Strengthening University Students' Mentoring Practices in a Math Enrichment Program

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Presentation

- Math CEO
- Math CEO Mentoring Context
- Mentor Experiences (Opportunities & Benefits)
- Mentor Experiences (Challenges)
- Mentor Trainings

What is Math *CEO*?

- A Math **C**ommunity **E**ducational **O**utreach Afterschool Program held at the University of the California, Irvine since 2014
  - Expanded to include sessions during school hours and at schools themselves
- Founded & Directed by Alessandra Pantano
- Community-University Collaboration

Mentoring Context

Middle School Students

- ~150 middle school students from underprivileged schools from Santa Ana, California
- 98% Hispanic or Latino and are from low SES backgrounds
- Only 14-18% are proficient or advanced in math

University Mentors

- ~70 university students from UCI
- UCI is a Hispanic Serving Institution
- 60% first-generation college students, 47% from low SES backgrounds
- Most mentors are undergraduate education, math &/or science majors
- ~10% are graduate students
- ~25% are international students

Mentoring Context

Weekly Math Circles
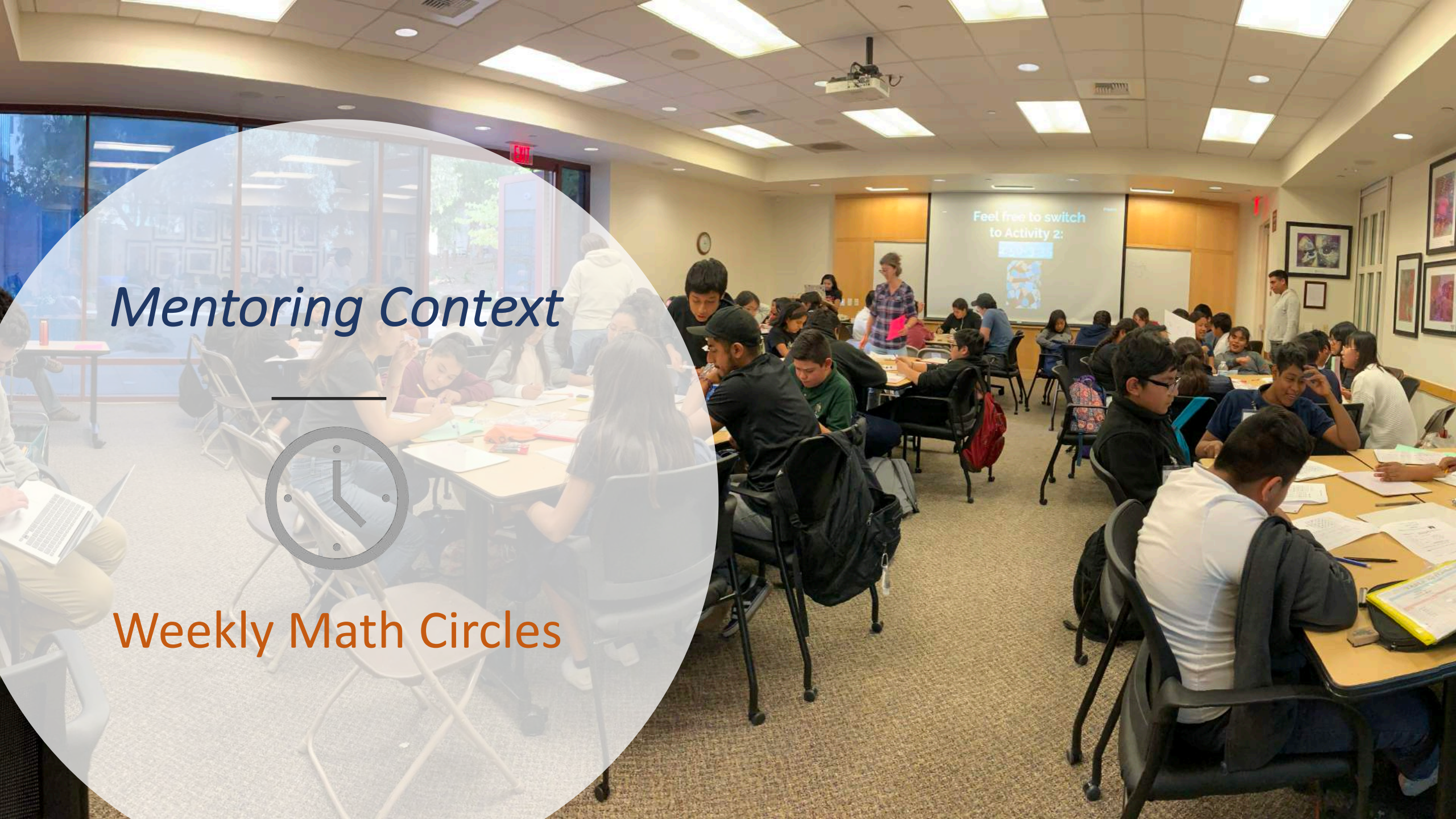
A focus on University Student Mentors' Experiences in Math CEO

Mentor Experiences: *Challenges*

Math Knowledge

Relational Challenges

Teaching Challenges

Program Level Challenges

Time Management

Strengthening Mentoring Practices

Strengthening Mentoring Practices:
Learning and engaging with the Math Curriculum

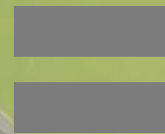Math Knowledge + Relational & Teaching Skills = Effective Mentor

Guided Workshops & Mentoring Tip-sheets

- Weikart Center for Youth Program Quality Guidebooks

- Tips from experienced mentors

Math Knowledge + **Relational & Teaching Skills** = **Effective Mentor**

BUILDING COMMUNITY AT YOUR TABLE

A tip sheet for fostering collaborative learning.

FOUR REASONS

Belonging - fundamental human need. Students who feel like they belong tend to do better   academically.

Group interactions - helps groups get along with one another. Students will become more comfortable working in groups, which fosters a collaborative environment.

Increase in participation and attendance - by increasing sense of community and belonging, students are more likely to contribute into group discussion.

Student learning - When students feel like they belong, they feel safe and are in a good position to learn.

MENTOR INVOLVEMENT AND CONSCIOUSNESS

Being Involved - Participating in the discussions/activities that take place at your table will allow you to monitor emotional climate enable you to be a better contributing entity.

Mindfulness - youth programs tend to have some form of power dynamic, in this case it is between mentees and mentors. This can limit the extent of community, therefore, being mindful of issues surrounding power dynamics and addressing them promotes equal respect and diversity.

Comfort levels - be mindful of the comfort levels of each of the students in the space, including but not limited to things such as identity and language.

STAGES OF GROUP DEVELOPMENT

Forming - people begin familiarizing themselves with one another. Students at your table may focus on what the group is going to be like and the mentor's role is very important in this stage by establishing the table's climate.

Storming - differences amongst members of the table may cause conflict and result in questioning of authority. Mentors should understand that this is normal and won't last forever.

Norming - the table begins to come together. Cohesion and normalization emerge within the group and the various conflicts fade.

Performing - table is cohesive and capable of getting things done.

Adjourning - table ends their time together.

IMPORTANT TAKEAWAYS

- *Strong, welcoming communities* make spaces safer and allows the students who are participating in the program comfortable enough to establish themselves in the space.
- A student's decision to stay or leave the program is oftentimes based on their experiences.
- Conflict is normal, but should be monitored so that it doesn't get out of hand.

TIPS ON INVOLVING ALL THE STUDENTS AT YOUR TABLE

Personal tips from an experienced mentor!

MEET YOUR FELLOW MENTOR: LUCY DOLMADJIAN

Lucy is a fourth-year at UC Irvine pursuing a major in Mathematics and a minor in statistics. Lucy, through her experience as a MathCEO mentor has provided you all with five tips and tricks that she was able to use to navigate the space as a mentor.

LUCY'S TIPS ON STUDENT ENGAGEMENT

1. Call students by their names.
2. Move next to students who are more shy and/or participate less.
3. Keep changing your seat (if there are extra seats, at your table) or walk around moving closer to students who are farther away from you.
4. If students don't know how to begin a problem, ask them to identify the things they know. Or ask them an obvious question that they will know. For example, you can ask about a value that is already given in a problem.
5. If possible, make the problem more relatable by putting it in their perspective. This will help them understand the problem, which will make them more interested in the activity.

GOOD LUCK, MATHCEO MENTORS

IMPORTANCE OF STRUCTURE AND CLEAR LIMITS

Tips for building balance between warmth and expectations.

IMPORTANCE OF STRUCTURE AND CLEAR LIMITS

Structure - framework for a program and what it offers.
Clear limits - established boundaries set and reinforced by mentors, youth, or a partnership between the two.
Structure and Clear limits in youth programs, like MathCEO, lay foundation for a safe environment that supports the success of mentees. This methods looks for balance between warmth and setting expectations, and whenever possible, involved youth input.

BUILDING STRUCTURE

Structure is all about regularity and purpose - As mentors, we want to achieve a program space where things aren't chaotic, but where they're also not completely rigid. To do that, you should:

Establish routines: *When mentees know and can anticipate what's next, it increases feelings of safety and comfort.*
Define Goals/Objectives: *Having defined objects assist youth in staying focused and supports them in building new skills.*
Create a space that works: *Physical structure of the program space is as important as other, less tangible parts of structure.*
Consistently Reinforce the Structure: *All elements of structure should be reinforced and communicated in order to succeed.*

ESTABLISHING CLEAR LIMITS

For youth, part of feeling safe and secure in program spaces is knowing where the boundaries of acceptable behavior along with knowing what is expected of them, in terms of participation, lie.

Set Clear, Positive Guidelines: having parameters to set positively-framed limits should be established (like how to take turns in a large group discussion).
Use Rules to Meet the Needs of Youth: guidelines are useful for setting parameters around different activities. It is important for a few clear, constant rules to be established.

Rules, however, should not change like guidelines, and should mainly focus on maintaining the emotional and physical safety of the space.

Set High Behavioral Expectations: Set youth up for success by setting expectations high for behavior. Communicate these expectations clearly and positively to youth.

KEEPING KIDS FOCUSED AT MATHCEO

Personal tips from an experienced mentor!

MEET YOUR FELLOW MENTOR: LORA WEISS

Lora is a fifth-year PhD student in Applied Mathematics studying Cancer and Stem Cells. This is her second year in MathCEO, and she has been teaching/tutoring/mentoring in various forms for **over ten years**.

LORA'S TIPS ON KEEPING KIDS FOCUSED

1. ***Join the conversation for a minute, don't jump straight back to the math*** – If you ever feel the kids' focus slipping, or if they're doing something else, it can be better to not jump straight back to math. Join the conversation, if it is appropriate, and slowly make your way back to the math problem.
2. ***Be goofy on occasion*** – Being goofy may help students relate to you, which helps them respond to you, even when the conversation is being brought back to math.
3. ***Move around, stand, sit next to them*** – Don't stay in your chair and help different kids. It allows students to engage with you and also take breaks in between tutoring help over the course of the two-hour session.
4. ***Lead up to hard questions with simple questions, one at a time*** -- By using simple questions that students know how to answer, you're encouraging students to make attempts instead of giving up.
5. ***You v. Them Scenarios*** – Don't tell students that they're wrong. Instead, ask challenge them with different scenarios so that they can catch the mistakes they're making. These students are competitive and will respond to different scenarios that challenge them and each other.

PROMOTING ACTIVE LEARNING AT MATH CEO

What is active learning?

Active learning occurs when students actively process, rather than passively receive information. As a mentor, you can promote Active Learning by providing content that is challenging, meaningful, and focused on skill building.

SIX STEPS TO PROMOTE ACTIVE LEARNING

1. Provide stimulating activities
- Tailor the weekly Math CEO curriculum, activities and materials based on your students' interests, ambitions, and ideas.

2. Provide appropriate challenges
- This means providing your students with challenges that requires effort but remains attainable for them to complete successfully.

3. Engineer success and allow for mistakes
- It is important for your students to believe that you believe that they can succeed and solve problems.
- However, as mentors, you should provide opportunities for your students to reflect on and learn from their mistakes that can naturally occur in activities.

4. Ask a lot of questions
- Asking your students questions can help you to adjust the challenge level and can promote processing of new information.

5. Participate alongside youth
- Working alongside your students and carefully monitoring their participation can allow you to get to know them as individuals.
- The personal relationships that you develop with your students can lead to a better understanding of the right amount of guidance and challenges to provide.

6. Promote learning connections
- Make connections between real experiences and abstract concepts.
- Doing so can help your students apply a specific experience/problem to a broader context.

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scaffolding material for students, and helping them solve problems without revealing the answers.

Tips from an Experienced Math CEO mentor!
David Wych is a PhD student in Pharmaceutical Sciences. He performs simulations of proteins and small molecules, with a focus on drug design and protein structure and dynamics. He has been teaching for five years, in undergraduate resource centers, one-on-one tutoring jobs, and in TA jobs for UCI classes, and has been with Math CEO for a year.
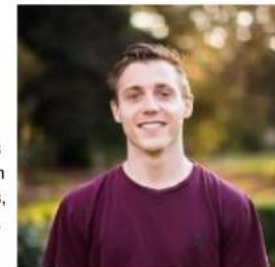
1. Forget What You Know
When we graduate from understanding a topic mechanistically to understanding it intuitively, we often forget the steps that got us there. Even worse, we're often taught shortcuts that help us use the things we've been taught, skipping over the intuitive understanding altogether. This does not make for good pedagogy, at any level.

For example, all of us know that when you add two fractions, you do not simply add the numerators and add the denominators to get the resulting fraction — but why can't you do this? And how did you learn this? Were you just told that's the way it's supposed to be?

2. Focus on the Journey, not the Destination
Teaching is a lot like performance. You need to hold the students attention, and engage them in the topic you're trying to teach, not simply get to the final product. If getting to the end of a performance was the only thing that mattered, all music would be performed as quickly as possible.

Instead, in the performing arts, we understand that the important thing is the journey not the destination. We forget the plots of movies and tv shows that bore us. In teaching, the idea is the same. Students will not remember how to solve problems if we don't make the journey we take to solve the problem engaging and memorable.

3. Ask the Follow-up Question
Often students will know how to solve problems, but they won't know how, or why they know what to do. For example, students may know that 0.5 is the same as 50%, or 0.3 is the same as 30%, but if you ask them why this is the case, they may blank on the answer. It's important to ask the follow up question ("Why is 0.5 the same as 50%") because they will develop a better understanding themselves, and the other students at the table will be able to learn along with them. You can even ask then other students if they have their own way of understanding why this is true: e.g. "0.5 is 1/2 and 1/2 of 100 is 50", or "0.5 is the same as 0.50 which is 50 hundredths, and 50 hundredths is 50 out of a hundred, or 50 "per" "cent"", etc.).

4. Let the High-achievers Teach
It's pretty common to have one student that has a much better understanding than the other students in your group, There are many ways to deal with this situation, but often, what we end up doing is either: (1) letting the high achiever answer all of our questions, and move on, or (2) block the high achiever from answering further questions, and fielding questions to the other students in the group. Option (1) doesn't engage the other students in the group, and option (2) doesn't engage the high-achiever.

A better solution is to have the high-achieving student teach the rest of the group. First, the high achievers are closer to the other students' level of understanding than we are, so they have a better reference frame for teaching the others than we do. Second, this is better because it lets the students learn from one of their peers, rather than feeling like the lessons are being broadcast from on high. Third, and most importantly, letting the high achievers teach often it uncovers gaps in the high-achiever's understanding that allow them to grow, and allows the other students to learn along with them.
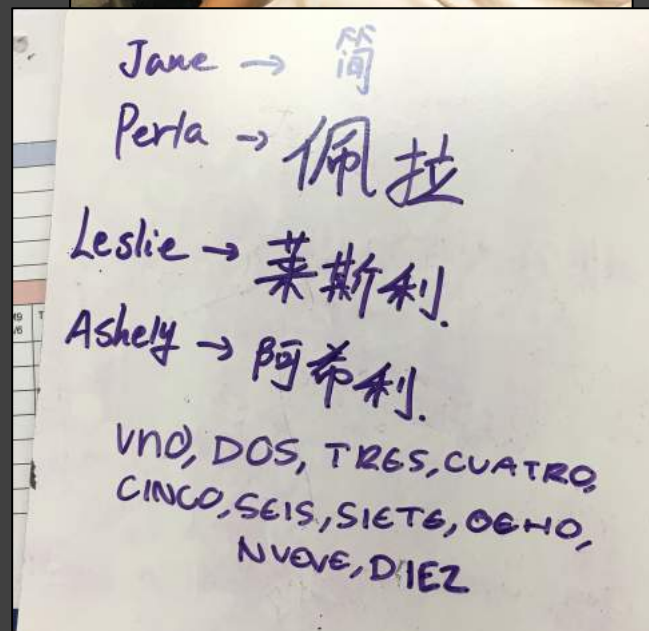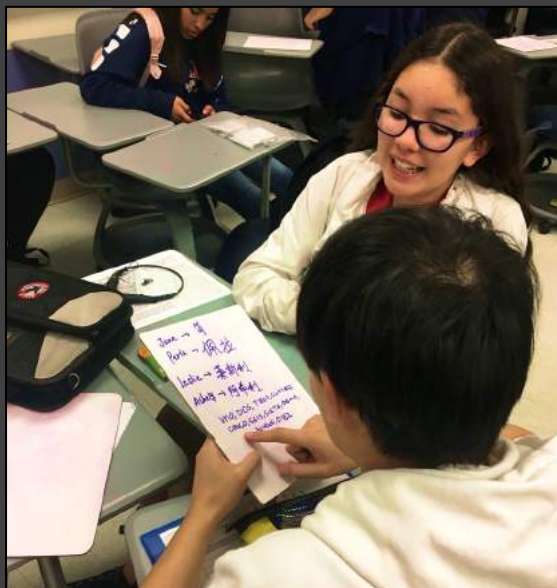
Community Building

Strengthening Mentoring Practices

Intergenerational opportunities at Math CEO

Relationships are the most important ingredient

Evaluation & Training as a process

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