

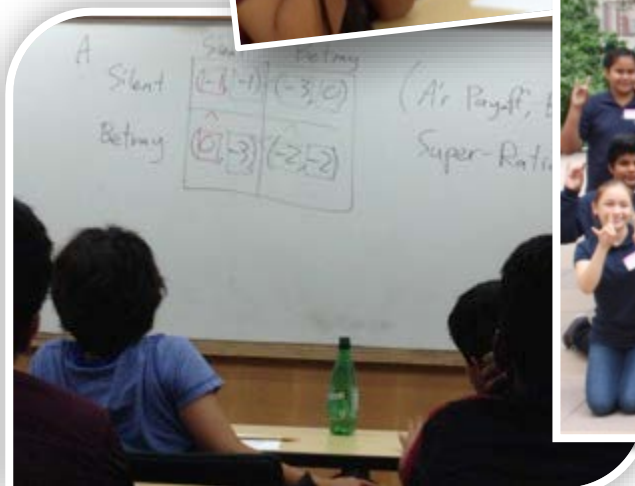
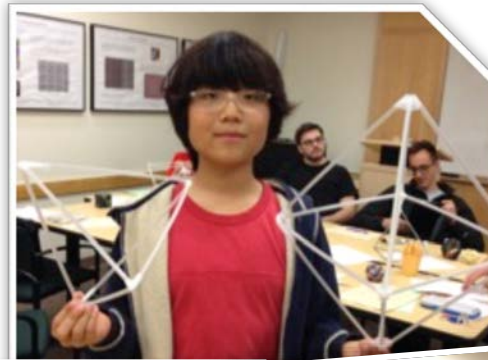
THE RIPPLE EFFECT of the UCI Math Educational Outreach



Alessandra Pantano
University of California, Irvine

UCI Math CEO: *Community Educational Outreach*

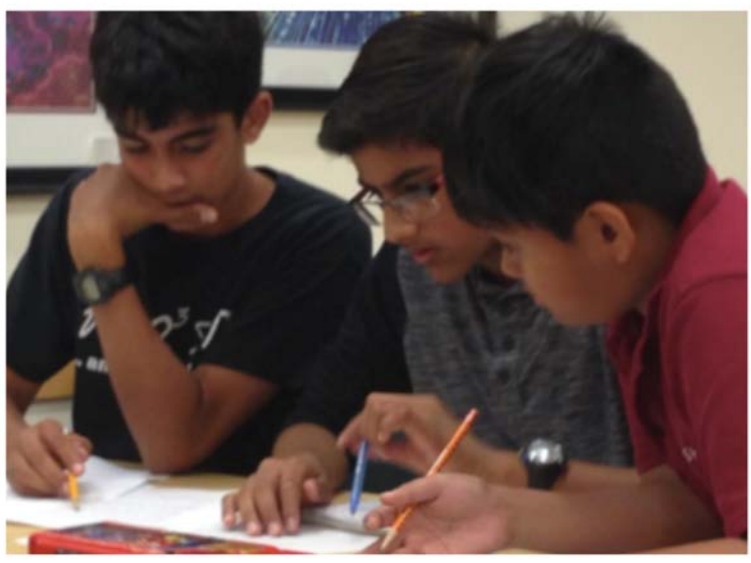
- Founded in 2012, with support of a Dolciani grant
- Started as a math circle for mathematically talented *high school* students (@UCI)
- In 2013, added *middle school* math circle (@UCI) with NAMC support
- In 2014, added a new outreach component targeting *children in disadvantaged schools* (@ school site first, then at UCI)





VIBRANT COMMUNITY OF LEARNERS



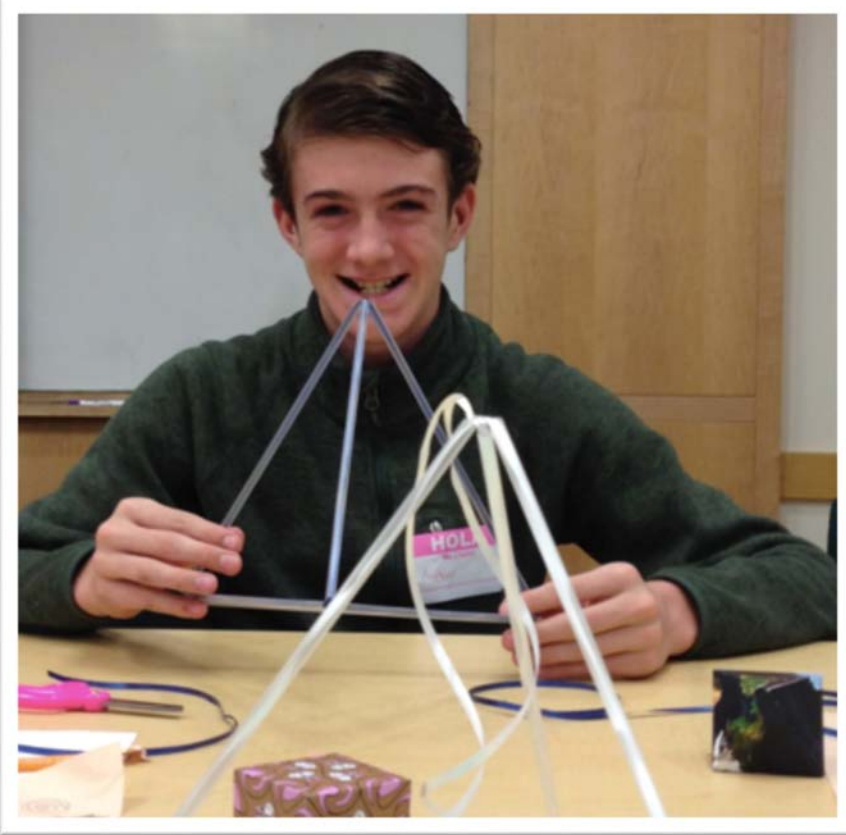
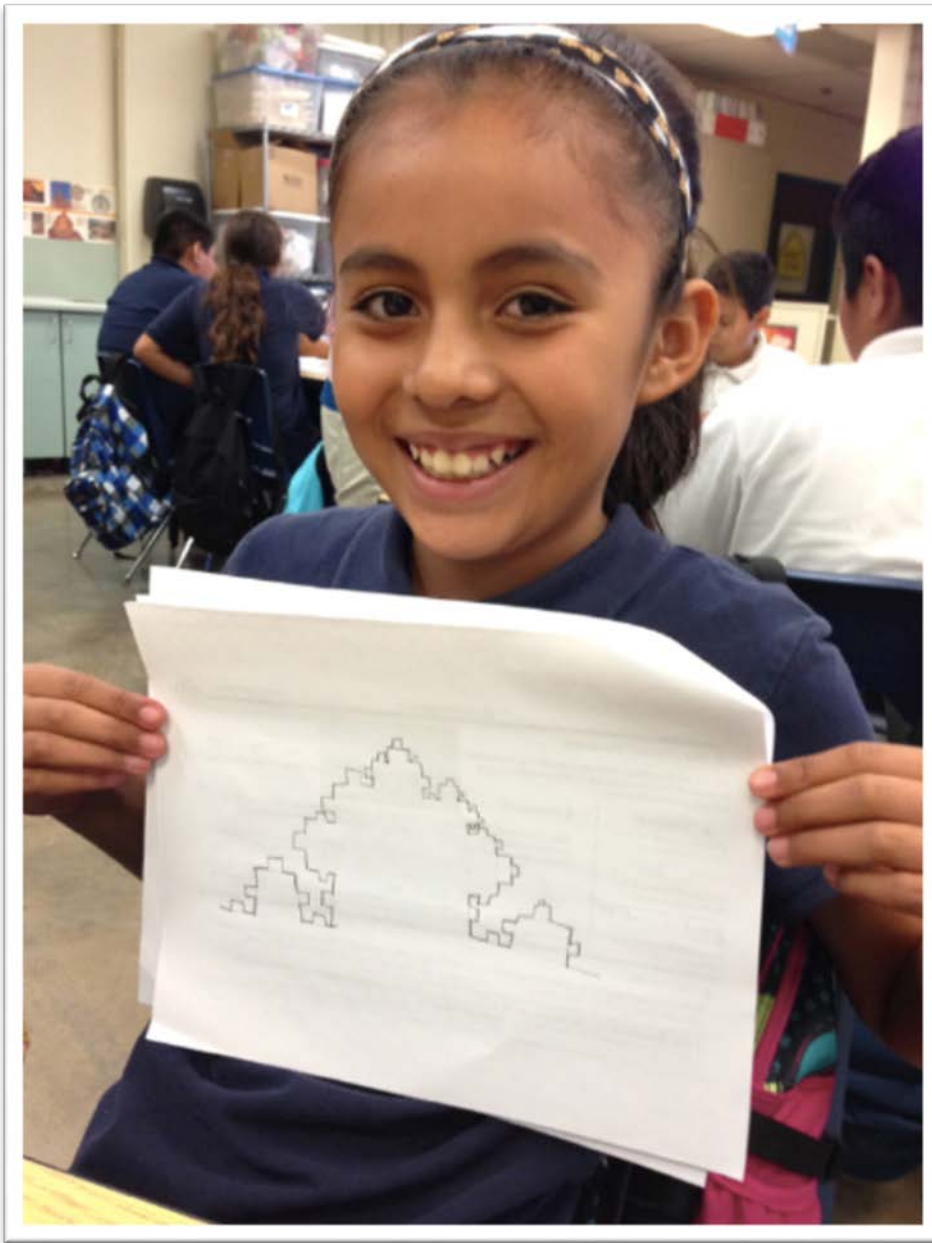


**HIGHLY
ENGAGED
IN THE
LEARNING
OF
MATHEMATICS**



THEY WORK HARD





BUT THEY ENJOY IT



Thank You UCI

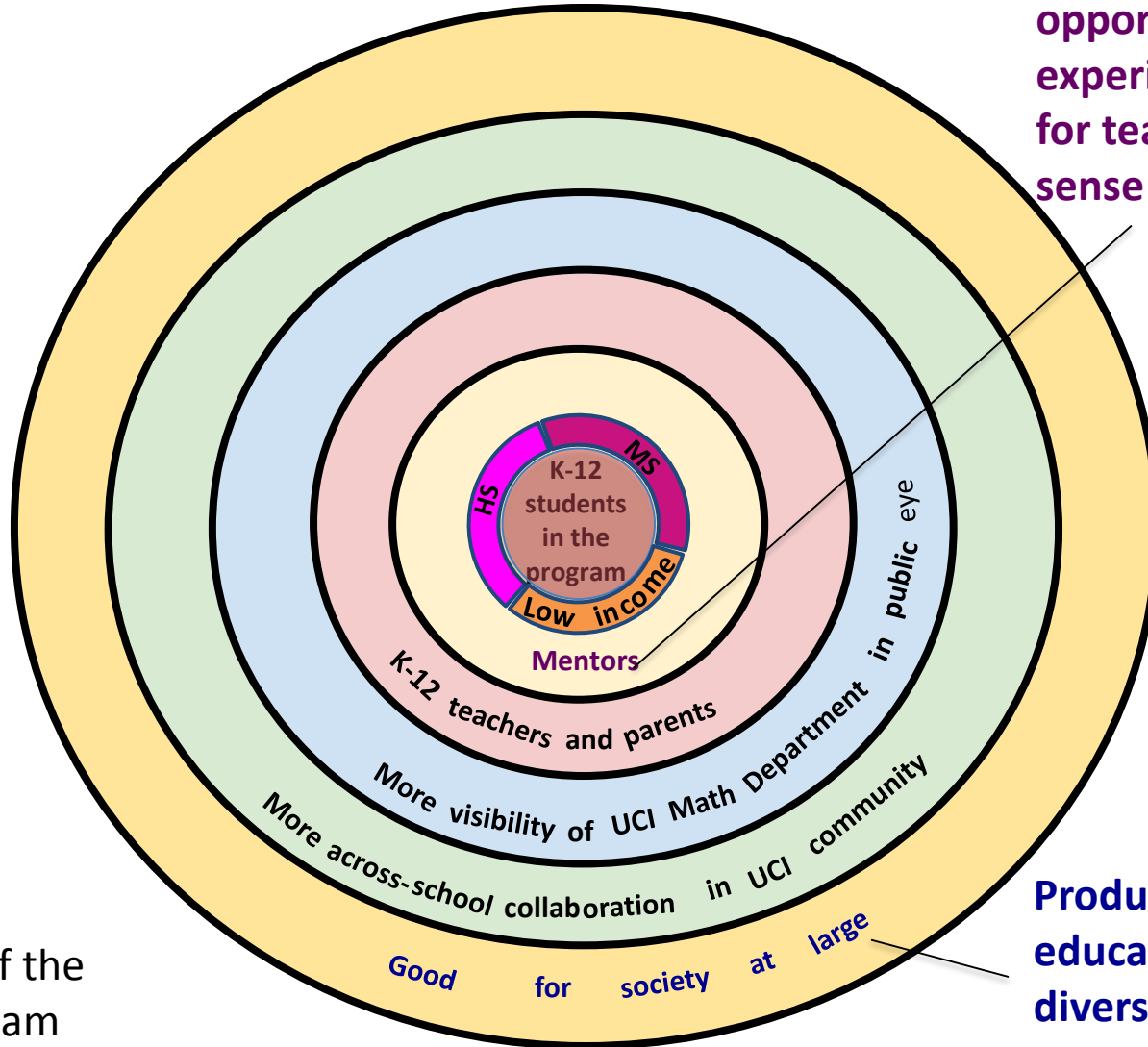
Students enjoyed lectures and got to see math from a very different perspective. They also got an idea what going to college means, and parents were very happy to learn that their low income is not an obstacle on the path of getting excellent education.

Middle school math teacher

**AS THE PROGRAM EVOLVES,
IT HAS A GROWING IMPACT
ON THE COMMUNITY**



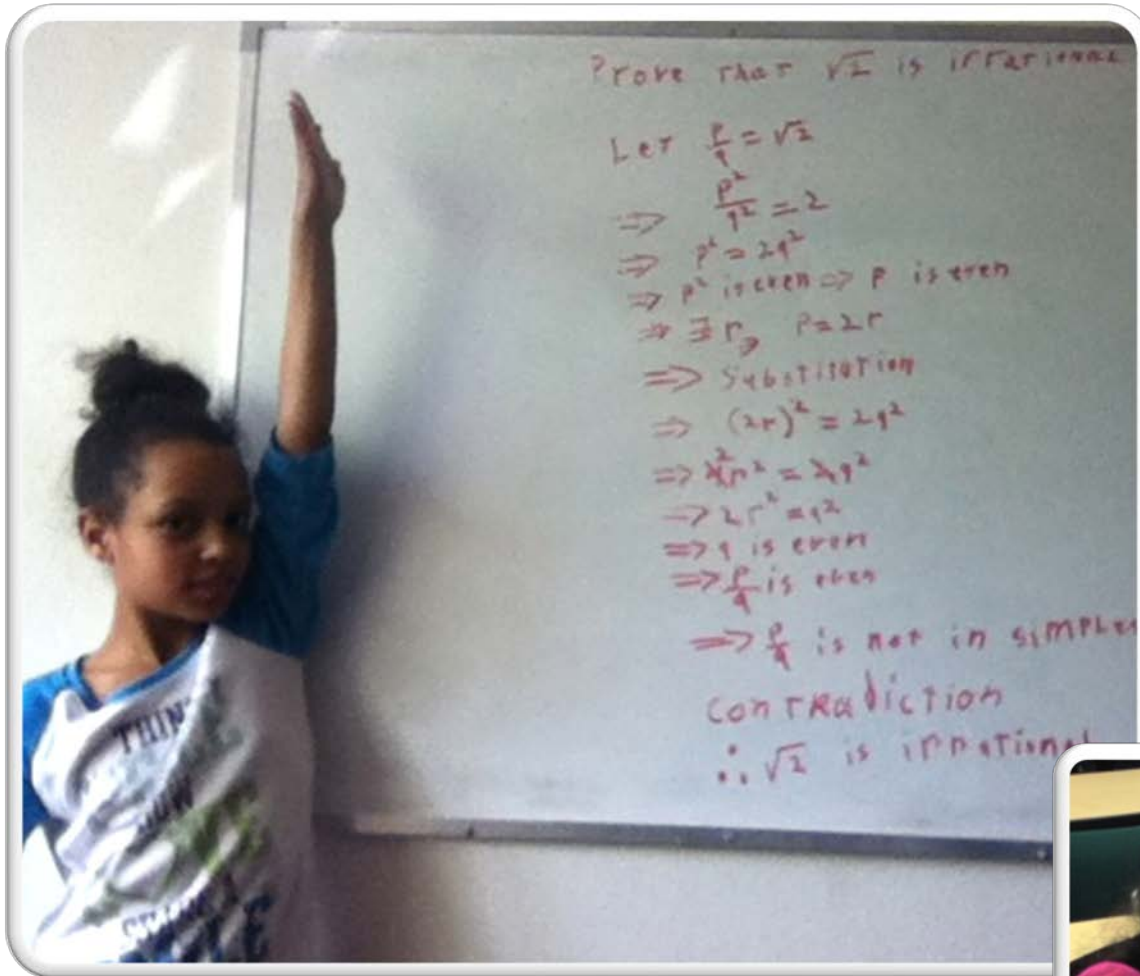
THE RIPPLE EFFECT OF UCI MATH CIRCLE



Strong letters of recommendation, expanded job opportunities, increased experience & enthusiasm for teaching and outreach, sense of community

Produce a more STEM educated youth, increase diversity in academia

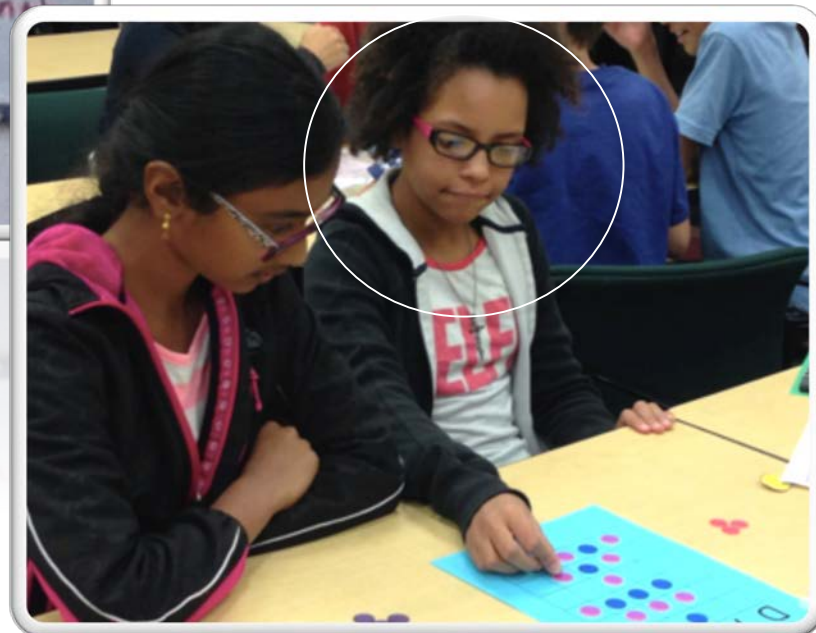
All members of the Math Circle team
❤️ the program



Fall 2013



Fall 2015



To: "apantano@uci.edu" <apantano@uci.edu>

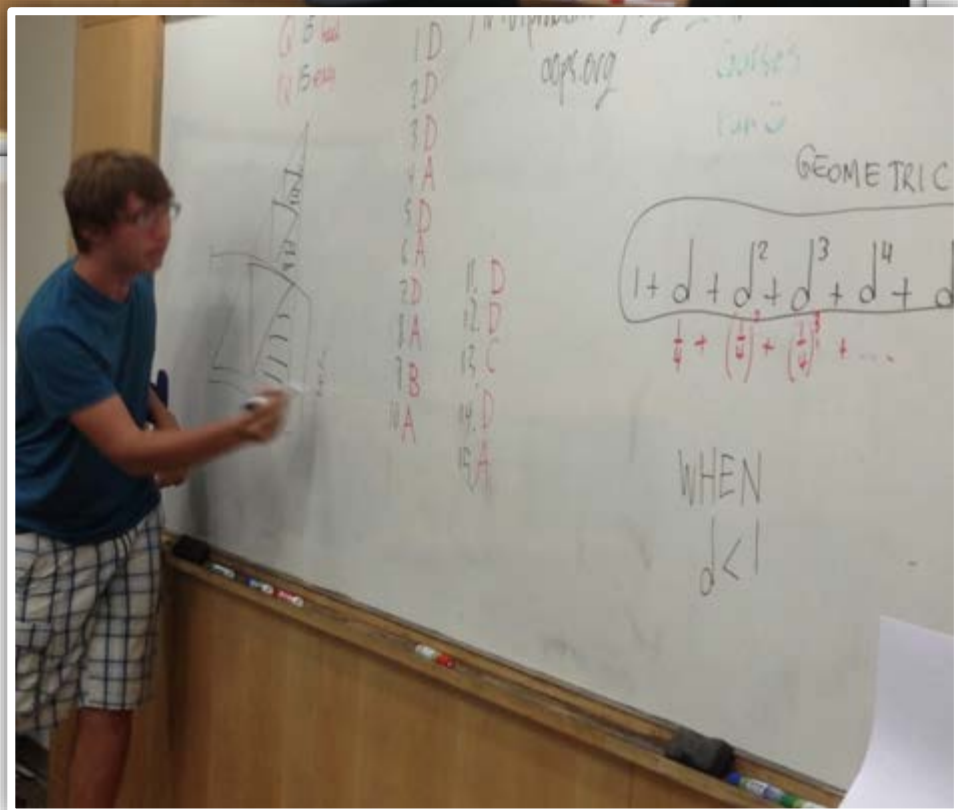
Subject: Math Circle

Hi Alessandra -- I wanted to tell you about the impact UCI's Math Circle has had on our nine-year-old daughter Ida.

Since first attending your program several months ago her enthusiasm for the subject has soared. She meets new math problems (especially the tough ones) with a new excitement of discovery rather than anxiety over being graded and ranked. She builds dodecahedra in her room using a magnetic set recommended by you, multiplies two-digit numbers together in her head using a random number generator, is crazy for number theory and constantly plays math games at the table with us for the enjoyment of doing it.

We live in a working-class community that is ill-served (read not at all) by challenging academic programs for children of any kind, let alone a math circle of the caliber of UCI's. This wonderful program is one that we could never afford and is offered to students free of charge! It's an hour's drive for us each way and we never miss it -- our daughter insists. Your teachers are FANTASTIC and have a true gift for sharing their enthusiasm for math with students.

I hope your program continues the great good it's done for young people. If you'd like me to speak to anyone as math circle parent I'd be happy to do so. Thanks so much and best,
T.G.



From Spring 2012

High School Math Circle participant



*High School Math Circle
Participant, and
Middle School Math Circle
Instructor*



**To Fall
2015**

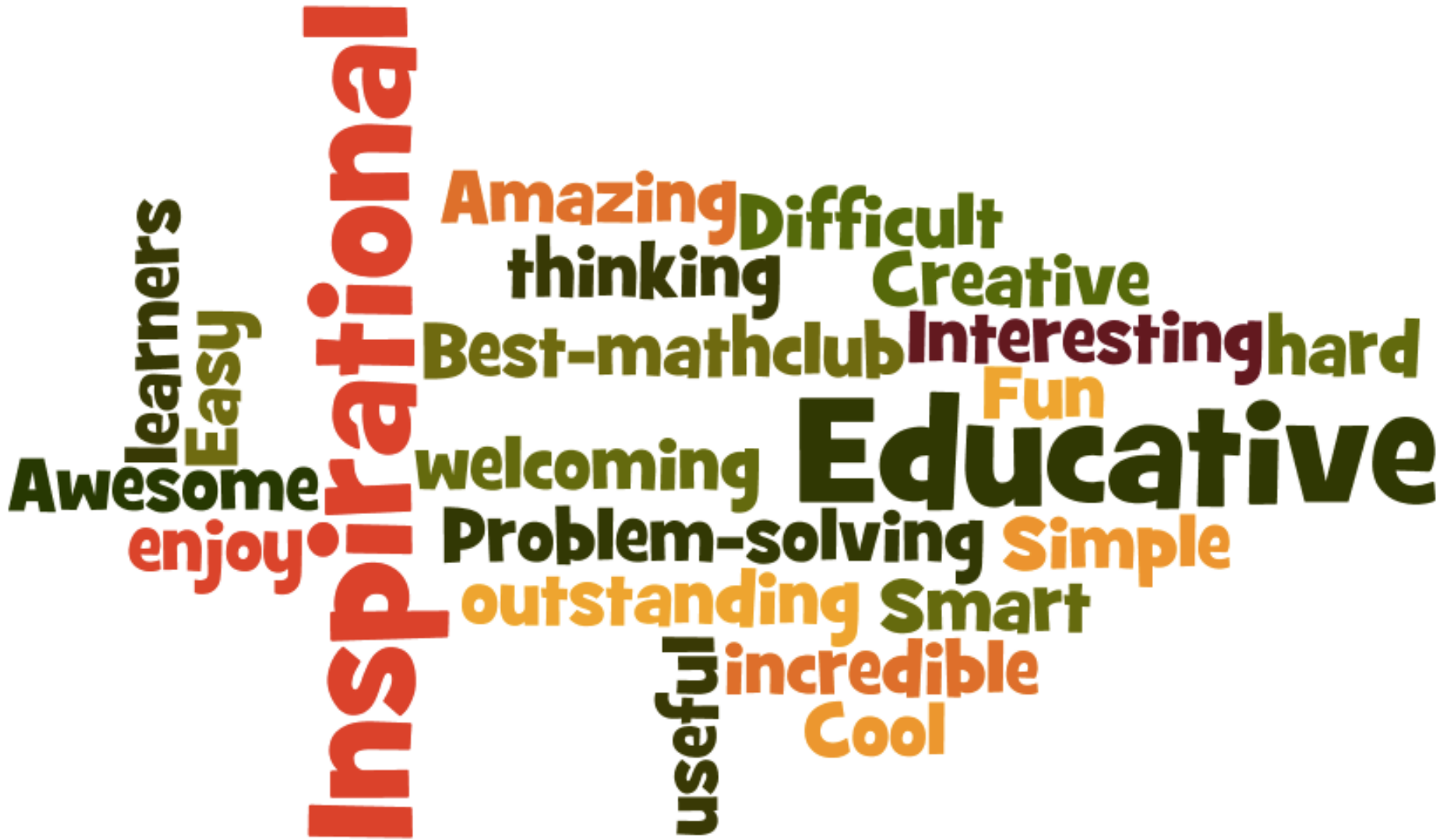
Dear Dr. Pantano,

The UCI Math Circle has proven time and time again to be my favorite and my most valuable math opportunity. **As one of the most senior members and a participant since its creation, I have attended almost every meeting.** The UCI Math Circle's ability to integrate college student helpers with diverse high school level competition math in a completely stress free and collaborative environment has been endlessly valuable to me.

Participating in many classes and other clubs including my local ARML (American Regional Mathematics League) team, online and regular competition math classes, and various summer camps, **I have been a part of almost all competition math opportunities in my area. Despite this, the UCI Math Circle continues to be my favorite class,** and I look forward to attending every week. **As someone who works best in a collaborative work environment free from time pressure, the UCI Math Circle is the only main class that allows me to truly work at my maximum efficiency in an environment in which I can thrive.** I am truly grateful for this experience at the Math Circle when the math community around me values speed as a representation of mathematical ability. Allowing me to truly appreciate math as a method of problem solving over a subject to be memorized, Dr. Pantano's UCI Math Circle is, in my opinion, one of the best math programs provided in my region because of its non-competitive and collaborative nature.

[...]

K-12 STUDENTS REALLY ENJOY THE PROGRAM
AND BENEFIT FROM IT





MENTORS DO TOO

*UCI undergraduate pursuing a (2nd) degree in
Computer Science*

*In Fall 2013, started to be a
Middle School Math Circle volunteer*



To me, **the best part of Math Circle is working with the kids. All of them are enthusiastic about the problems, and the excitement is contagious. It is extremely fun to talk to them about mathematics, and see their unique ideas and approaches to problems. To be honest, I may have learned more from them than they have from me.**

It's also nice to know we are bringing the kids together in a positive environment; I may have even influenced some of their lives in a positive way. When you think about all the other things they could be doing with their free time, it's inspiring to know that instead of playing video games or getting into trouble, they are coming to Math Circle. **Helping at Math Circle is a very rewarding experience, and I look forward to it every two weeks.**



4. Did the speakers make the mathematics exciting?

Ho-hum

1

2

3

Not bad

4

5

6

Inspiring

7

→ on the whole

→ Bill



Date: January 2, 2016 at 12:03:46 PM PST
To: Alessandra Pantano apantano@uci.edu
Subject: Letter of Recommendation

Hi Professor Pantano-

I am writing to ask if you would consider recommending me for the Teacher Credentialing Program at Cal. St. Fullerton. I would be honored and grateful if you would be willing to complete the attached recommendation form on my behalf.

I finished my Second Bachelor's Degree in Computer Science this past Spring, and I have decided to embark on the journey of becoming a High School Mathematics Teacher. [...]. I wanted to let you know that my work with the UCI Math Circle Program provided a strong impetus for this decision. Math Circle not only helped to inspire a passion for teaching, but also for Mathematics.

I truly enjoyed working with the students and I was honored to be a small part of this extraordinary program.

[....]



*Students in the math circle practice an exploratory approach to math; this is a technique that is not often used in traditional math courses, but **one that I would like to promote in my own classes** through more thoughtful choices in problem sets and group activities. I would like to continue helping with the math circle for the remainder of my time at UCI, and take the experiences and knowledge I've gained about teaching to **assist with other math outreach programs in the future.***

*Leading these math circle sessions has **helped to improve my mathematical communication ability** with respect to students (especially in the materials preparation and problem development), **as well as my enthusiasm for teaching and working with young people.***



*As a leader of the math circle, it was rewarding to see children who were excited about mathematics and wanted to explore unique concepts not found in their class curriculum. **Having my colleagues assist me in planning and facilitating my activity made me feel like a part of a unified department that wants to make a difference in education.***





*While rewarding, helping is also compelling me to improve my mathematical communication skills. Being able to communicate mathematical ideas effectively and understandably is an invaluable ability. **At Math Circle I get to hone my communications skills in a fun and low-stress environment.***

Overall helping at Math Circle is an enjoyable and rewarding experience, and I know the skills that I am learning from it will benefit my future mathematical career.

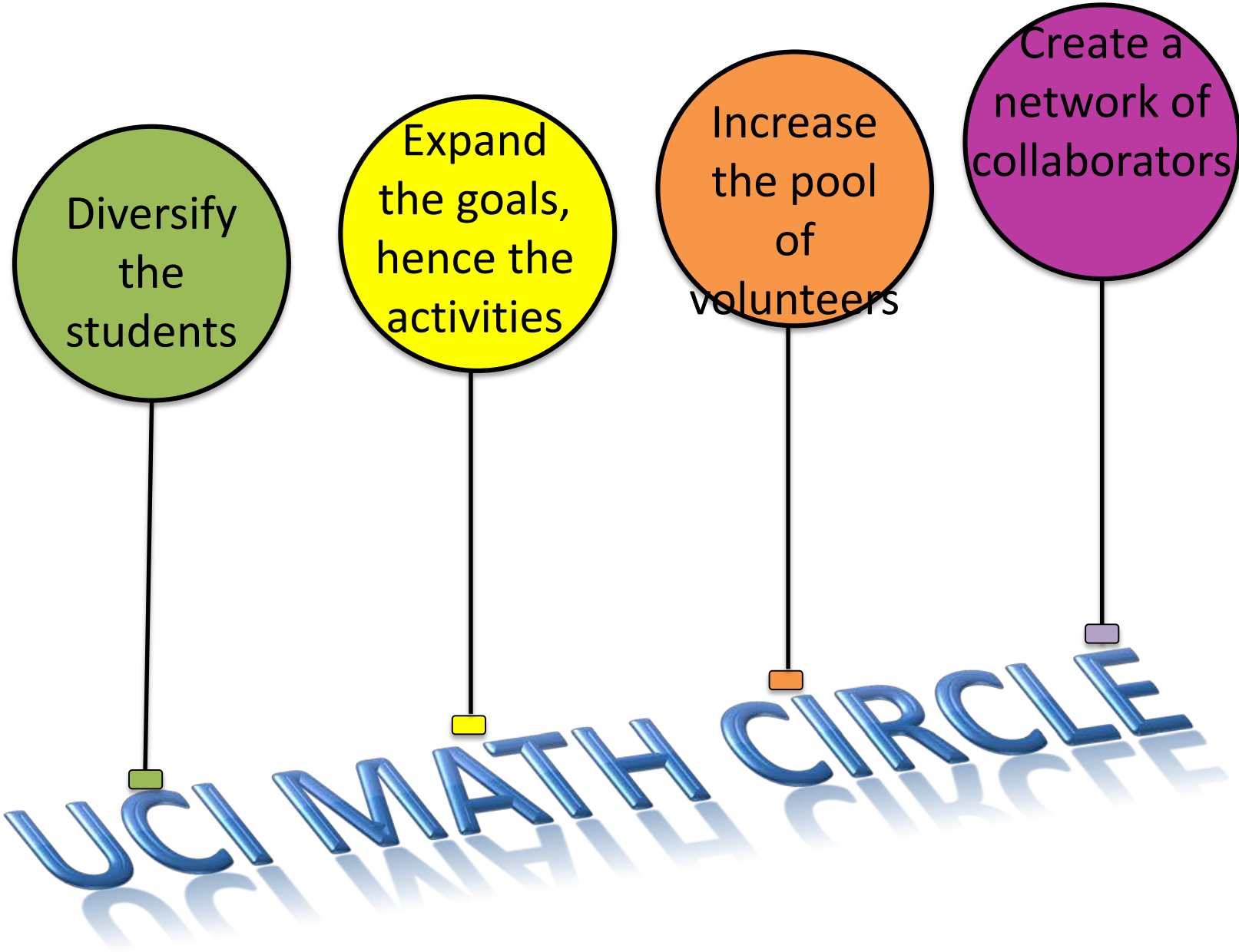
*The UCI Math Circle (UCIMC) has been incredibly advantageous for me. **For students with fellowships who have no Teaching Assistant responsibilities, this is an incredible way for us to stay active in the teaching community. [...]***





HOW CAN WE INCREASE THE IMPACT EVEN MORE?

Bringing our math circle to the next level



Bringing our math circle to the next level



Certain groups (e.g., **young people from low socio-economic backgrounds**) participate in STEM-related activities at a much lower rate than others.

Engaging these groups in math circles and other outreach initiatives can **boost their participation in higher education and in STEM careers.**

Special efforts are needed to recruit these traditionally under-represented students.

UCI MATH CIRCLE

Bringing our math circle to the next level



Diversify
the
students

What worked for us:

- **Specifically target two low-performing schools** in Orange County (90% of students are Latino, 97% are low-income, 47% have parents without a high school degree).
- **Initiate a math enrichment activity directly at the school site**, right at the end of the school day. **Demonstrate success** to teachers, parents and school administrators. **Then “transfer” the initiative to a college campus** for added benefits (to expose disadvantaged students to university life, increase number of volunteers, simplify the logistics for the math circle team).

UCI MATH CIRCLE

Bringing our math circle to the next level

Expand
the goals,
hence the
activities

Beyond traditional scope of increasing critical thinking and mathematical creativity, plan to:

- Introduce students to **STEM careers**
- Instill in students a sense of “**belonging in college**”.

UCI MATH CIRCLE

Bringing our math circle to the next level

Expand
the goals,
hence the
activities

What worked for us:

- **Parental involvement**

Organize workshops to introduce parents to college opportunities for their children: describe available options (community college, state and private universities), explain HS requirements, present financial aid opportunities.

- **Involvement of undergraduate students**

As teachers, role models and mentors for K-12 students. Success stories of college students from under-represented minorities are a source of inspiration and encouragement for parents.

UCI MATH CIRCLE

Bringing our math circle to the next level

Increase
the pool
of
volunteers

Current team of volunteers:

- **Faculty** members
- **Graduate students** (in math, but also computer science)
- **Undergraduate students** (in Math, but also in Education and other majors)
- **Exceptional high school students** (math circle alumni)
- (1) **UCI math alumnus.**

In progress:

- **Corporate sponsors** (from funding corporations)

UCI MATH CIRCLE

Bringing our math circle to the next level

Increase
the pool
of
volunteers

What worked for us:

- **To recruit more undergraduate volunteers:** give students credit for volunteering (weekly) to the math circle, through fieldwork hours or (2) units credits.
- **To recruit better prepared undergraduate volunteers:** Train math majors volunteers on mentoring/teaching techniques and education majors on math content.

UCI MATH CIRCLE

Bringing our math circle to the next level



Create a network of collaborators

Current network of collaborators:

- **UCI Math faculty** (teaching and coordination)
- **UCI Education faculty** (assessment and coordination)
- **UCI Supplemental Instruction coordinator** (training of volunteers)
- **UCI graduate students** (teaching and volunteering)
- **UCI undergraduate students** (volunteering, student workers)
- **UCI (Schools of Physical Sciences Education) development office** (seeking funding from donors and corporations)
- **UCI Office of Admission Financial Aid** (parent workshop)
- **Math teachers** from Santa Ana Unified School District (recruiting students for the program, chaperon kids on buses, training volunteers on middle school math content)

UCI MATH CIRCLE

A team of UCI math faculty & students who put their heart in the program.



Dedicated math teachers from Lathrop and Villa who invests time and energy in our program.

UCI students always ready to volunteer and share (sometimes in Spanish) their math knowledge, and their experience with college.



Amazing parents who chaperone the kids on their bus trips to the UCI math circle.



Spanish-speaking financial counselors from UCI who can advise parents about college admission and available scholarships.



THANK YOU

**THE UCI
MATH CIRCLE**

