We are grateful to every district, school, foundation, and individual who supports the CRR programs.

Visit us on the web at crr.math.arizona.edu

District Partnerships 2018-2019

Altar Valley School District
Amphitheater School District
Benson Unified School District
Catalina Foothills School District
Continental School District
Flowing Wells School District
Marana Unified School District
Sahuarita Unified School District
Santa Cruz Valley School District
Sierra Vista School District
Sunnyside Unified School District
Tanque Verde School District
Tucson Unified School District
Vail Unified School District

School Partners 2018-2019

Academy of Tucson
Ace Charter High School *
AmeriSchools
City High School
Ha:san Preparatory & Leadership School *
Highland Free School
Imago Del Middle School
Paulo Freire Freedom Schools
Pima Community College West
Presidio Schools
San Miguel High School
The Gregory School
Tucson Country Day School
YouthWorks Charter High School *

* denotes new partners in 2018-2019

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Kautz Family Foundation
Thomas R. Brown Family Foundation
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Mathematics Educator Appreciation Day Conference Partners
Tucson Unified School District
Pima County School Superintendent’s Office
Texas Instruments
Desmos
UA Institute for Mathematics and Education
Pearson
Houghton Mifflin Harcourt
KP Mathematics
EAI Education

Helping Teachers Make an IMPACT

2018-2019 Annual Report
Center for Recruitment and Retention of Mathematics Teachers

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The Center’s Vision - An excellent mathematics teacher for every child in every grade

The Center’s Mission - Attract and prepare mathematically talented college students to become mathematics teachers & Retain and support mathematics teachers currently in the classroom

Highlights of the 2018-2019 School Year

The Center’s 15th Annual MEAD Conference hosted 109 sessions. The keynote speaker, Dr. Dan Meyer, inspired participants to see mathematics instruction as an exciting story unfolding, and to allow students to discover the “punchline”, “shocking conclusion”, or “motivating message”. See page 5.

The Center offered five Herbst Enrichment Mathematics Seminars, with an average of 19 teachers attending each session. See page 10.

A third year of the IMPACTS K-5 program kicked off with a week-long Mathematics Summer Institute for 16 teams of elementary teachers thanks to the financial support of the Thomas R. Brown Family Foundation. See page 3.


The Center initiated the IMPACTS-MS program to support the unique needs of middle grades teachers and to address the urgent need to improve middle grades students’ mathematics proficiency. The program was made possible by the Center’s partnership with the Thomas R. Brown Family Foundation and included a week-long Mathematics Summer Institute, school year workshops, and on-site classroom support. See page 4.

Through the continuation of the AmeriCorps grant, the Center provided a second year of Student Thinking Enrichment through Mathematics Mentors (STEMM), a tutoring and mentoring program that served 20 teachers in their first two years of teaching, 32 UA undergraduate students, 19 experienced classroom teachers, and more than 3900 K-12 students. See page 8.

The Center broadened its community outreach through special family and educator events, such as Game Night, Pi Night, STEM Fair, and a film screening of Teaching in Arizona. See page 11.

The Center and CRR personnel were recognized by both the University and the College of Science. See page 6.

The Center maintained 25 partnerships from 2017-2018 and added 3 new partnerships. See page 15 for a complete list of partners and donors.
Helping Teachers Make an IMPACT

The Center has worked hard to help teachers discover their own differentiated professional growth pathway. The breadth of CRR services and programs, and the individualized attention of the Center staff have supported many teachers in identifying, beginning, and making an IMPACT in their own professional growth journey, digging into areas in which they have felt less confidence or in areas in which they have found curiosity and interest. More teachers than ever before have IMPACTed their students by implementing ideas and structures learned at CRR events in their classrooms and reflecting upon those experiences.

Teachers have found ways to IMPACT their colleagues by leading from the classroom, as well as leading in their schools, districts, and regions. As a result, many classroom teachers have begun to speak and share on the regional, state-wide, and national levels, ever expanding their professional community and IMPACT.

In this way, the CRR is transitioning from “the best kept secret in Tucson” to a nationally-recognized Center with services and programs proven to make an IMPACT on teaching and learning. With the support of school and community partners, the Center aims to adapt and grow in order to address the ever-changing needs of teachers and students.

“Thank you for supporting the continuing education of teachers. Learning is a lifetime endeavor and having a place to gather with other teachers, to learn from other teachers and experts, helps me through the journey.” - Jamie Drobeck

“Everytime I attend an event, I walk away feeling empowered as a learner, teacher, and a leader. The growth and learning is unmatched. I am a math educator because of these programs.” - Eboney McKinney
**Improving Mathematical Problem solving, Acumen, & Confidence for K-5 Teachers and Students Program (IMPACTS K-5)**

IMPACTS K-5 is a professional development and teacher leadership program has three main components. The CRR offers a series of teacher workshops throughout the school year to address essential mathematical concepts in grades K through 5. Elementary school teachers from all partners may attend any or all of these workshops. An intensive one-week Mathematics Summer Institute is provided to teams of teachers who wish to begin the journey of teacher leadership from the classroom. A two-day leadership retreat is provided to a select group of teachers from across Tucson and surrounding areas who endeavor to continue their teacher leadership journey by leading regionally.

Sixteen teacher teams attended a one-week Mathematics Summer Institute in June 2018 to deeply explore elementary mathematics and to design site plans for professional development that will share strategies and content with colleagues in their schools. Parents and administrators were invited to attend two days of the Summer Institute alongside their teacher teams.

The IMPACTS program is made possible by the generosity of the [Thomas R. Brown Family Foundation](https://crr.math.arizona.edu/james-kautz-endowment).

"Since taking these classes, my confidence with teaching math has gone to new heights! My students just took a math benchmark quarterly test and my scores showed great improvement. I credit these CRR classes for this as I now have learned to love teaching math and my students are reaping the benefits!" - Dory Zawada

"I got inspired to use more different kinds of manipulatives when investigating fractions with my third graders." - Andrea Rickard

I left this workshop deep in thought because I learned some things I hadn't known or thought about before. It also helped me grapple with some of the doubts I have had about the curriculum I use to teach math. I hope to come to some more this year. - Amy Busse

"I appreciated learning about thinking of struggling students in terms of what they can do instead of what they can't. I am also looking forward to seeing and using the learning trajectories to help determine exactly where a student is and where the next step should be. Actually, I've been looking for something this specific for a long time!" - Jamie Drobeck

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**James Kautz Memorial Endowment**

James Kautz retired from Goldman Sachs in 1987 and moved to Tucson in 2006. Jim became involved in the UA Center for Recruitment and Retention of Mathematics Teachers (CRR) almost immediately upon his arrival in Tucson. He provided advice and much-needed funds to support the outreach efforts of the CRR.

In 2012, Jim married Mary Nickerson and both Jim and Mary have been instrumental in supporting the Mathematics Educator Appreciation Day conference. They have been advisors to the CRR Directors and Co-Directors, regularly discussing the needs of the CRR and the services that the CRR can provide Tucson teachers and students. Jim and Mary continued to support the CRR’s efforts with generous gifts each year.

Jim, Mary, and the Kautz Family Foundation have left a large footprint on the Tucson community. Jim passed away in 2018, and to honor him and his legacy, the James Kautz Memorial Endowment has been established. The endowment will support the CRR programs that he cared so much about.

In order to promote the endowment, the CRR worked with Tucson Values Teachers to provide a free movie showing of the documentary, "Teaching in Arizona".
Workshops and Events

The Arizona College & Career Ready Standards provide the blueprint for what students should know and be able to do. Dedicated educators continually search for effective lessons and strategies to ensure that students are meeting and exceeding the standards. CRR provides workshops in the evenings and on Saturdays to help teachers engage in exemplary lessons and strategies both as mathematics learners and as educators. They then implement these in their own classrooms to develop deeper student understanding of concepts. The participants earn continuing education hours for their involvement in and implementation of ideas from these highly interactive workshops. In 2018-2019, the Center partnered with local groups to coordinate cross-curricular workshops for teams of teachers in different disciplines.

Improving Mathematical Problem solving, Agency, & student-Centered instruction for 6-8 Teachers and Students Program (IMPACTS-MS)

Similar to the elementary program, IMPACTS-MS provides professional development and leadership opportunities for middle school mathematics teachers. The Summer Institute focused on the Critical Foundations of Algebraic Thinking in order to inform teachers’ classroom practices and to prepare them to implement professional development at their school sites.

The Thomas R. Brown Family Foundation has provided funds for an expansion of the IMPACTS-MS program to include two years of on-site coaching support for participating Teacher Teams.

That was one of the best PDs in all my 17 years of teaching. I am “jazzed” for next school year. - Patti O’Rourke

“Thank you so much for helping make this opportunity for all of us educators to grow in our teaching. Our children deserve these opportunities to enhance their understanding of math. Thank you for inspiring and reinvigorating my enthusiasm for math instruction.” - Ilyssa Whitehead

Your summer institute has an amazing quality to it. The growth I witnessed in only five days was astonishing. It was an honor to be a part of your group, even if my brain hurt at the end of the day! I can firmly say that although I am not certain how it all works, Algebra tiles are my friends! - Kitt Bret Harte, Principal
The 15th Annual Mathematics Educator Appreciation Day Conference (MEAD)

MEAD was held on January 26, 2019. 133 different presenters facilitated 109 sessions at Tucson High Magnet School. 555 K-16 participants attended four different 50-minute sessions followed by a luncheon and keynote presentation at the University of Arizona Recreation Center. Several public officials attended and addressed the audience at the luncheon, including the Mayor of Tucson, school superintendents, and the State Superintendent of Public Instruction.

The keynote speaker, Dr. Dan Meyer, inspired participants to see mathematics instruction as an exciting story unfolding, and to allow students to discover the "punchline", "shocking conclusion", or "motivating message". His thoughtful and inspiring talk included an engaging task that resulted in oohs and ahhs from the audience. We are grateful to Desmos for supporting Dan's keynote address.

"I LOVE getting to attend MEAD! This was my second year and I will definitely return. I'm excited to get more and more colleagues to join me each year." - Elementary School Teacher

"This was my first MEAD Conference and I am so glad I attended. It was well organized and the sessions covered so much. The sessions I attended were relevant and I was able to use information on Monday morning. This conference takes a lot of work, not with just the presentations and organizing but also with the door prizes and coordinating with the U of A. It was so much fun to see so many educators from around Southern Arizona. Thank you!!!!" - K-2 Teacher

"This conference is an enriching and inspiring event every year, and I am so impressed how it's grown over the years. We are so fortunate to have this amazing opportunity every year!" - Middle School Teacher

"I really enjoyed the conference. This was my first MEAD conference and I plan on attending more. It was a really great feeling to be with other dedicated educators from all levels." - Preservice Teacher

Herbst Enrichment Mathematics Seminar

With generous support from Lee and Arthur Herbst, the Center offered five Saturday workshops in which local master teachers shared their expertise in mathematics content and pedagogy with colleagues. Herbst Seminars focus on connecting content to practice and providing teachers with concrete tools and techniques to use in the classroom. Participants receive a continental breakfast, a stipend, and continuing education hours for their participation in and implementation of ideas from these highly interactive workshops.

A two-part high school workshop, Investigations in the High School Mathematics Classroom! was presented by Jennifer North Morris and Sara Thompson in September.

A two-part middle school workshop, Building Student Conceptual Understanding With Manipulatives To Conquer Middle School Math was presented by Jennifer Thompson and Heidi Sweet in November and December.

The Beginnings of Number Sense: Why it Matters and How to Nurture it was facilitated by Elisabeth Bankhead in February for K-5 teachers.

"I think the workshops are amazing - I learn so much and I can immediately implement the ideas/activities." - Middle School Teacher

"I am so thankful that I came to this workshop. The information I learned is knowledge that will be used as a resource for all my math lessons in the future." - Elementary School Teacher

"This was unequivocally one of the best workshops I've attended... PDs that feature relevant hands-on activities for HS math teachers." - High School Math Teacher
Advanced Placement Practice Exams

(https://crr.math.arizona.edu/ap-practice)

Thanks to Bruce MacMillan’s leadership, CRR has been sponsoring Advanced Placement Calculus (AB and BC) Practice Exams since 2008.

Students have the opportunity to take a mock timed AP test prior to taking AP exams. The multiple-choice portions are scored while the students complete the free response items.

Facilitators then teach the students how to score their own free response answers. In this way, students learn the expectations for a well-written, complete solution. By the end of the day, students know what score they would have earned for the exam. The experience gives them practice answering sample items and gives them insight into what preparation is necessary prior to taking the actual AP exam two weeks later.

Beginning in 2014, CRR started a parallel Advanced Placement Statistics Practice Exam. The statistics students experience a similar format, so that they too know what they would have scored on an actual exam.

While the students are taking their practice exams, local AP teachers meet to share ideas, lessons and strategies. On May 4, 2019, 250 students and 14 teachers participated in the AP Practice Exams.

CRR Recognition and Awards

The Center and CRR personnel were recognized by both the University and the College of Science. President Robbins presented the CRR with the UA Team Award for Excellence in recognition of “outstanding team contributions toward the University’s mission and goals”. Additionally, Melissa Hosten received the College of Science March Star Award in recognition of “hard work, dedication, and commitment to service.”

“The CRR has seen the needs of the community and has increased services, advocacy activities, collaboration with private and public organizations, and service regions to improve the outreach provided. This was accomplished with a small team and many community partnerships.” - Tucson Teacher

“I’m sure that you are aware that there is a dire shortage of highly qualified math and science teachers, so CRR’s mission is important and timely. Co-directors Melissa and Rodrigo have carried out this mission with great distinction, making exceptional contributions toward effectiveness, providing outstanding service to our community, and placing diversity and inclusion at the very center of their efforts.” - University Leader

“While over the years CRR has delivered an amazing series of programs for teachers in the community, I have to say that in the last 2 years or so, with this current team of co-directors, the number, variety and quality of programs have increased dramatically. In great part this is due to their efficient and effective approach in recruiting the right people to help deliver workshops and in obtaining funding.” - University Faculty

“The Center for Recruitment and Retention of Mathematics Teachers offers an invaluable service to K-12 teachers and schools in Tucson and in parts of Southern Arizona. In so doing CRR contributes to link the University of Arizona with the local community through its high-quality programs. This is the result of a team effort, with a shared common vision where each team member brings their unique expertise towards that vision. Their focus on improving the mathematics education of K-12 students is not only commendable but very needed in our community.” - University Mathematics Educator

“The CRR brings exceptional quality to their work with the community. The CRR has partnerships with many school districts, charters and private schools in southern Arizona and they consult closely with those partners to develop and shape programs for teachers and students. Their ability to stay closely connected to those they serve greatly benefits their work and ensures that they are meeting the needs of the community.” - Community Donor
New Teacher Induction Program for Secondary Mathematics

(https://crr.math.arizona.edu/induction)

The New Teacher Induction Program supports middle and high school mathematics teachers in their first two years of teaching. Participants attend monthly Saturday sessions throughout the school year. These sessions provide a format to share ideas, materials, and concerns, while deepening mathematical knowledge, modeling good teaching, and promoting collegiality.

Each participant works with an Induction Coach. These coaches are former middle or high school master teachers. Coaches meet with teachers several times per semester to support teachers’ instructional shifts towards active learning and deep mathematical exploration, including professional growth in promoting discourse, maximizing classroom participation, instruction, collaboration, lesson planning, classroom management, student motivation, assessment techniques and more.

Furthermore, each participant selects three students from their classrooms to mentor throughout the school year. Mentoring students not only improves student attendance, achievement, and graduation rates, but it also improves teacher satisfaction, efficacy, and retention.

Twenty teachers participated in the New Teacher Induction Program during the 2018-19 school year.

“This program has been so helpful and rewarding. I learned so much and am so grateful for what I have learned and who I have met.”
- Middle School Teacher

“The support and encouragement is amazing” - Middle School Teacher

“This is a valuable workshop. I appreciate all the resources” - Middle School Teacher

Student Thinking Enrichment through Mathematics Mentoring (STEMM)
An AmeriCorps Program

(https://crr.math.arizona.edu/stemm-mentors-tutors)

STEMM recruits mathematically talented college students who are committed to serving their community, regardless of whether they are considering a career in education. These UA students enroll in a one-credit mathematics course that focuses on tutoring techniques, supporting conceptual mathematics understanding and multiple approaches to problem solving. The UA students also attend monthly Saturday trainings to help them use successful mentoring practices. The college students serve five to ten hours per week in selected elementary, middle and high school mathematics classrooms. The UA students work with their cooperating teachers to identify three students who can use additional targeted support. The UA students mentor the three youth throughout the school year in addition to the classroom service hours, making a personal connection and difference in their mentees’ lives. UA students also volunteer for Family Math Nights, STEM nights, and Math Carnivals at schools throughout the Tucson area. UA Students earn a living stipend for their dedicated, reliable community service, and they have the opportunity to receive an education award upon completion of the program. The teachers with whom they work are chosen based on their enthusiasm for mathematics and teaching, their student-centered classroom environments, and their knowledge of current state standards and effective learner-centered practices.

“Building connection with my students was the most memorable. I really enjoyed learning every students’ struggles and strengths. Seeing them light up after they understand something is my favorite.” - Lillian Ha (Tutor Scholar)

“Many students specifically ask for Nate to explain things to them. They appreciate his descriptions of procedures and concepts. Some of them clearly relate and connect better with Nate” - Kathy Morre (High School Teacher)

96 students were mentored by STEMM members, and all 96 increased a full level of proficiency on the state mathematics achievement assessment (AzMERIT). The STEMM Tutor Mentors served 9,922 hours in Tucson classrooms, supporting teachers conceptual instruction.