue our national series of conferences run by a collaboration of classroom teachers, mathematicians, coaches, administrators, district and state mathematics experts, and mathematics educators. Participants will delve deeply into the standards through large group presentations, break-out sessions, and small group activity development. Teachers will leave the conference with a concrete classroom activity based on a task or set of tasks from the **Illustrative Mathematics website**.

Conference details can be found on the **Institute website**.

### **Mathematicians in Mathematics Education (MIME)**

MARCH 24-26, 2013, TUCSON, AZ

This annual workshop is aimed at the general audience of university mathematicians who wish to become involved in helping solve problems in mathematics education. It orients mathematicians on the following key issues: the core mathematics of K–12, the mathematical knowledge of teachers, the nature of the educational system, the variety of curricula, and mathematics education research.

# Featured Programs

## Illustrative Mathematics

WILLIAM MCCALLUM, CHAIR

KRISTIN UMLAND, CO-CHAIR



Illustrative Mathematics is a project of the Institute that seeks to help mathematics teachers understand the Common Core State Standards in Mathematics and build a community of teachers, mathematicians, and mathematics educators who work to improve their own teaching and learning through the sharing of resources and peer feedback. Blossoming from the idea of building an online resource sharing center into the development of a searchable website and vibrant online community, Illustrative Mathematics is now a **virtual destination** for all people interested in K-12 mathematics education. Armed with a new interface in the 2011-2012 school year, the website ballooned to host more than 400 tasks and 4,000 registered users by the end of the school year and has continued to grow since then.

Illustrative Mathematics is built around illustrations of standards and clusters of standards in the Common Core. Each illustration is a set of mathematical tasks that illuminates a standard or cluster by showing how a classroom teacher might help students develop or demonstrate mastery of a mathematical idea. In the future, the website hopes to house not only tasks but also videos, lesson plans, and student work related to the standards, as well as illustrations of the Standards for Mathematical Practice and learning progressions through the standards. Each illustration published on the site must go through a comprehensive review process in which it is vetted by both a mathematician and a classroom expert. A task typically undergoes multiple revisions and is published only after reviewers and editors agree that it is an accurate illustration of a standard or cluster.

K	1	2	3	4	5	6	7	8
Geometry								
Measurement and Data					Statistics and Probability			
Number and Operations in Base Ten					The Number System			
Operations and Algebraic Thinking					Expressions and Equations			
Counting and Cardinality		Number and Operations— Fractions			Ratios and Proportional Relationships		Functions	

In addition to providing tasks that illuminate the standards, Illustrative Mathematics is in the process of building an active and self-regulating online community that engages classroom teachers, mathematicians, and mathematics educators. Members of this community not only write and contribute tasks, but also review others' tasks and think critically about various aspects of

task writing. These comments have already led to revisions and improvements on currently published tasks. By fostering this community, the project hopes to build legitimacy and appreciation for the art of writing and reviewing mathematical tasks. In the future, the Illustrative Mathematics website will use a badge system to recognize the expertise of participants in the community.



Throughout the 2011-2012 school year, Illustrative Mathematics continued to improve how it engages users and monitors the creation and publication of tasks. The project implemented a new review form for tasks, encouraging reviewers to think critically about essential characteristics of a task, such as its mathematical correctness, its accuracy as an illustration of a standard, and its suitability for classroom use. The new form was developed by a working group of community members using their knowledge from previous task reviews to fine-tune the review process.

In 2011-2012, Illustrative Mathematics also improved the usability of the site based on user feedback. The website now allows users to link directly to specific tasks, making it easier for other sites and blogs to refer to content on Illustrative Mathematics. The website also allows a user to generate a PDF file of a task, including commentary and solutions; this feature makes tasks much easier to print. Both of these improvements are convenient for teachers who wish to share tasks with their colleagues in working groups and professional learning communities.

Illustrative Mathematics will continue to write, review, and publish illustrations of the standards, grow the community of task writers and reviewers, and improve the usability of the website. Specifically, the project will illustrate the Standards for Mathematical Practice at different grade bands through a variety of different materials, including task sets, student work, videos, and cartoon sketches. The community has also started the work of illustrating progressions of mathematical topics across multiple grades. The first of these progressions will be published on the site in the 2012-2013 school year as a collection of modules including videos, tasks, and quizzes with answer keys. Each month, the website releases a set of new community-building features, such as user profiles for subscribers of the website and badges for members who have demonstrated skill in writing, reviewing, or editing tasks. Through such features, Illustrative Mathematics hopes to serve not only as a destination for information on the Common Core State Standards, but as a growing community of experts with recognized expertise in their field.

## Arizona Teacher Initiative (ATI)

DAN MADDEN, PI

CODY PATTERSON, DIRECTOR

The Arizona Teacher Initiative, established in 2007 by a 4.8-million-dollar grant from the National Science Foundation, gives K-8 teachers the opportunity to earn a Master's degree in mathematics teaching and leadership while deepening their understanding of mathematics content and current research on effective mathematics teaching. Teachers in the program take courses in mathematics and pedagogy for two years, and spend a year completing an action research project in which they investigate a problem of practice in their classrooms.

During the life of the grant, awarded in September 2006 and ended in summer 2012, the Arizona Teacher Initiative has served 69 local K-8 teachers. Approximately 40 of these teachers have already graduated; most of the remaining participants are still in the process of completing the program. Each teacher received full tuition support and stipends for participation in the program. In addition, the Arizona Teacher Initiative provided employment and educational opportunities for two additional groups of professionals: high school mathematics teachers who spent a year at The University of Arizona as Mathematics Specialists, and recent doctoral graduates in mathematics who spent three years at the University as teaching postdoctoral fellows associated with the program.

The Arizona Teacher Initiative has produced significant benefits for teachers, for the University of Arizona and the Department of Mathematics, and for the mathematics education community.



## **BENEFITS TO TEACHERS**

- Teachers completed substantial coursework in mathematics, including four credit hours each in Number and Operations, Algebra, Geometry, and Statistics and Probability. In these courses, teachers investigate the topics of K-8 mathematics from an advanced perspective, exploring how fundamental concepts work and how they connect with one another. Teachers in the program have shown significant gains on the Learning Mathematics for Teaching tests, instruments that measure mathematical content knowledge for teaching.
- Teachers completed coursework in mathematics pedagogy, taking courses in mentoring, research on student learning of mathematics, and equity in mathematics education. These courses explore student understanding from a mathematical point of view, applying their understanding of number, operations, and algebraic thinking to analyze student work. Participants also discover how to use students' funds of knowledge to enhance mathematics instruction for students from diverse backgrounds.
- Teachers developed persistence and problem-solving skills by completing research projects in mathematics.
- Teachers learned how to use qualitative and quantitative data to inform their classroom practice by completing action research projects. They develop lessons or instructional approaches to use in their classrooms and collect data in order to assess how these lessons or approaches affect student learning. Many teachers have reported that their action research projects have given them opportunities to think deeply about issues central to mathematics teaching and make adjustments in their classroom practice.

## **BENEFITS TO UNIVERSITY AND DEPARTMENT OF MATHEMATICS**

- Financial assistance provided by the grant, has allowed mathematics and education faculty at The University of Arizona to develop mathematics content and education courses for K-8 teachers. These courses continue to run (sometimes in an online format) and serve teachers in other programs, such as the MASTER-IP Program run by the University of Arizona College of Education.
- The program has strengthened the connection between local K-8 teachers and the University, particularly the Department of Mathematics and the Colleges of Science and Education. Many ATI teachers continue to attend workshops and conferences offered by the University through the Institute and the Center for Recruitment and Retention of Mathematics Teachers.
- The program has developed a cadre of mathematicians at the University who can present mathematics content to an audience of teachers. For some mathematicians, ATI was their first opportunity to teach courses for inservice teachers.
- The interaction between teachers and program faculty has heightened the University faculty's awareness of the mathematical, pedagogical, and practical issues that confront local teachers in their work.

## **BENEFITS TO THE MATHEMATICS EDUCATION COMMUNITY**

- The program has provided data on the effect of mathematics and pedagogy courses on teacher practice and student achievement. These data will be used to inform future teacher education efforts at the University and at other institutions.
- The program has provided prototypes for mathematics courses for K-8 teachers, parts of which may be used in similar courses at other institutions.
- Through the postdoctoral fellowship program, the program has developed a group of mathematicians who can contribute to national discussions on issues that lie at the intersection of mathematics and education.

## **SAMPLING OF ACTION RESEARCH PROJECTS COMPLETED BY ATI TEACHERS**

- *Can a Math Classroom Foster Belief That Success is Attainable Through Effort?*  
Steven Martinez, Challenger Middle School
- *What Gets Students to Talk About Math?* Samantha Klein, TUSD
- *Teaching Strategies for Integers and Operations;* Liliana Munoz, Udderback Middle School
- *Number Sense and Its Impact on Students' Solving of Algebraic Equations;*  
James Henry, Gridley Middle School

### **FEEDBACK FROM ATI TEACHERS**

“[My action research project] let me bring real-life important issues into the classroom. It gave me an opportunity to research and implement something in my classroom that I would not have had time for if not for the program.”

- Carina Kennedy, Roskruge Bilingual Magnet K-8

“Even though I currently teach in elementary school, many of the activities and learning strategies introduced and practiced in the ATI program have fit perfectly in my curriculum, and have in fact served as a wonderful precursor to the upcoming Common Core implementation.”

- Esteban Promis, Gale Elementary School

“Being in this program has changed the way I think about teaching math. It has helped my teaching because I have a deeper understanding of the math concepts I teach.”

-Patty Manciet, Valencia Middle School

*For more information visit the **Institute Website**.*



## People

### Staff

Joceline Lega, Director  
 Rebecca McGraw, Assistant Director  
 Cody Patterson, Assistant Director  
 Alejandra Gaona, Program Coordinator  
 Aubrey Neihaus, Intel Math Program Manager  
 Ellen Whitesides, Director, Common Core  
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 James Lewis, University of Nebraska  
 Cathy Kessel, Mathematics Education  
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 Hung-Hsi Wu, University of California,  
 Berkeley

#### Mathematicians in Mathematics Education Workshops

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