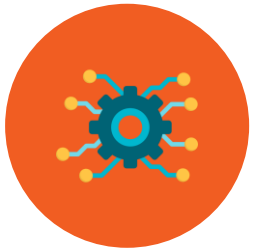
Beyond the Numbers: Shaping Student Success through Math Narratives

Day 2

Agenda

Welcome and Framing



Connector

Math Narratives

Closing

Icons: www.flaticon.com

Your Feedback

Your feedback is important to us!

Designed by Freepik.com

Pulse Check Results

Pulse Check Results

What feedback can you give us to help us improve tomorrow's sessions?

Check in with what people have done in this area already

Excellent

Provide a break for check in, if we were not able to check in earlier. Also more time to talk.

Too much getting up and walking around. Less of that.

Nothing!

Same

A few more minutes to share out from more participants.

Everything is great! Thanks for everything.

All good

Today was wonderful, the more movement, the better

Temperature control potentially but more ways to get involved and grants that may be available.

Give us enough time to speak as a table so everyone has time to share.

Pulse Check Results

What feedback can you give us to help us improve tomorrow's sessions?

Nothing! I loved this!

None.

Sometimes, we might need a bit more time when sharing out at our tables. We learn so much from each other.

Today's model was great...unless you're an introvert.

None at this time

Today was great! I am looking forward to tomorrow.

Not sure

If we can be encouraged to meet different people throughout the day, I believe this will encourage more interaction among participants.

No suggestions at this time. A great afternoon of connection and learning!

None

A repeat of today allowing interaction would be great. Please note that there are alot of talkers/reflecters in this group lol we may need additional time when we popcorn answers

Pulse Check Results

What feedback can you give us to help us improve tomorrow's sessions?

Day 1 was good. Good pacing and info. Tomorrow I would like to learn more about who we are in the room with, is list of attendees? I wonder who has a similar role as me for future collaboration & netw

Please allow additional share out time, we are talkers/reflecters.....we like the interaction

N/A

Perhaps we change groups/tables more. I still haven't met everyone.

No e

Breaks are important health foods also help the concentration fruits vegetables and water

I don't have any suggestions as of now because today's session helped to truly open up the mind in terms of our own math narrative to lead to figuring out the root of our students narratives.

I think there might be better ways to share results from discussions. Like most groups, when asking for volunteers, there tends to be the same people volunteering. Maybe a online submission?

N/A

Learning Objectives

1. Examine our own math identity
2. Define math narratives
3. Apply math narratives in secondary math classrooms to enhance student engagement and academic success using Mixed Reality Simulation
4. Explore how this observation tool can assess and strengthen the use of math narratives in secondary math classrooms
5. Apply the observational tool by analyzing real classroom footage to identify effective instructional strategies using the Teacher Video Library

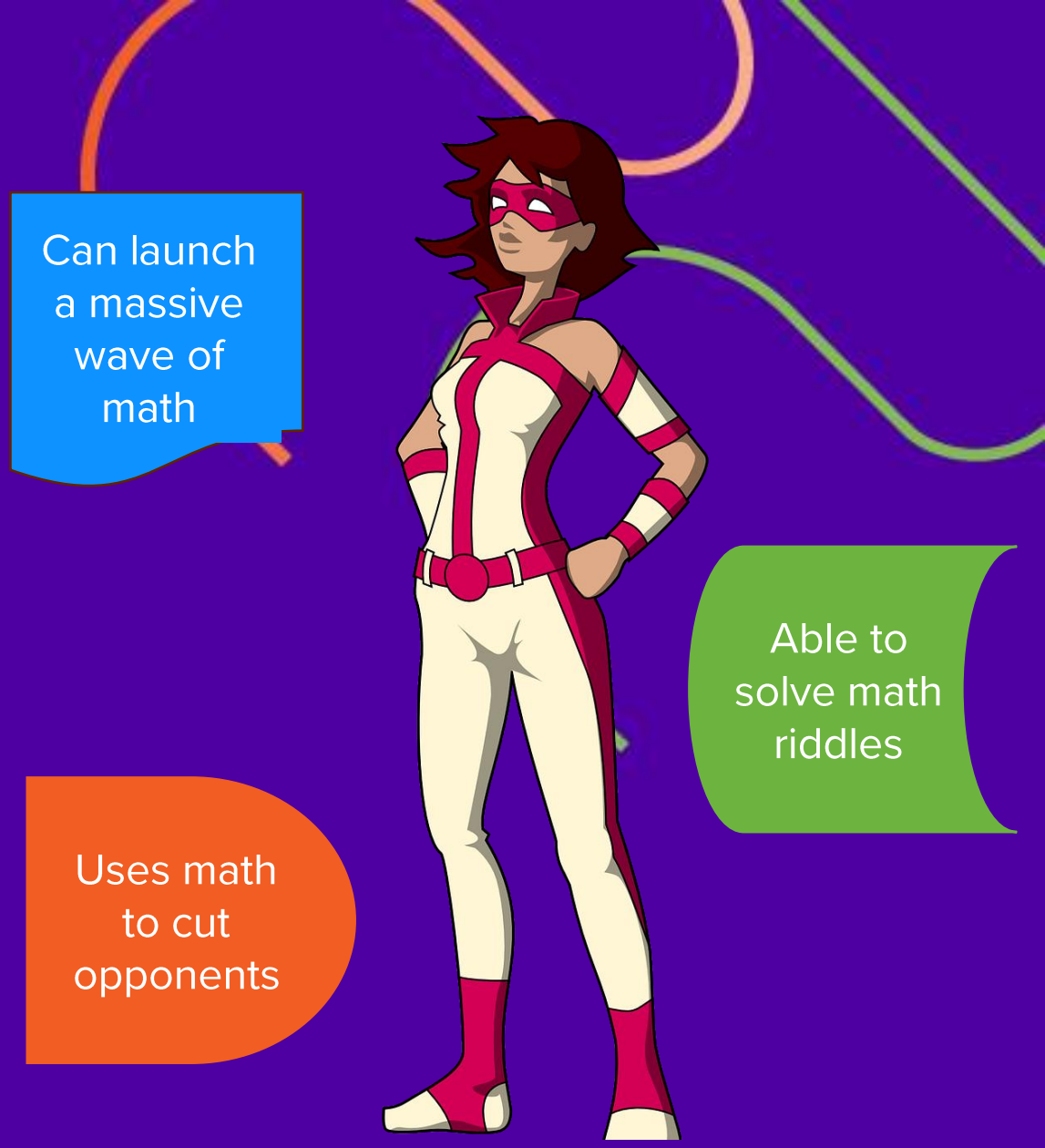
Math Superhero

Envision your Math Superhero identity

Use the materials provided to create a superhero cape that illustrates your identity

Get creative and be ready to share with others

Wear your cape proudly and remember that YOU are a Math Superhero!




Picture
Time

Share Out

Other Super Powers

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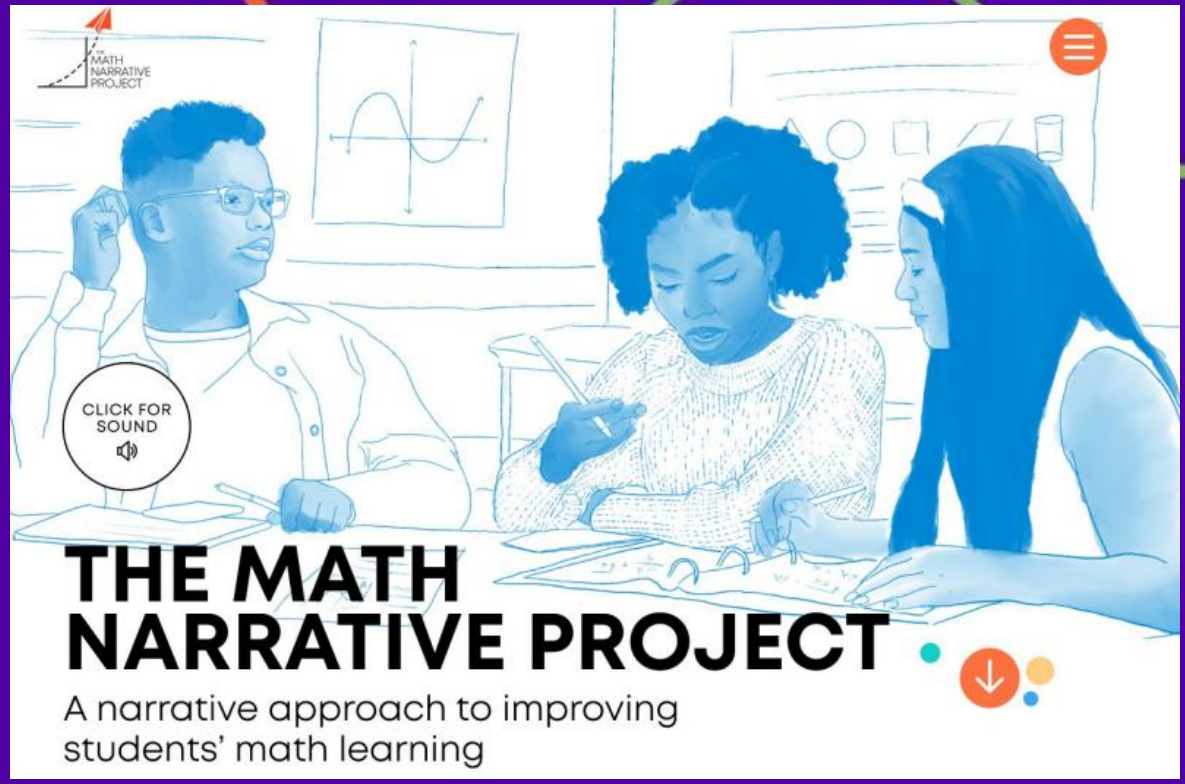
Math Narratives

Math Narratives

Cultural narratives about learning math that impact how students see themselves, their abilities, and their potential.



Impact of Teacher Messaging on Students

Students' math experiences are greatly impacted by…

- Quality of their relationship with math teachers
- Classroom environment established by each teacher
- Teachers' comments and behaviors that reflect their belief in students' ability to learn math
- Teachers' reactions to students' mistakes or questions
- How teachers convey the relevance and usefulness of advanced math

Research Audiences

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Students

- Black and Hispanic all incomes; AAPI and white, lower-income
- 6th to 10th grade, attending public school

Parents

- Black and Hispanic all incomes; AAPI and white, lower-income
- At least one child in 6th to 10th grade attending public school

Math Teachers

- Black, Hispanic, AAPI, and white, all incomes
- Teaching math to 6th to 10th grade students in public schools serving primarily lower-income communities

Gates Foundation

GOODWIN SIMON STRATEGIC RESEARCH

wonder strategies for good

Findings

Many students believe...

- Most adults rarely use higher-level math
- Advanced math is only useful for STEM or technical careers
- Mistakes or slow understanding mean they're "not good at math“
- Asking questions feels embarrassing
- Struggling with math is viewed as proof they lack talent
- Belief that if they're not good at math now, they never will be

Many parents believe...

- Basic math is useful, but most people don't use higher-level math like algebra
- Many adults get by without advanced math
- Some are naturally good at math; some are not
- They should help with math, but often believe they can't
- When their child struggles with math, they assume the child just isn't good at it

,

Our Focus

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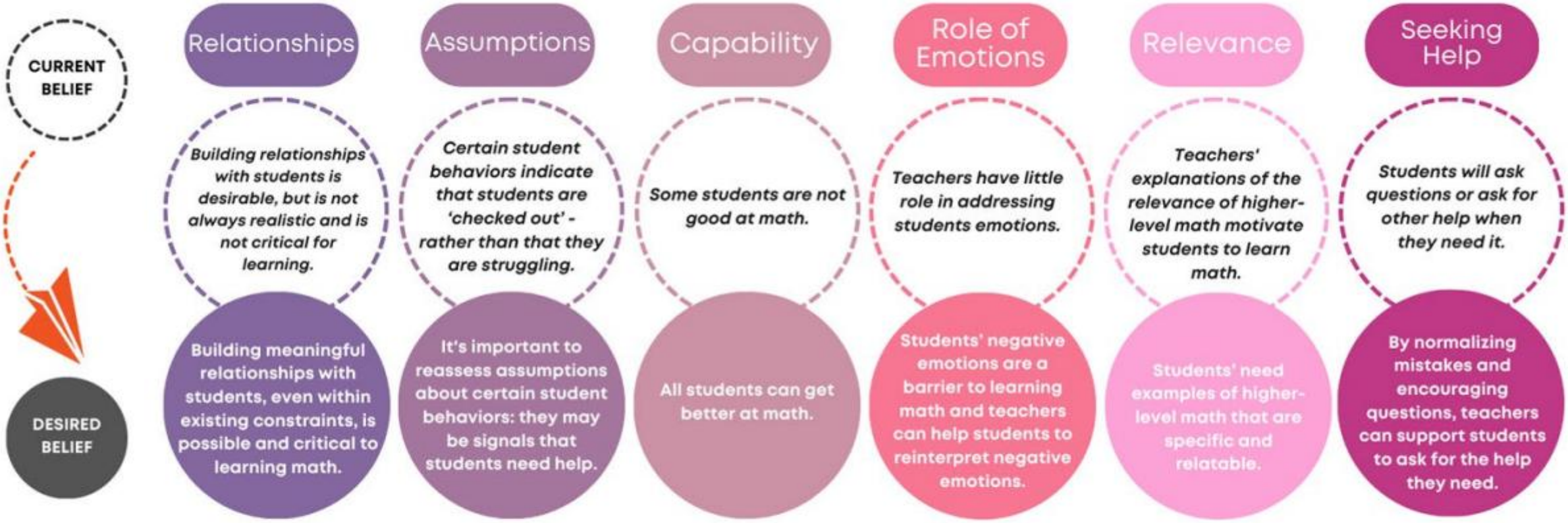
Many teachers believe...

- Students' emotions are unrelated to math learning
- It's the student's responsibility to ask for help
- Some students are seen as simply unable to grasp higher-level math
- While they value relationships and classroom belonging, external pressures often make it hard to prioritize them
- To manage diverse student needs, teachers often focus on those who show effort

Break Time!

Belief Pathway: Teacher



Teacher Emotions

Teaching math is emotional for teachers. Many of these emotions are positive, but negative emotions can interfere with teachers' capacity to help students learn math.

Gallery Walk

https://www.freepik.com

Share Out

Surprise!

BranchED Tradition

- Poetry Slam
- Battle of the Bands
- Math Superheroes
- Children’s Books
- It’s All About the Data
- EBP Cheers
- Songs of the Summit: AI Edition

IT WAS A DARK AND STORMY NIGHT

Lunch Time!

From Paper to Practice

Mixed Reality Simulation

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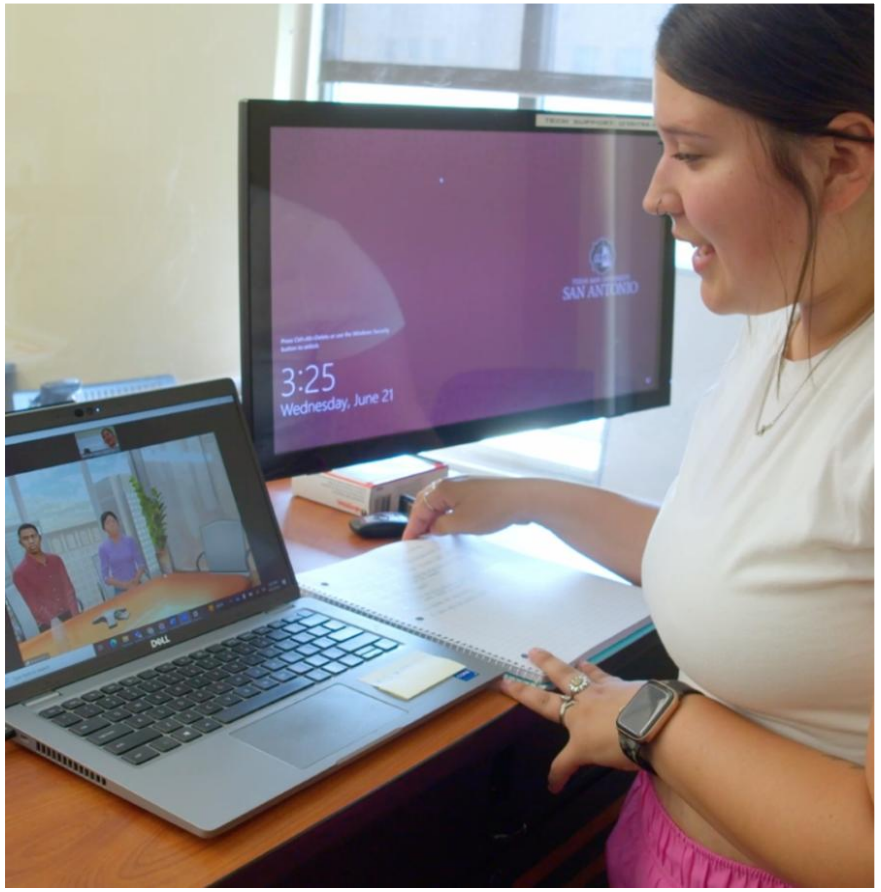
Facilitates Learner Development through Purposeful Practice

- Allow individuals to develop new skills in an environment that does not put others or relationships at risk
- “Human in the Loop paradigm”
- Real time interactions

(Brown, 1999; Dieker et al., 2014)



Unique Blend of Human and Artificial Intelligence

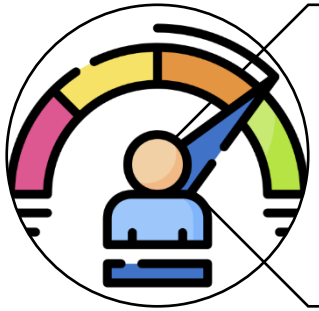
- Artificial intelligence allows a simulation specialist to control single or multiple avatars: **“Human in the Loop paradigm”**
- Machine learning used to **classify learner’s** simulation **performance**
- Learners can **personalize** the learning challenge in **real time**

Research

(Aresti-Bartolome & Garcia-Zapirain, 2014; Maas & Hughes 2020)

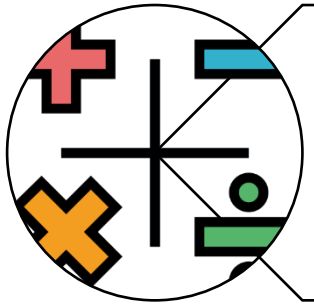
Learners can change people skills behaviors after **engaging in as few as four 10-minute MRS sessions.**

Improvements in practice **transferred** to the workplace.

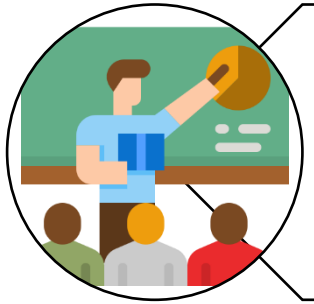


Compared to colleagues who received online instruction on the same content, MRS participants **significantly outperformed** their colleagues on all targeted measures.

Research



Three hours of MRS experiences develops pre-service teachers' self-efficacy beliefs in teaching mathematics just as much as **three weeks of training** with real students and significantly more than teaching colleagues during a seminar.



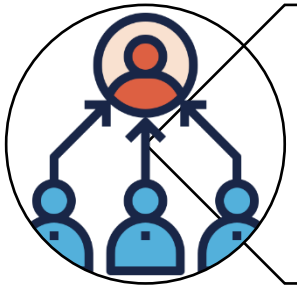
Teacher candidates (TCs) improved delivery of specific praise, which **generalized** to the classroom after engagement with MRS.

Simulations are **more effective** than other instructional methods, because they **engage participants emotional and cognitive processes simultaneously**.

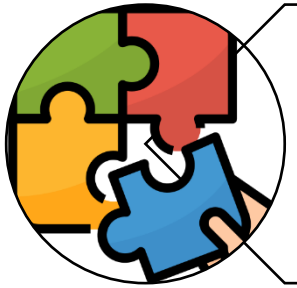
(Samuelson, Samuelson, & Thorsten, 2021; Dawson & Lignugaris/Kraft, 2017; DeBorst & DeGelder, 2015)

Research

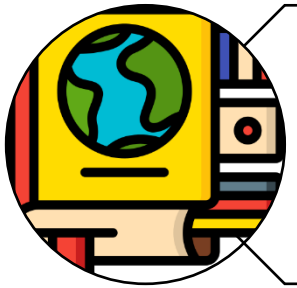
(Aresti-Bartolome & Garcia-Zapirain, 2014; Maas & Hughes 2020)



90% of participants agreed the avatars **accurately represented** the kinds of people that exist in the real world.

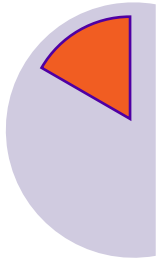


Some evidence of its success in **teaching behavioral skills** to children with autism spectrum disorder



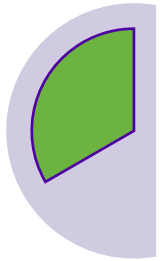
Have been used to **enhance students' learning and engagement** in the sciences and English as a second language

Levels of Behavior



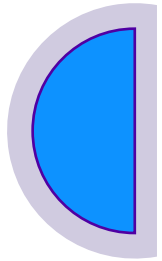
Low:

- Suited for introductory classroom
- Confidence building sessions or content delivery and error correction strategies.
- Exhibit mostly on task behavior with some fidgeting



Medium:

- Suited to practice classroom management and content delivery in a moderately challenging environment.
- A variety of student reactions to content and participant pacing and pedagogy with moderately paced off task behavior.
- Exhibit side talking, use of cell phones and potential power struggles that can escalate in intensity based on strategies used by the participant.
- Escalation will abate with use of effective strategies



High:

- Suited for preparation for challenging classroom settings and application of behavior management and de-escalation strategies.
- May include bullying behavior, power struggles, swearing and potential direct attack of the teacher if outlined in the scenario design
- Exhibit off task behavior and aggressive interaction at a rapid pace.

Your Turn

Purposeful Purpose that Makes an Impact

Narrative Recommendations Focus

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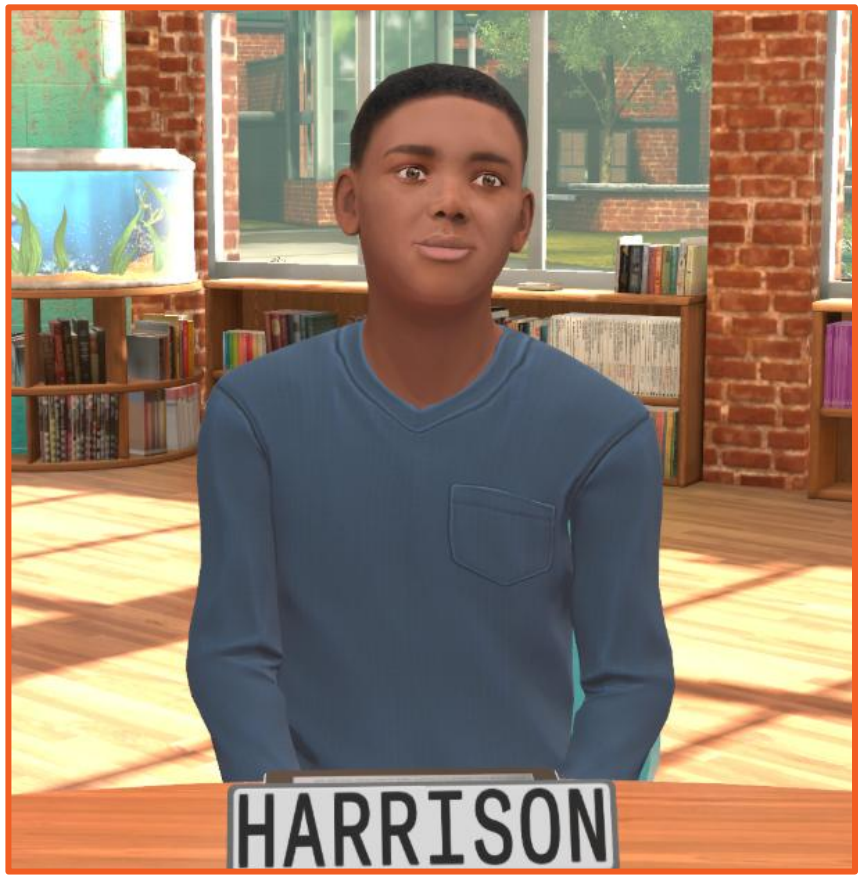
Math Narrative Recommendation	Description
Make Math Relevant	Deliver credible and motivational messaging on the relevance, value, and utility of higher-level math for students' lives, desired careers, and futures.
Affirm the Value of Mistakes	Normalize making mistakes as an important and valuable part of learning, including learning math.
Encourage Help Seeking	Build student confidence to seek the help they need to learn math and equip parents and teachers with messaging that supports and encourages students to seek help.

Making Math Relevant



You are a middle school math teacher working one-on-one with Harrison, a 6th grader who usually finds confidence in math because reading is more challenging for him due to his reading disability. During your session, Harrison begins to show frustration as he works through practice problems. Finally, he asks quietly, “Why do I need to know this anyway? I won’t use it after I graduate.”

Your objective: The goal is to make the problem relevant to the student’s life.

Debrief

Affirm the Value of Mistakes

You are a middle school math teacher reflecting on your lesson from the previous day. During that class, one of your students, Jasmine, was solving a math problem at the board and made a mistake. You praised her effort and pointed out that mistakes help everyone see different ways of thinking. Jasmine smiled slightly, but when you corrected her work, she quietly nodded and returned to her seat. On the way back, another student, Dev, remarked that she “never pays attention,” and a few students chuckled. Jasmine kept her head down when she reached her desk and did not participate for the rest of the lesson.

Your objective: Normalize making mistakes as an important and valuable part of learning.

Debrief

Encourage Help Seeking

You are a high school teacher who is reviewing your exit ticket data and reflecting on your lesson. You notice that over 90% of your students answered 4 of the 5 exit ticket questions incorrectly. You being to reflect on your lesson. During the part of the lesson where you showed students how to solve the problem, you asked" Are there any questions?" but only one student asked a question. As you reflect deeper you wonder if students are not comfortable asking questions in your class.

Your objective: Create an open dialogue about the value of asking questions if you don't understand.

Debrief

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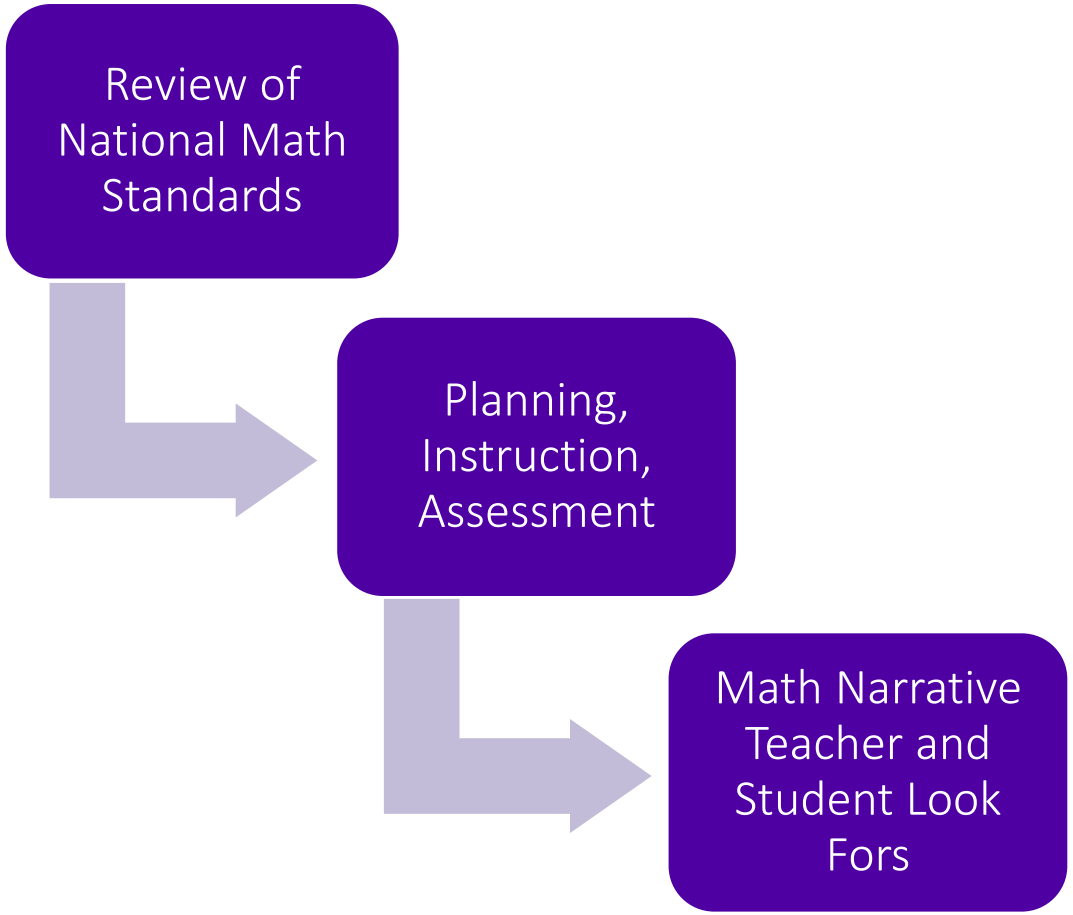
Observational Tool



POP Cycle

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Pre Observation

Self-Efficacy Tool: Teachers assess their confidence in their own mathematical abilities, beliefs and their ability to teach math.

Reflection Template: Asks teachers to share an example of what these practices look like in their classroom.

Pre Observational Planning Instructional Tool: Examine their use of math narratives in the classroom, teaching practices, and student engagement.

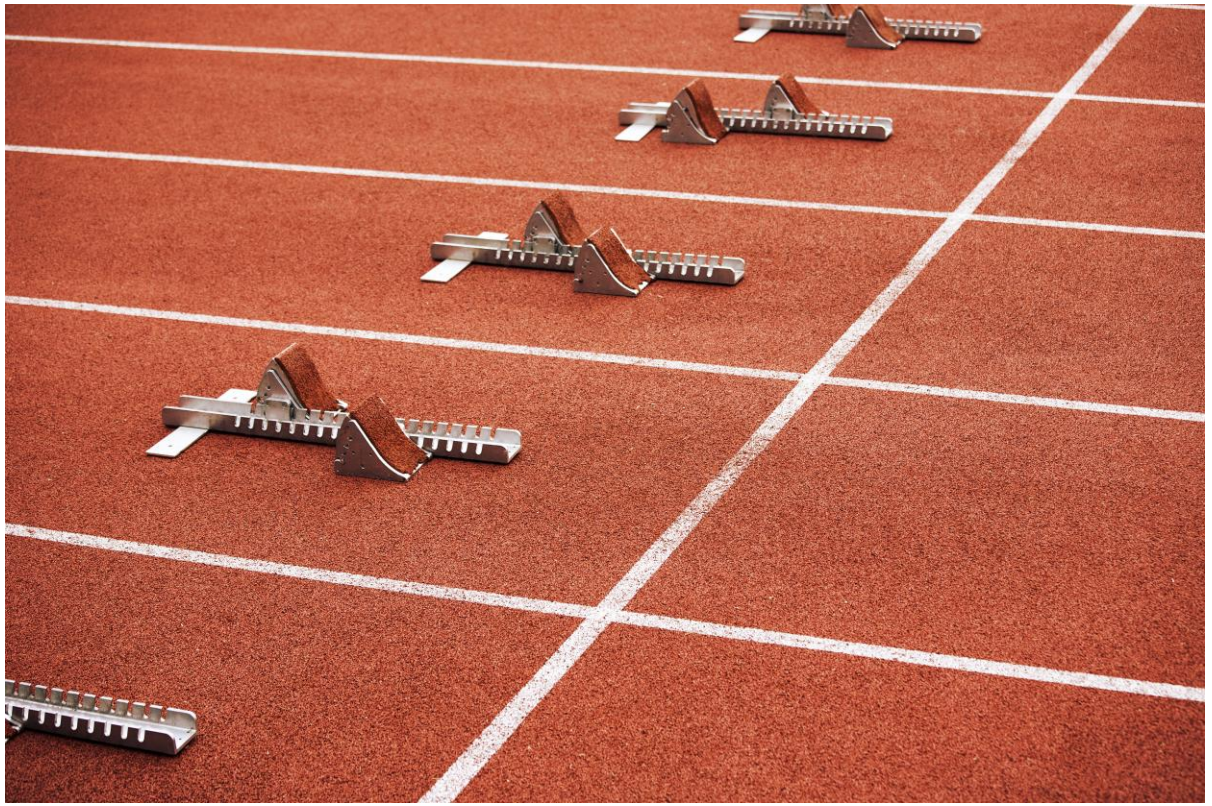
Observation

Observational Tool: Provides a framework for teacher educators/district administration to observe and analyze teaching practices, student engagement, and the effectiveness of math narratives in the classroom.

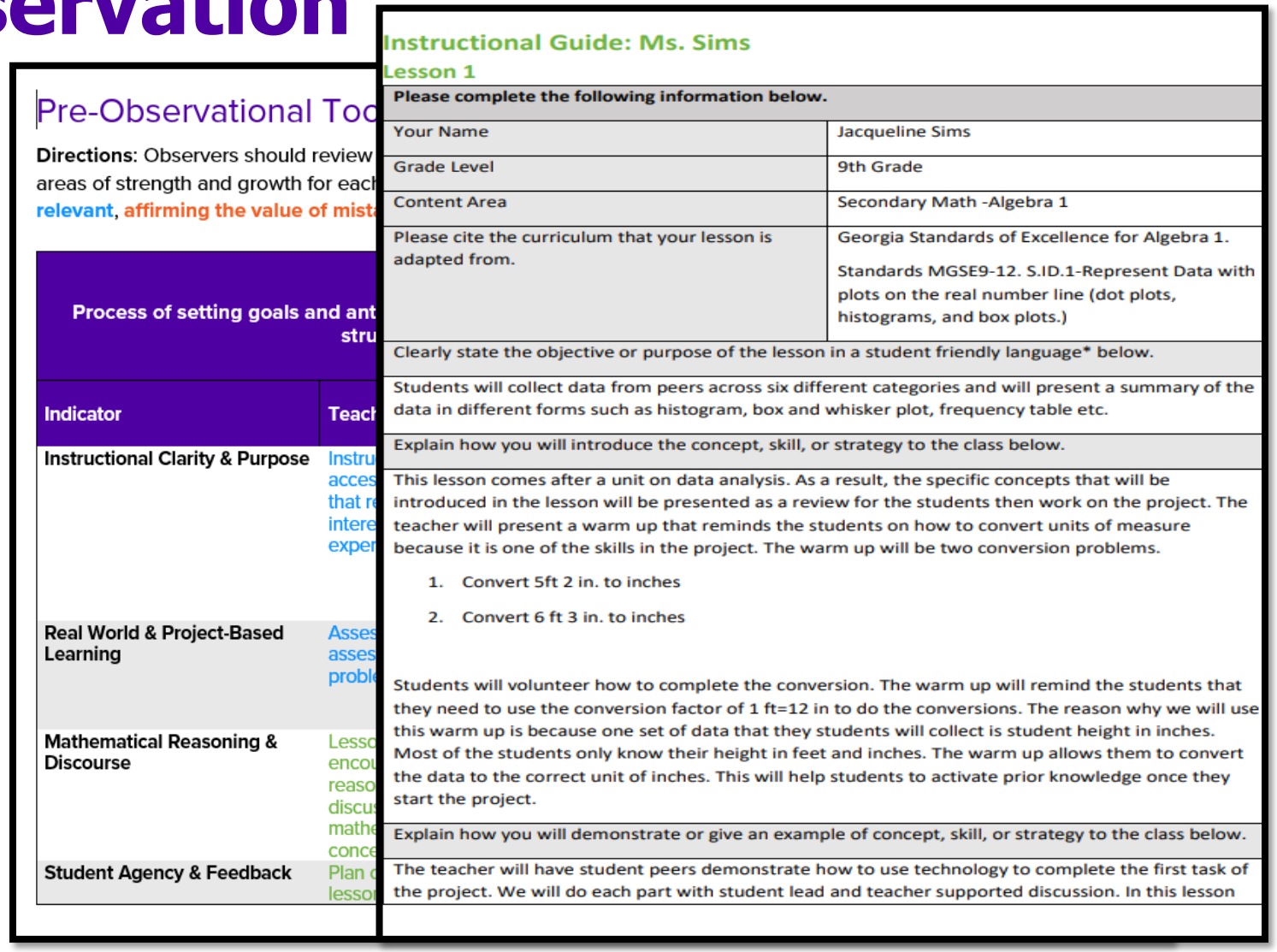
Post Observation

Observation Debrief with Guiding Questions: Guides teachers to reflect on their observation with their teacher educators/district administration

Applying the Tools



Pre Observation



Pre-Observational Too

Directions: Observers should review
areas of strength and growth for each
relevant, affirming the value of mist

Process of setting goals and ant stru	
Indicator	**Teach**
Instructional Clarity & Purpose	Instru acces that re intere exper
Real World & Project-Based Learning	Asses asses probl
Mathematical Reasoning & Discourse	Lesso encou reaso discu mathe conce
Student Agency & Feedback	Plan o lesso

Instructional Guide: Ms. Sims

Lesson 1

Please complete the following information below.	
Your Name	Jacqueline Sims
Grade Level	9th Grade
Content Area	Secondary Math -Algebra 1
Please cite the curriculum that your lesson is adapted from.	Georgia Standards of Excellence for Algebra 1. Standards MGSE9-12. S.ID.1-Represent Data with plots on the real number line (dot plots, histograms, and box plots.)

Clearly state the objective or purpose of the lesson in a student friendly language* below.

Students will collect data from peers across six different categories and will present a summary of the data in different forms such as histogram, box and whisker plot, frequency table etc.

Explain how you will introduce the concept, skill, or strategy to the class below.

This lesson comes after a unit on data analysis. As a result, the specific concepts that will be introduced in the lesson will be presented as a review for the students then work on the project. The teacher will present a warm up that reminds the students on how to convert units of measure because it is one of the skills in the project. The warm up will be two conversion problems.

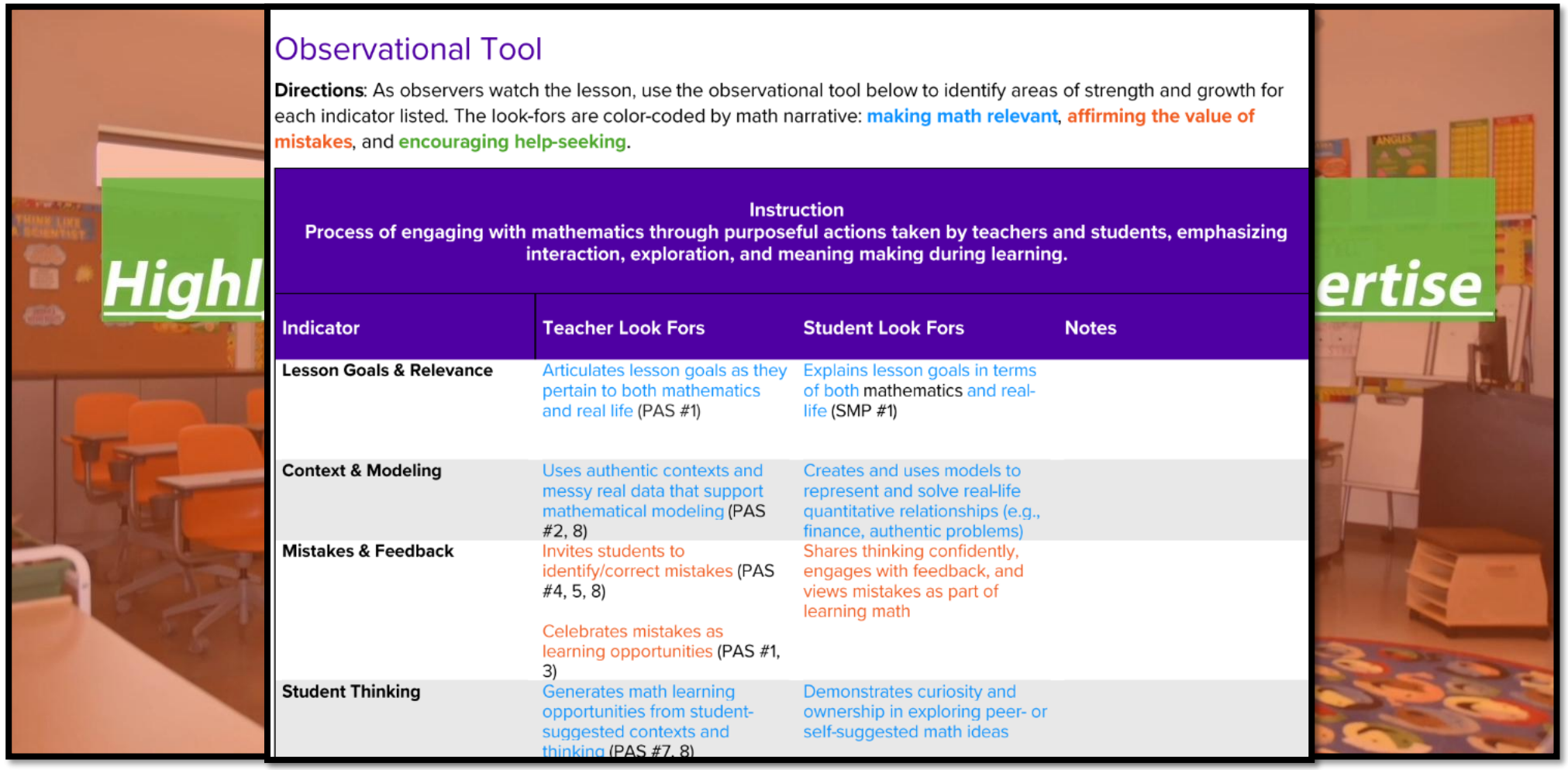
1. Convert 5ft 2 in. to inches
2. Convert 6 ft 3 in. to inches

Students will volunteer how to complete the conversion. The warm up will remind the students that they need to use the conversion factor of 1 ft=12 in to do the conversions. The reason why we will use this warm up is because one set of data that they students will collect is student height in inches. Most of the students only know their height in feet and inches. The warm up allows them to convert the data to the correct unit of inches. This will help students to activate prior knowledge once they start the project.

Explain how you will demonstrate or give an example of concept, skill, or strategy to the class below.

The teacher will have student peers demonstrate how to use technology to complete the first task of the project. We will do each part with student lead and teacher supported discussion. In this lesson

BranchED's Teacher Video Library



Observational Tool

Directions: As observers watch the lesson, use the observational tool below to identify areas of strength and growth for each indicator listed. The look-fors are color-coded by math narrative: **making math relevant**, **affirming the value of mistakes**, and **encouraging help-seeking**.

Instruction
Process of engaging with mathematics through purposeful actions taken by teachers and students, emphasizing interaction, exploration, and meaning making during learning.

Indicator	Teacher Look Fors	Student Look Fors	Notes
Lesson Goals & Relevance	Articulates lesson goals as they pertain to both mathematics and real life (PAS #1)	Explains lesson goals in terms of both mathematics and real-life (SMP #1)	
Context & Modeling	Uses authentic contexts and messy real data that support mathematical modeling (PAS #2, 8)	Creates and uses models to represent and solve real-life quantitative relationships (e.g., finance, authentic problems)	
Mistakes & Feedback	Invites students to identify/correct mistakes (PAS #4, 5, 8) Celebrates mistakes as learning opportunities (PAS #1, 3)	Shares thinking confidently, engages with feedback, and views mistakes as part of learning math	
Student Thinking	Generates math learning opportunities from student-suggested contexts and thinking (PAS #7, 8)	Demonstrates curiosity and ownership in exploring peer- or self-suggested math ideas	

IT WAS A DARK AND STORMY NIGHT

Branch Alliance for Educator Diversity

A Higher Standard

Thank you for your time

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