



Welcome!

- **Please keep your microphone muted!**
 - Unless the speaker asks you to unmute.
- **Chat box:** Comment, chat with other participants, ask questions, ... you know chat.
- **Video:** Be mindful that everyone can see your video unless you choose to stop
- **Disabled:** Share screen and record



Welcome

- A recording will be available on www.nctm.org/100
- A link to a certificate will be provided in the chat box toward the end of the webinar. It will not be emailed.
- Follow us on Twitter @NCTM @todosmath and share your thoughts about tonight's webinar using the hashtag #NCTM100
- Continue the conversation after the session on my.nctm.org



Translanguaging to Persevere: Exploring Latinx Bilingual Students' Collective Problem-Solving

Hector Morales, Jr. - Northeastern Illinois University

Joseph DiNapoli - Montclair State University

Craig Willey - Indiana University-Purdue University, Indianapolis





Overview of Workshop

- We will:
 - Explore the collaborative efforts of Latinx students drawing on their bilingualism
 - Share vignettes, artifacts, mathematical activity
 - Engage participants in analysis and discussion to inform ways of leveraging translanguaging to persevere in mathematics classrooms



Preliminary thoughts...

- How might your conception of language influence your mathematics pedagogy with bilingual students?
- How does a mathematics classroom that encourages students to utilize all of their linguistic resources look and sound?

You can post your responses in the Zoom chat!



What is translanguaging?

- More than just code-switching between English and Spanish; complex and interrelated communicative practice that make up bilinguals linguistic repertoire (Cenoz, 2017)
 - Using language, body, multimodal resources, tools, and artifacts in a dynamically entangled, interconnected, and coordinated way to make meaning (Garcia, 2017)
 - Reconceptualizes bilingualism as a liberating and empowering communicative practice capable of transforming mathematics learning



Context 1: Digital Story

Context: one cohort of ~20 children in an after-school math club that privileged Spanish as a means to promote bilingualism/biliteracy.

Mathematics in the Community Project:

- Identified diverse sites of mathematical practices in the community (e.g. firehouse, mechanic, travel agency, florist)
- Arranged site visits
- Student prepared interview questions
- Disposable cameras to take pictures of the site



Discussion Question to Consider

As you watch the digital story, make note of the ways Ramiro is translanguaging.

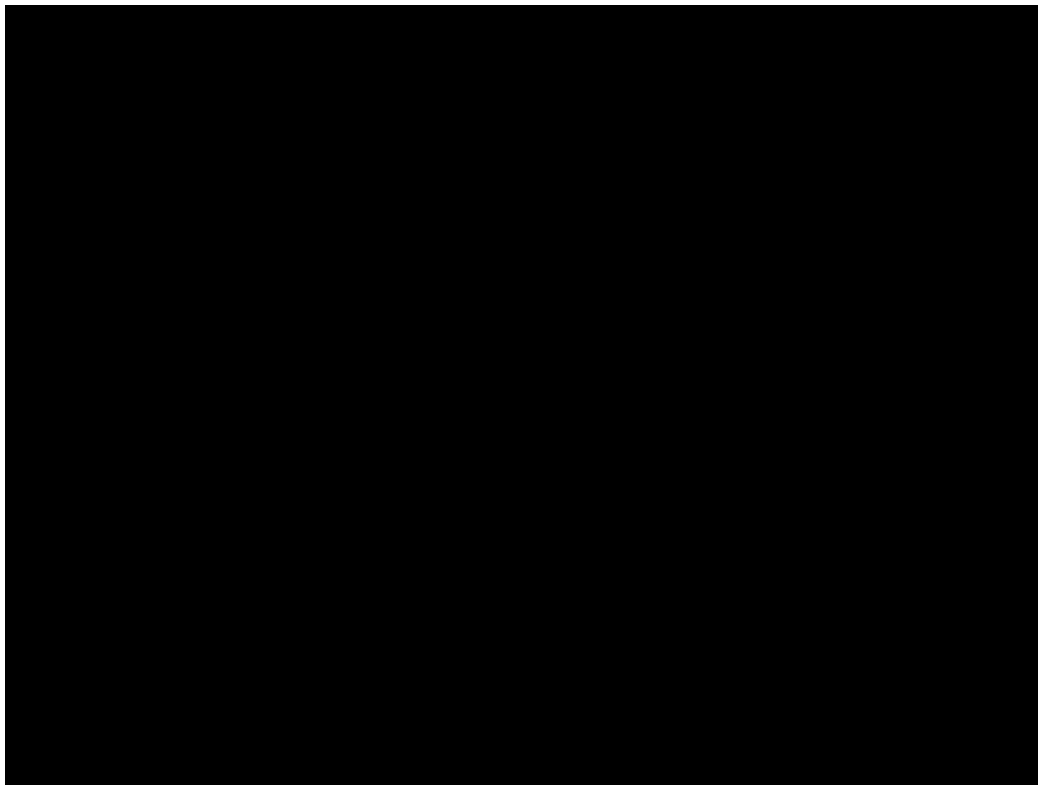
- How might Ramiro be developing an identity as a successful math doer?
- How does Ramiro use language(s) to do math and communicate mathematically?

You'll get a chance to discuss this in your Breakout Rooms!

Also, feel free to jot down your observations in the chat!



Ramiro



Discussion Question to Consider



After watching the digital story and engaging with the transcript:

- How might Ramiro be developing an identity as a successful math doer?
- How does Ramiro use language(s) to do math and communicate mathematically?
- What is the role of culture, community, and language in Ramiro's mathematical identity formation?
- How are these dimensions/dynamics representative of translanguaging?

You'll get a chance to discuss this in your Breakout Rooms (8 min)!

You can post a summary of your discussion in the chat once we return to the full group. Raise your hand if you'd like to speak!



Context 1: Conclusions

- Ramiro fluidly draws on his languages (bilingualism) to problem solve and communicate mathematically.
 - Not necessarily code-switching
- Place-based mathematics provided an opportunity for Ramiro to develop his mathematical imagination.
 - Broaden what constitutes as mathematical activity



Context 2: Collective Problem-Solving

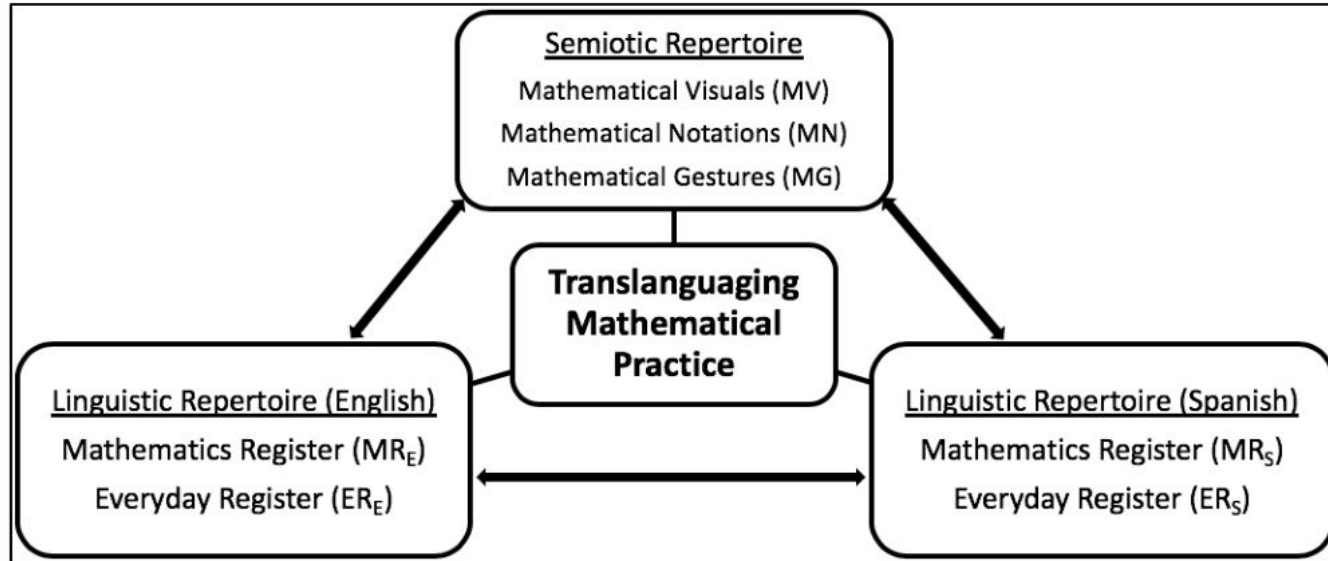
Our aim: capture the ways in which Latinx bilingual students draw on translanguaging to help naturally persevere

- Reveals details about students' identities as bilingual mathematics learners, especially when perseverance is spontaneous

Context: IMP Year 4 classroom, urban HS, 80%+ Latinx student population, English-speaking teacher

- Case study of Carina, Jessica, Elena, and Ines' engagement with a function analysis task
- The group had shown evidence of understanding the goal of the task, but did not know immediately how to solve it.

Translanguaging Mathematical Practice





Mathematical Task

Function Analysis Task

Select a specific function from a past unit.

1. Describe the problem context in which the function was used, and explain what the input and the output for the function represent in terms of the problem context.
2. Describe how the function was helpful to you in solving the central unit problem or some other problem in the unit.
3. If possible, determine what family the function is from.

IMP Year 4

Alice's height changes when she eats the cake. Assume as before that her height doubles for each ounce she eats.

- a. Find out what Alice's height is multiplied by when she eats 1, 2, 3, 4, 5, or 6 ounces of cake.
- b. Make a graph of this information.

IMP Year 2



How is perseverance relevant?

Translanguaging practice may help nurture, support, and facilitate perseverance in problem solving for Latinx bilingual students.

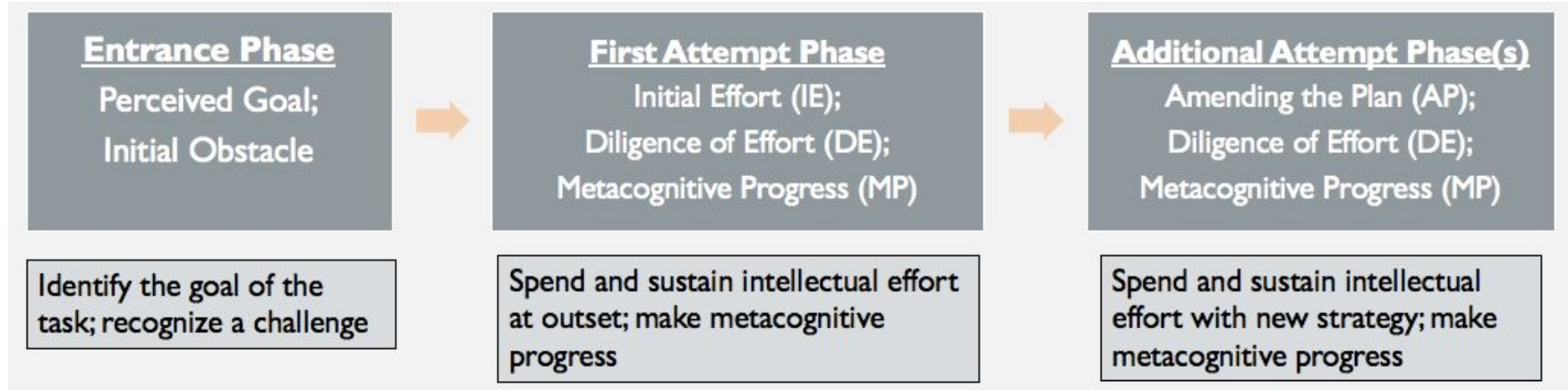
- Draw on fluid linguistic repertoires and be an agent of their own engagement (de los Rios & Seltzer, 2017)
- Autonomously engage with inviting yet complex tasks (Aguirre et al., 2012; DiNapoli, 2016)
- Leveraging bilingualism to help coordinate meaning-making actions (Driscoll, Heck, & Malzhan, 2012)

Perseverance can be especially important for learning mathematics conceptually -- students make meaning by productively struggling with ideas that are not immediately clear (Hiebert & Grouws, 2007).



Three-Phase Perseverance Framework

Perseverance is initiating and sustaining in-the-moment productive struggle in the face of one or more obstacles, setbacks, or discouragements (DiNapoli, 2018).



Classroom Episodes





Discussion Question to Consider

As you read through the following vignette, what do you notice about how this group of Latinx students draw on their bilingualism as they work on the mathematical task?

You'll get a chance to discuss this in your Breakout Rooms!

Also, feel free to jot down your observations in the chat!

Transcript

English Translation

JESSICA: ¿Qué era la primera, se hace así? If [Alice] eats one ounce, that means that she grows twice, dos ¿qué? **Double, no double, two... See, so when two is four, and then three is six, and four is eight, y así, y así vamos hacer la graph. Going like that (gesturing), para arriba. You get it?**

What was the first one, do you do it like this? If [Alice] eats one ounce, that means that she grows twice, two what? Double, no double, two... See, so when two is four, and then three is six, and four is eight, like this, and this is how we are going to make the graph. Going like that (gesturing), up. You get it?

ELENA: Um hmm. Pero, how do we times it?

Um, hmm. But how do we times it?

JESSICA: Porque mira, two, times two. Well no... Double it by, nomas double the number of ounces, so if she takes...

Because look, two, times two. Well no... Double it by, just double the number of ounces, so if she takes...

ELENA: **Two times two, y luego four times two, y luego six times two, is that what you are saying?**

Two times two, and then four times two, and then six times two, is that what you are saying?

JESSICA: Más o menos como sumando el mismo número.

More or less like adding the same number.

CARINA: Pero **es lo mismo de sumando si lo multiplicas por dos.**

But it is the same as adding if you multiply by two.

INES: Lo que parece es como hicimos un in/out table y ya lo sacamos [Referencing past work].

It looks like we just did an in/out table and that's it [Referencing past work].

CARINA: Yeah. **In times two equal out... ¿Ya no tenemos que hacer su altura?**

$$\text{In} \times 2 = \text{Out}$$

In	x	1	2	3	4	5	6	7	8	9	10
Out	y	2	4	6	8	10	12	14	16	18	20

Yeah. **In times two equal out... We don't have to use her height?**

Transcript

English Translation

INES: Empezamos de cuatro pies. Si toma si come un pedacito son ocho, si come un pedacito son dieciseis, el tercer pedazo dieciseis y dieciseis. Treintaidos ¿no?

We start at four feet. If she drinks, if she eats one piece it becomes eight, if she eats one piece it becomes sixteen, the third piece, sixteen and sixteen, thirty two, no?

JESSICA: Pero, ¿cómo sacastes eso?

But how did you get that?

INES: Porque si empezamos con cuatro pies, como yo les digo, si come un pedacito y sale, aumenta de altura de doble.

Because, if we start at four feet, like I'm telling you, if she eats one piece and it comes out to, her height grows double.

JESSICA: Ohh, her height doubles.

Ohh, her height doubles.

ELENA: You know it's the same thing mira. Dos, you multiply one times two is two, two times four is eight, y si pones two times two is four, four times four is sixteen.

You know it's the same thing look. Two, you multiply one times two is two, two times four is eight, and if you put two times two is four, four times four is sixteen.

CARINA: In squared times 2 is equal to your out (creates new table).

In squared times 2 is equal to your out (creates new table).

Starting at 4 feet						
$In^2 \cdot 2 = Out = Y = X^2 \cdot 2$						
In	1	2	3	4	5	6
Out	8ft	16ft	32ft	64ft	128ft	256ft

CARINA: Mira, la pongo en la calculadora y luego pido la Table y me da otra answer de lo que nosotros tenemos aquí (shows calculator table).

Look, I put it in the calculator and then I push Table and it gives me a different answer from the one we have here (shows calculator table).

JESSICA: Entonces lo hicimos mal... pero esto el OUT tiene que ser así (points at earlier written table).

Well then we did it wrong...but this the OUT has to be like this (points at earlier written table).

X	Y_1
0	0
1	2
2	8
3	18
4	32
5	50
6	72
$Y_1 = 2 \times X^2$	

JESSICA: Porque también el zero tiene que ser el cuatro, In tiene que ser cero y luego el out tiene que ser cuatro. Así tiene que ser. Y primero el zero cuatro uno ocho dos dieciseis.

Well the zero has to be four, IN has to be zero and then the OUT has to be four. That's how it has to be. And, first, the zero four, one eight, two sixteen.

ELENA: Sólo si tenemos que cambiar el fórmula, el equation, ¿no?

The only thing we have to change is the formula, the equation, no?



Discussion Question to Consider

After engaging with the previous vignette, what did you notice about how this group of Latinx students drew on their bilingualism as they worked on the mathematical task?

You'll get a chance to discuss this in your Breakout Rooms (8 min)!

You can post a summary of your discussion in the chat once we return to the full group. Raise your hand if you'd like to speak!

Our Observations and Analysis



The group had shown evidence of understanding the goal of the Alice task, but did not know immediately how to solve it.

- Demonstrated broad range of linguistic features via translanguaging
 - Linguistic repertoire (Spanish), linguistic repertoire (English), semiotic repertoire
- Passed through Entrance Phase, into First Attempt Phase of Perseverance
 - Exploring what it means to double across representations, recognizing mistakes

The group then questioned their initial strategy and began to amend their plan.

- Demonstrated broad range of linguistic features via translanguaging
 - Linguistic repertoire (Spanish), linguistic repertoire (English), semiotic repertoire
- Moved into Additional Attempt Phase of Perseverance
 - Changing strategies to include Alice's initial height, exploring how her height changes across representations

Context 2: Conclusions



This group's spontaneous translanguaging played a central role in their meaning-making around exponential functions.

- Contrary evidence for the deficit misconception of Latinx bilinguals (Garcia, 2009; Willey, Gatz, & Flessner, 2017)

Encouraging/rehumanizing outcomes:

- Perseverance itself, assertion of bilingual identity, sense of empowerment of doers of mathematics, naturalistic agents of own learning (Gutierrez, 2017)

Cannot rely on spontaneous translanguaging – need a support system in place

- “All teachers, whether bilingual or monolingual, are capable of having a translanguaging stance and are able to design translanguaging instruction” (Garcia, 2017, p. 262).



Final Discussion Questions

Now think about your own classroom contexts:

- How does a mathematics classroom that encourages students to utilize all of their linguistic resources look and sound?
- How do you plan for a pedagogy that helps bilingual students capitalize on their languages?
- How do you co-construct a translanguaging classroom if you don't share the children's language(s)?



Implications and Next Steps

Implications for Teacher Dispositions

- Translanguaging is about an appreciation for the resources - particularly the linguistic resources - children come with.

Implications for Math Pedagogy

- Students do not distinctively draw on one language for certain purposes, and another language for other purposes, but rather draw on a collective linguistic repertoire/reservoir.

Implications for Assessment

- Thinking innovatively about assessment - drawing on multimodalities - will help us broaden the way in which we elicit students' knowledge.

Implications for Practice within Diverse Policy Contexts

- We recognize restrictive policy contexts and a shortage of resources depicting translanguaging; teachers in multilingual classrooms can proactively seek support.



Q&A

What other questions/comments do you have? Feel free to post questions in the chat or raise your hand if you'd like to speak.



Thank you!

Feel free to contact us at:

Hector Morales, Jr. at h-morales3@neiu.edu

Joseph DiNapoli at dinapolij@montclair.edu

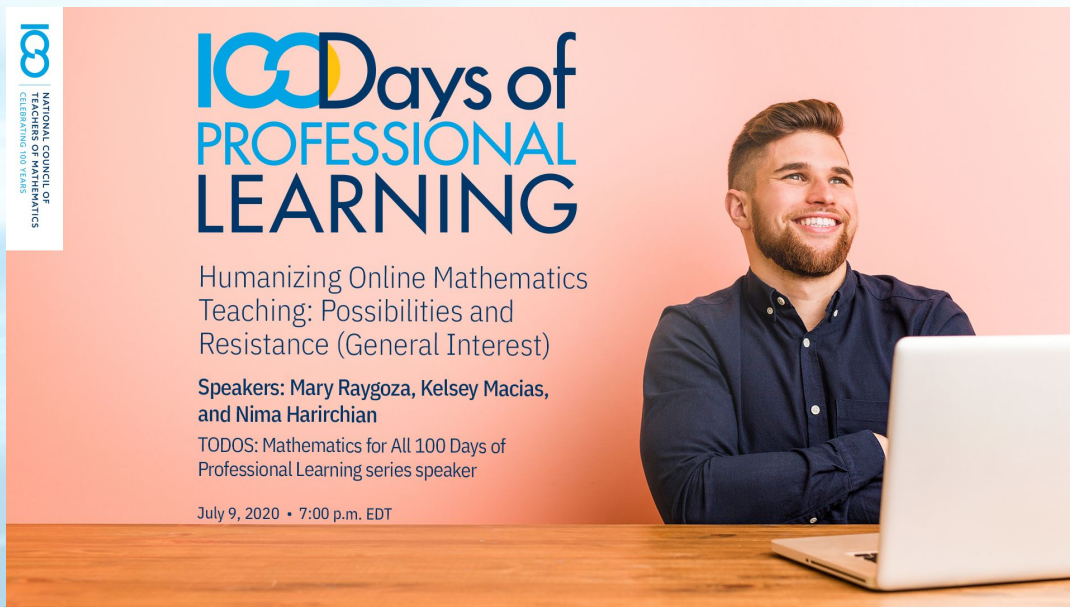
Craig Willey at cjwilley@iupui.edu



NATIONAL COUNCIL OF
TEACHERS OF MATHEMATICS
CELEBRATING 100 YEARS

Thanks!

The next webinar will be...

A promotional poster for a webinar. On the left, a vertical banner contains the '100' logo and the text 'NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS CELEBRATING 100 YEARS'. The main title '100 Days of PROFESSIONAL LEARNING' is prominently displayed in blue and black. Below the title, the topic 'Humanizing Online Mathematics Teaching: Possibilities and Resistance (General Interest)' is listed, followed by the speakers 'Mary Raygoza, Kelsey Macias, and Nima Harirchian'. A note mentions 'TODOS: Mathematics for All 100 Days of Professional Learning series speaker'. The date and time 'July 9, 2020 • 7:00 p.m. EDT' are at the bottom left. On the right, a man with a beard, wearing a dark blue shirt, is smiling and looking at a laptop on a wooden desk. The background of the poster is a solid light orange color.

100 Days of
PROFESSIONAL
LEARNING

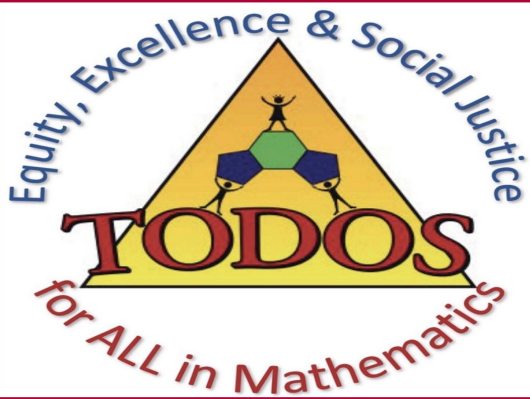
Humanizing Online Mathematics
Teaching: Possibilities and
Resistance (General Interest)

Speakers: Mary Raygoza, Kelsey Macias,
and Nima Harirchian

TODOS: Mathematics for All 100 Days of
Professional Learning series speaker

July 9, 2020 • 7:00 p.m. EDT

www.nctm.org/100



Announcing Our New Position Statement

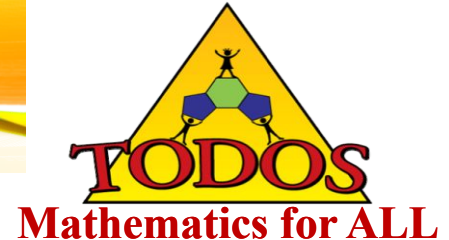
***The Mo(ve)ment to Prioritize
Antiracist Mathematics:
Planning for This and Every School Year***

Become a TODOS Member Today!

\$35 per year or \$100 for three

Reduced rates available for pre-service teachers
and institutional memberships

<https://www.todos-math.org/join-todos->



YOU ARE INVITED to a **FREE** Webinar

Friday, July 10

1 pm EDT/ 10 am PDT

Register at:
www.todos-math.org

PANELISTS

Margarita Barraza

Marian Dingle

Linda Fulmore

Rochelle Gutiérrez

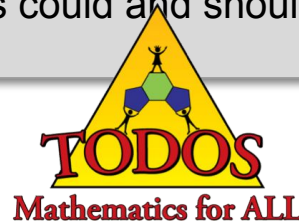
Lisett Sierra

Moderated by: Luz Maldonado Rodríguez

The Changing Landscape of Mathematics Education

In light of current health and social issues, five panelists representing various positions across the United States in mathematics education will share their reflections and ideas on:

- **Priorities** for mathematics teaching and learning in the fall and in the long term
- **Actions** mathematics educators could and should be taking





SAVE THE DATES!

June 28 - 30, 2021

TODOS Preconference and Conference

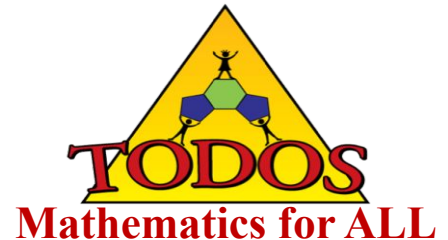
For preK-12 teachers, parents, coaches;
college and university faculty and
administrators

K-16 Topics

Equity ✚ Identity ✚ Agency ✚ Access

✚ Antiracism in Mathematics ✚

and more





NCTM Membership

- A community to help you grow, thrive and contribute
- Resources to prepare you for all situations
- Journal content created by teachers to enrich your teaching practice

Join now at nctm.org/join and get \$20 off Premium Membership

Renew at nctm.org/renew and get \$20 off any renewal



Reminder

- A recording will be available on www.nctm.org/100
- A link to a certificate will be provided in the chat box toward the end of the webinar. It will not be emailed.
- Follow us on Twitter @NCTM @todosmath and share your thoughts about tonight's webinar using the hashtag #NCTM100
- Continue the conversation after the session on my.nctm.org