Parallel Sessions:2018.02.22.1015.

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Speaker's Name:

Moderators:
- Aditya Adiredja, University of Arizona
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Talk Title:

Parallel Sessions on Challenging the System We Are Part of

Date:	02/22/2018	**Time**:	10:45 - Noon	am

Materials:

- Detailed notes from Notetaker (pdf)

List 6-12 key words for the talk:

Equity, Challenge, Discussion, Gatekeeper, Gateway

Please summarize the lecture in 5 or fewer sentences:

We are thinking about how to challenge the system we are part of, assuming that the math education system that we are part of is currently inequitable. What are the values and aspects of mathematics as an institution that serve as a gatekeeper?

This group discussion will share these thoughts and stories to document our values, our supports, and our obstacles to find commonalities across stories and experiences.

Discussion Activity

Plan: We are thinking about how to challenge the system we are part of, assuming that the math education system that we are part of is currently inequitable. What are the values and aspects of mathematics as an institution that serve as a gatekeeper?

Quick Pole/ Room Distribution:

- Working with undergraduate and graduate students - stay in the room
- Working in K-12 settings (including teacher educators) - go to the boardroom.

Now - You have 5 minutes to write down your own personal mathematical journey - 5 minutes of quiet individual work.

Reminder of the the expectations for group discussion

Introduction to the **Discussion Questions:**

1. What social, structural/institutional, and individual forces have helped you to be successful in your experience of learning mathematics?
2. What social, structural/institutional, and individual forces have served as obstacles in your experience with learning mathematics?
3. What values of the mathematics community resonate with you and that you uphold in your professional work? What values of the mathematics community are you troubled by and are possible sites for changes in your professional work.

- You have 2 minutes to reflect on this individually.

Get into groups of 4

- Now use the 2 minutes to each share uninterrupted.
- Now have a 5 minute discussion in your group.
- Check in with the others in your group - are you able to share stories? As we move into the whole group discussion then we want to be respectful of other people's stories.

Whole Group discussion

We want to now document the values - ways we have been supported and that we have faced obstacles in hopes that we can we find common themes.

Several of us shared something that we noticed about **obstacles** - if someone tells you can't do something, oh yeah watch me! That might not be the best part of personality but it is the part of personality to get others who might be outsider into mathematics.
Mathematics, especially at higher ed, has a narrowness to it. If you are a part of it you are cultivated and if you aren't it can be really hard to get into it. Looking at my group, Dave was the child of two PhD holders and it was something he was exposed to and it was natural for him to go on. However Ryan this wasn't something aware of that until later in life. So raising visibility and making them aware of opportunities

available to them, getting them involved in the mathematics community is really important.

Ari: I was planning to do this in regards to seeing how what was said resonates with other groups - how many other groups heard similar stories, or that that resonated with you personally?

1. **Theme: Proving people wrong - I need to show you that you are wrong** (most of room raised their hands)
2. **Theme: Math as narrow community where you belong with it or you don't** (most of room raised their hands)

Theme: **Math as a solitary endeavor is an obstacle**
Pure math there is a hierarchy of "good research" and others had experience where applied/interdisciplinary math is much more collaborative and much more open. There is a hierarchy, the intent is to work alone and that is an obstacle in mathematics.

In my own experience, I was fortunate enough to go to undergrad and grad community that had a solid inclusive community and I know for a fact that made a difference in my ability to graduate.

Theme: Representation matter.
I want to comment of the first two comments. Well you told me I can't do it and now I will, watch me. You can have that attitude if you have seen people like you do it. If you are constantly getting the picture that people like you aren't doing this and then someone tells you that you can't then you believe them. The idea of representation is HUGE. You can for a moment think that you can but it takes calming the demons that you don't do.

Ari - This is why we ask about social, structural/institution and INDIVIDUAL. You can say, "I'm going to prove you wrong", but what are the other aspects of the experience that influence that determination. How do personal experience fit with different students that experience the world very differently.

Theme: Mentors and representation at every stage

Even very young, building confidence. People that pick you out and having people that tell you can when you are questioning that. Having people in your life that are there at that time, someone you knew who knew your abilities made a big difference.

Institutional/structural things: having communities in place. I was lucky to be at grad school where there were structures where everyone worked together and wanted you to be successful. Wasn't isolating - people had somewhere to go when they were having ties of struggle.

My comment stretches across comments that came previously. In my own lifetime: low income, first generation, single parent, no one liked math, where are the opportunities to find people to help her? My mom had to go out of her way to find those opportunities. They were not just immediate there to put me in. So, for example, a math/science magnet high school where I had to bus an hour and half every day for 4 years to go to to school. I had gone to all black K-12 schools. For college I wanted

something different, it wasn't what I expected and it wasn't a good transition to get there. She was smart enough to get there but then there was questions about the programs to get there and stay there. I didn't find a community in the mathematic department, I found in at different communities (like MSRI-UP). Looking back, no one in my dept that looked like me and encouraged me to go to PhD. There was no one saying it to me that this was an option. Classmates were pursuing those options so someone was telling them. I graduated from Virginia Tech - ninth women to get math degree. No one told me. There was definite stereotype threat. I am happy where I am now but looking at other students going through this, how can we break those down to make sure the students feel resilient and make sure they feel like they belong.

Would like to respond - there is a mismatch, it's great to have mentors and have representation to give the idea. It takes the other side, to have instructors have a broader idea of who can do it. My parents did find mentors for me but I needed more. No one ever asked me to demonstrate my ability or go beyond. I was the kid in back and I was invisible. I was overlooked. During exam days I would dress as a woman (in heels, dress, makeup) so someone would notice me and say, wow! There is a women that can do math.

I was struck by these questions, my response was I didn't see much personally for obstacles and didn't see much need for help. In recognizing/reflecting further how invisible the supports are, what the nature of those very invisible supports are in telling the picture. I wanted to add that to the conversation.

Ari - What was the **invisible support**?

Hard to speak to speak to very directly. My work has opened this up to me. I study teaching in classroom, seeing the ways in which mathematical practices are communicated in classroom,looking at tasks and what is mathematical justification. Tasks are given those messages and support if they're part of the culture- if it's not made explicit then other people aren't sure they know what they're supposed to be doing. That is one kind of form it takes. I think almost anything (social/etc) we can look at each of these to see how this playing out.

Ari- The comments others have made so far show that some of the invisible support isn't there

Comment - Perhaps the invisible support is **finding people's passion**. If not given opportunity to find ways to being excited then you. This is a gatekeeper to developing mathematical passion because you first need to develop mathematical know how and then you can find the passion.

The other thing that came up in our group is the **cultural, social, and other roots that are common to the US.** I was Argenian and been away for 20 years and when I was there I didn't find the cultural and social barriers I've seen here. I was blind to them when I came here and it took me awhile to see them. In math there isn't research money for the very few - not highly looked after because as a profession there is not much access to money. Male - become a doctor or lawyer, access to money. In Argentine more access to women in academia because of these cultural

and social barriers

It is not surprising that Question (3) is our focus so far, we have stories fighting against obstacles. Obstacles and hierarchy is something that challenged our mathematical culture. I am working to remove the mathematics from the critique of us as people in mathematics.

The other thing is, t**he story about invisibility brings me to tears.** That is our fault, we need to change our practices so that no one in invisible. If we are seeking to change the obstacles then we are in the system. We are here to talk about how we can disrupt the system. Every day we don't do that we are continue to do the norm we uphold the people being invisible. Over the last 10 years I have been upholding the white males in my math classroom. The work to disrupt that is me saying that in front of you all, over and over and over again. Over the last several years I have been working to make invisible students visible.

We have a lot of work to do. It starts by looking in the mirror saying I'm great but I can be better. I need to make sure everyone who surrounds me sees that and does better too.

Economic burden to being a mathematician.

There is a certain amount of flexibility, economic wise, if you want to study math.
I learned this while I was trying to run a summer program but need to go work jobs over the summer because they were going to be homeless. Some students would miss to go to a foodbank, to have food for that week to eat. This is the level of burden on students, especially socioeconomically disadvantaged for students. Look at students off to college, lump school schedule to come in minimum days to work concrete hours. How do we begin to work and talk about that issue? That is the entire institution but it is much more burden to math because you need to put in reps/ work hours to be a mathematician. You need to put in hours every week to do the homework! Can't just do the essay at the end of the quarter.

Reflecting on all this I've been moved by the stories that I've been hearing. I benefit from a lifetime of white privilege but I've always been uncomfortable by, using Dany's language, mathematics to be a white institutional space. Un particular transphobia, cis heteronormativity, and tons of institutional racism and oppression. I find it important for me personally to be in places where we can build community to identify these things that so often go un-discussed and find ways to work towards dismantling them.

I had to go pretty far back because I'm already at retiring age. I went back to middle school and went back to when I moved from Northern idaho to Oakland. When I got to Oakland I wanted to be a teacher. My counselor steered me away, I had taken Geometry and then they made me repeat because there wasn't room in the next class. I had to work through high school.

An outside group helped me apply for college (LA Casa), my school had given me no information. As a teacher, what opened my eyes and changed my way of being taught

mathematics, I had a great memory and knew how to do all those things but I had no understanding of why we did those things, it was all procedure. I went to MSRI and worked over the summer with other teachers and developed a passion and love for math. It changed my whole of mathematics. My students did better the next year, scoring highest in mathematics compared to any other classroom. T**he passion was the key and I don't see it.** Now I'm a math couch and I see that not enough teachers have the passion. The students pick it up.

My students say, "You want to know what we're thinking. What the process is going to be, not just the answer."

I also have seen that a lot of kids that can't do one thing are left behind. I had a student that couldn't do algebra. We have different intelligence and we need to acknowledge that they have other areas of mathematics where they can keep going on.

A lot of teachers don't like math, they struggle in math, and they don't have the passion and the students pick it up. Learning to love the math - treating that as an algorithm.

My son is now getting a PhD in math and my daughter is a math coach - we need to do that passion. The passion has taught me to enroll in many things.

Don't want to downplay to the structural/institutional problems that fully exist. I also want to challenge us to not think these are monolithic and that all places have these challenges. When I thought about (1) - what structural things have been successful, how much people in broader society values mathematics. There is a sense that mathematics is really important. How can we harness that? Mathematics is a thing to use to move on. Take what people are doing creatively to challenge these structural/ cultural things and move on.

Connecting things -**importance of mentorship and gender/racial/economic issues. I connected these together, when you are mentoring someone it's important to take that into account.** Your students might be struggling with so many things.
At the level of graduate of school there is so much **dehumanized mentorship.**
How is math going? You try to talk about these institutional issues…. Ok great, how is math going? This is something I experienced. I was talking to my pure math advisor. I shared with them that I personally have this health issue, I feel better but I'm not ok. My advisor's response was, "ok, what are you plans". I'm trying to say that I'm better but I'm not ok, He said, "I hear that ok, what are you plans?"

This is something the math community has to change.

That is what we are going to talk for the rest of the conference - we're going to talk about the human aspect of mathematics. Math isn't just about the thinking itself. We're dealing with human beings. We've heard stories of race, gender, health. How do we think of our students as humans? How do we think about ourselves as educators of human beings and mathematics?