Teaching Math to Students with Disabilities

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The University of Hawai'i at Mānoa

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A Bit About Me

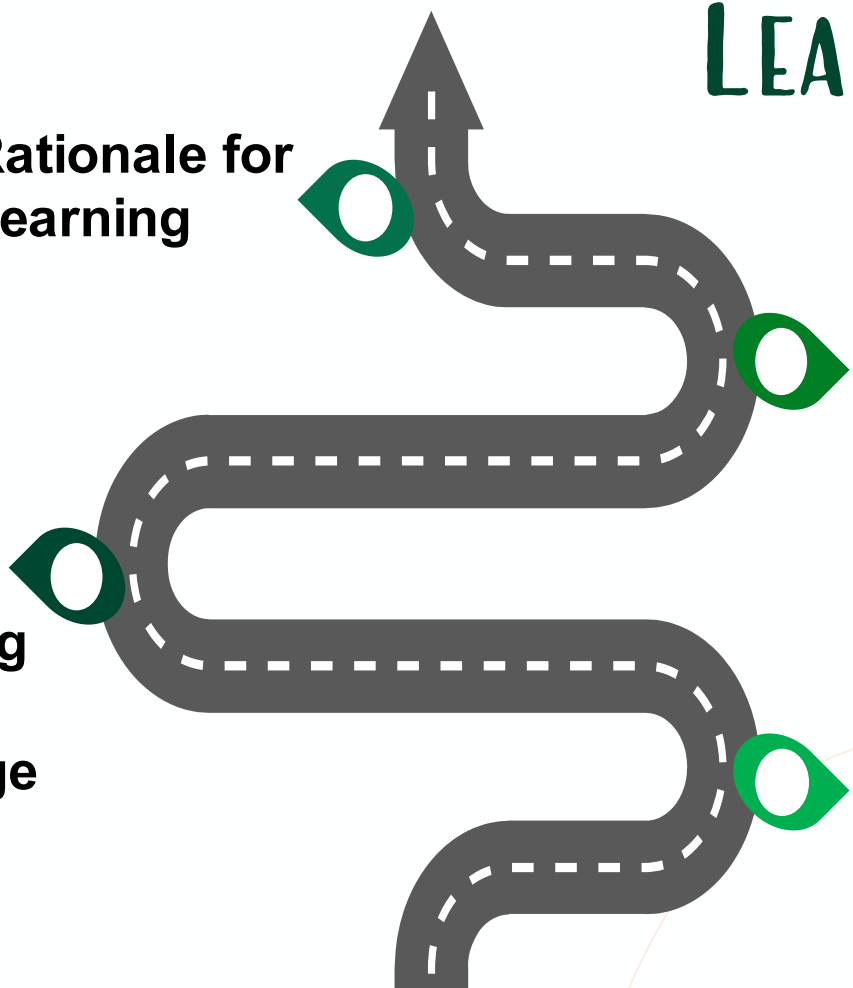
- Former Special Educator
- Current Assistant Professor / Researcher at UH Mānoa
- Teacher Educator
- Individual with Learning Disabilities, ADHD, and chronic illness

A Bit About You

Pop into the chat!

- Name
- Location
- Role/Grade level(s) you support

Learning Path



Rationale for Learning

Developing Mathematics Ability

Integrating Funds of Knowledge

Wrap Up & Reflection

Learning Objectives

Participants will be able to:

- Identify evidence-based practices (EBP) in mathematics
- Define culturally and linguistically responsive mathematics (CLRM)
- Apply knowledge of culturally and linguistically responsive mathematics practices through the use of a Funds of Knowledge Inventory

Icon Key

Dr. King's Favorite Resources

Pause & Reflect

Pop into the chat

01.
Rationale For Learning

Pop into the chat!

Do you agree or disagree?

"Addressing the unique learning needs of students with disabilities, especially those who culturally and linguistically diverse, is a major challenge educators are facing today."

(Harry & Klingner, 2006; NCES, 2023; Orosco & Klingner, 2010)

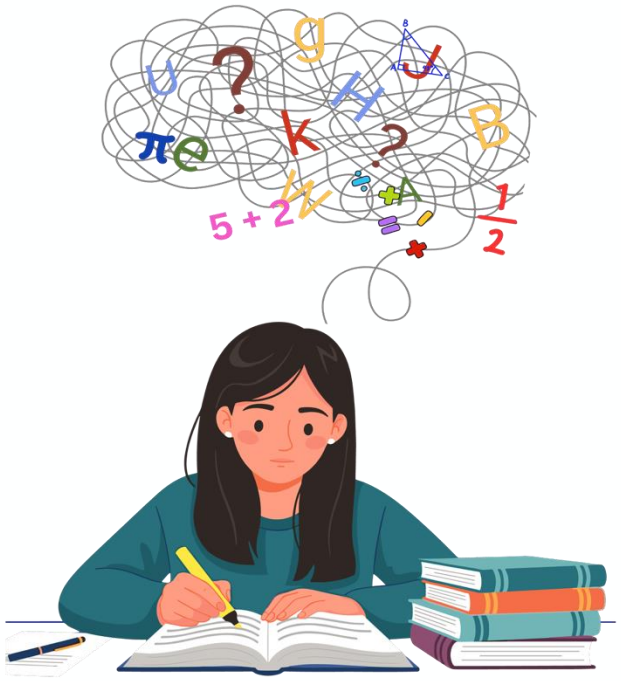
Rationale

- When students' cultures, languages, and lived experiences are valued in instruction, they demonstrate higher engagement, deeper understanding, and improved academic outcomes.

- Culturally responsive mathematics instruction—when paired with evidence-based practices—helps learners make sense of mathematical concepts, engage in problem-solving, and develop stronger conceptual understanding

(Gloria Ladson-Billings, 1995; Geneva Gay, 2010; Luis Moll et al., 1992).

Pause and Reflect



Why is math so challenging for students with disabilities, especially those who are culturally and linguistically diverse?

1. Read the problem

2. Determine what the problem is asking.

3. Understand vocabulary terms in isolation and in-context (e.g., word problems).

4. Interpret charts, graphs, or other visuals.

5. Determine the appropriate procedure to solve.

6. Accurately execute the chosen problem solving procedure.

7. Evaluate if the solution is reasonable.

HEAVY cognitive load!

How do we effectively address academic needs while also honoring students' cultural and linguistic differences?

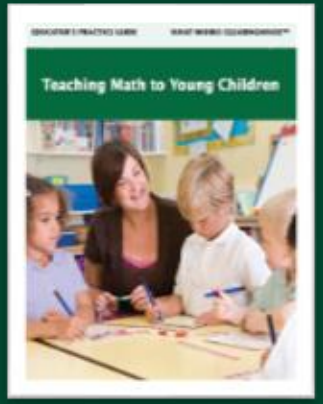
Key Instructional Moves:

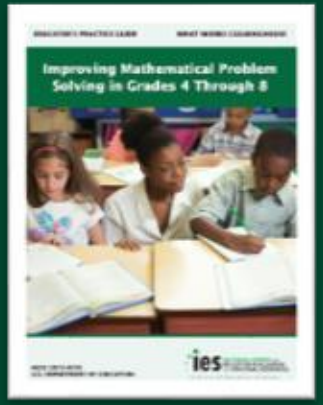
Develop students' math ability using **evidence-based mathematics practices**

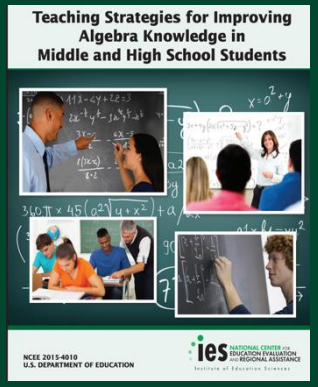
Integrate Culturally and Linguistically Responsive Practices using **Funds of Knowledge**

Develop math ability using evidence-based practices

IES Practice Guides







Evidence-Based Practices

Explicit, systematic instruction

Multiple Representations

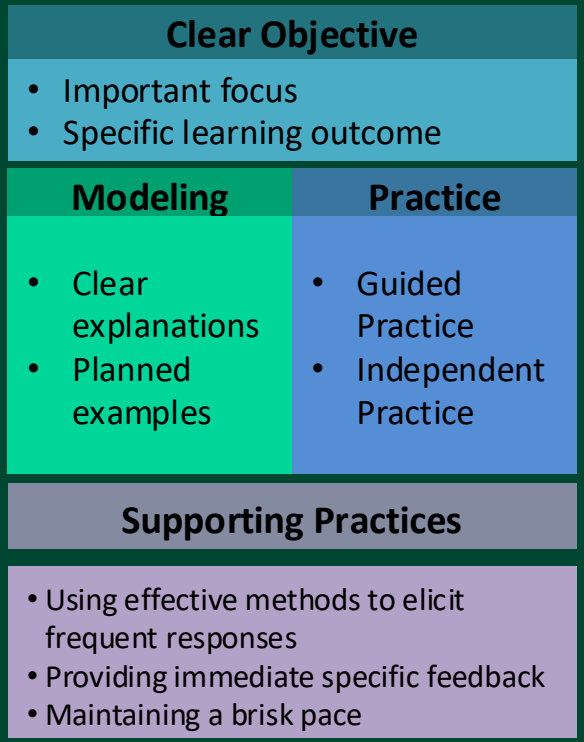
Math Language

Word Problems

Number Lines*

Fluency Building

#1: Explicit Instruction

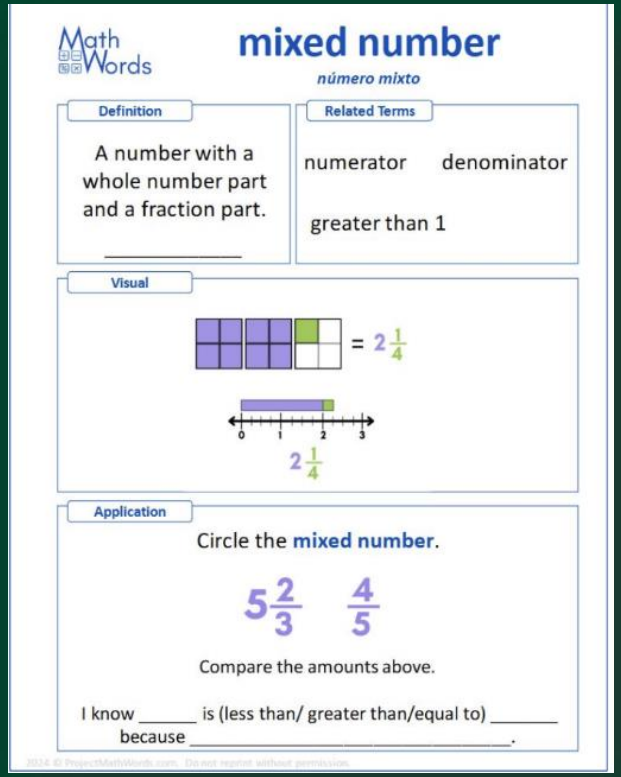


- Clearly aligned objective
- Modeling
- Many opportunities for practice
- Gradual release of responsibility from teacher → student
- Intentional questioning
  - low level (fact-based)
  - high level (open-ended; students explain their thinking)
- Immediate, specific feedback

#2. Mathematics Language

Explicitly teach precise mathematics vocabulary

- Pre-teach vocabulary terms
- Pair with visuals
- Use graphic organizers (vocabulary maps, Frayer models)



Vocabulary Map from (Stevens & Patton, 2026)

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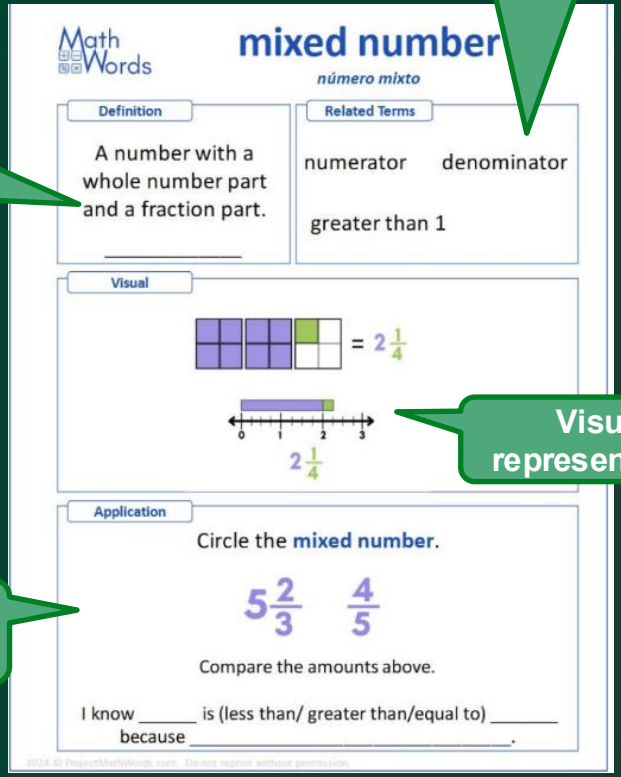

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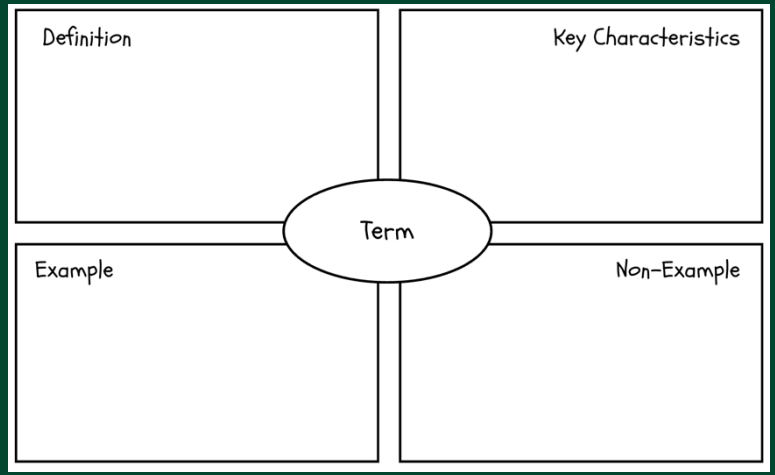
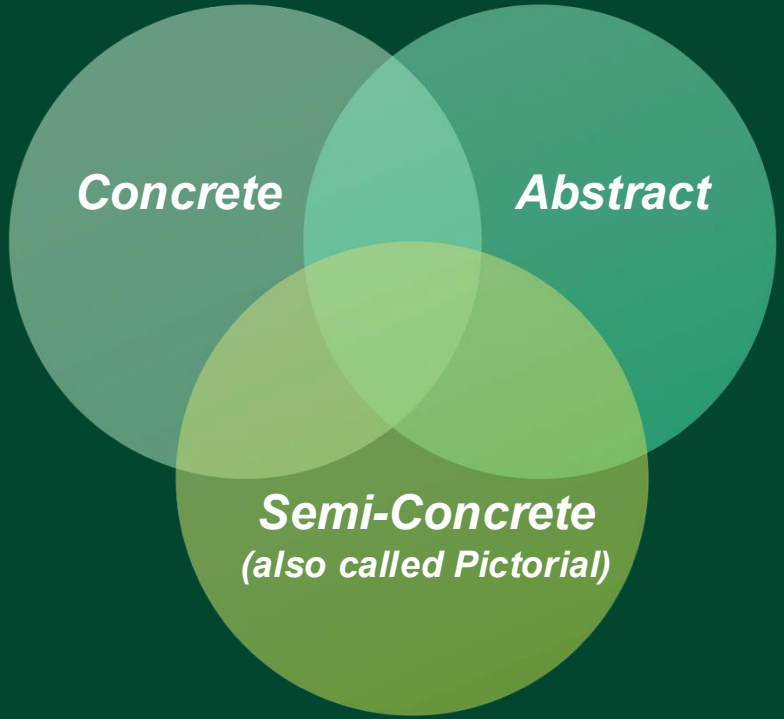


Frayer Model

#3. Multiple Representations



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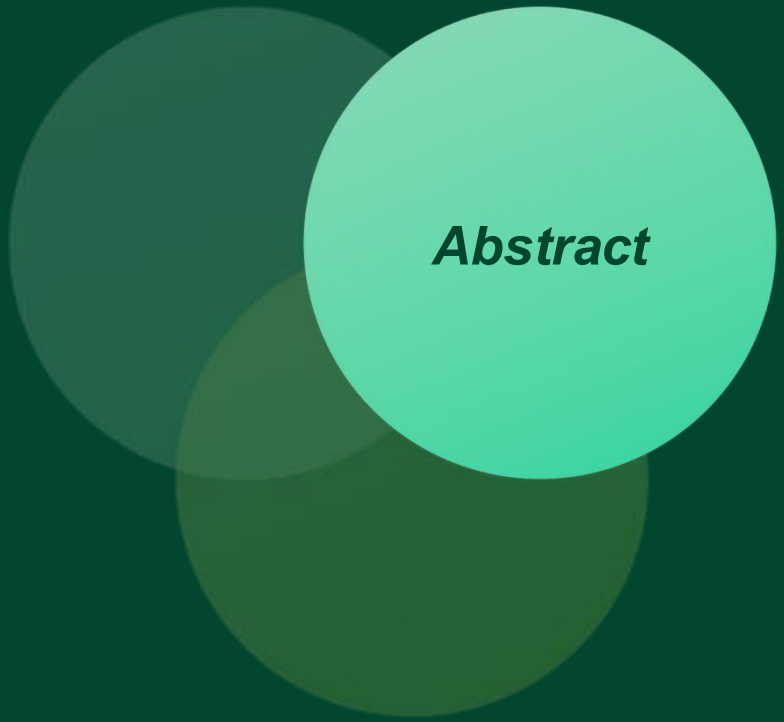
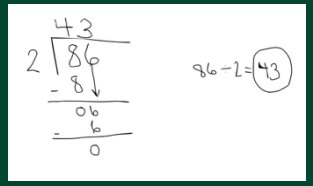
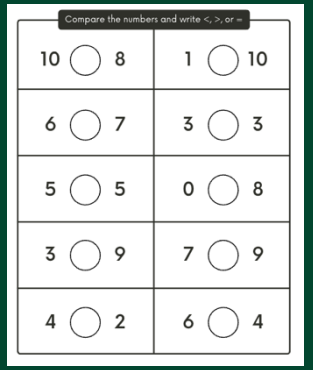
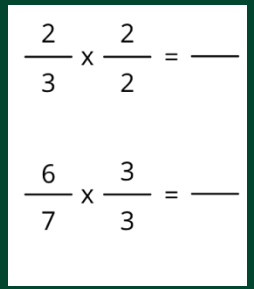


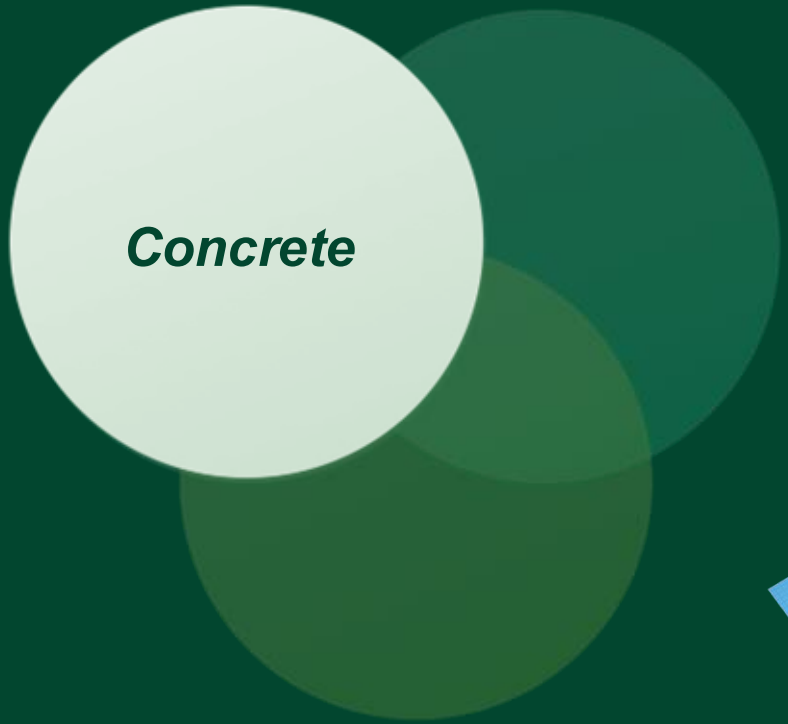
Abstract Representations:
Students use numbers, symbols, or words to represent math concepts







Multiple Representations



Concrete representations
Students use three-dimensional objects to represent mathematical concepts


Two-Color Counters

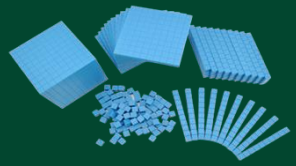

Cuisenaire Rods


Legos


Place Value Discs

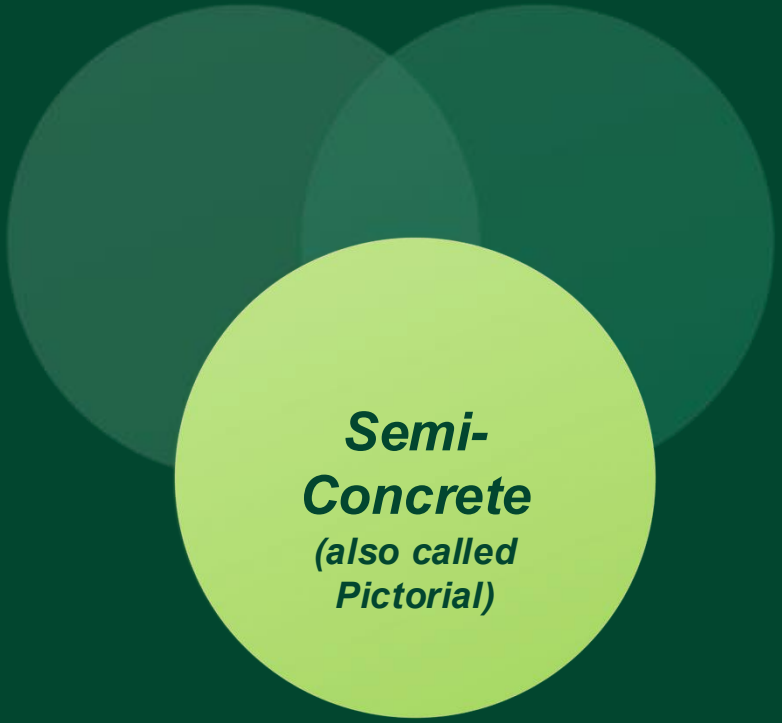

Fraction Circles


Fingers

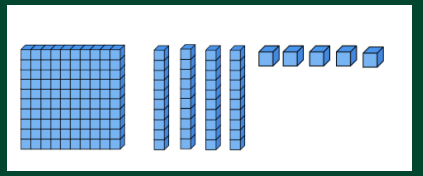

Base-Ten Blocks

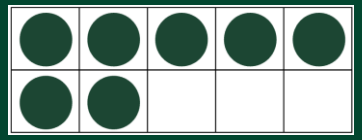

Pattern Blocks

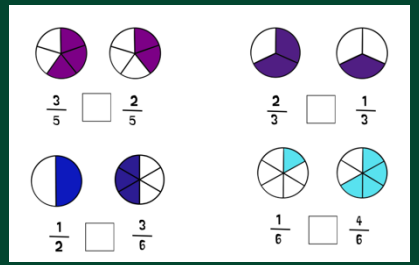
Multiple Representations

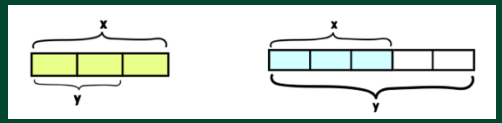


Semi-Concrete Representations are two-dimensional images that represent mathematics concepts or procedures









Multiple Representations

Make sure students understand *how* they are connected.

Key Instructional Moves:

Focus #1	Focus #2
Develop students' math ability using **evidence-based mathematics practices**	Integrate Culturally and Linguistically Responsive Practices using **Funds of Knowledge**

Integrate Culturally and Linguistically Responsive Practices using Funds of Knowledge

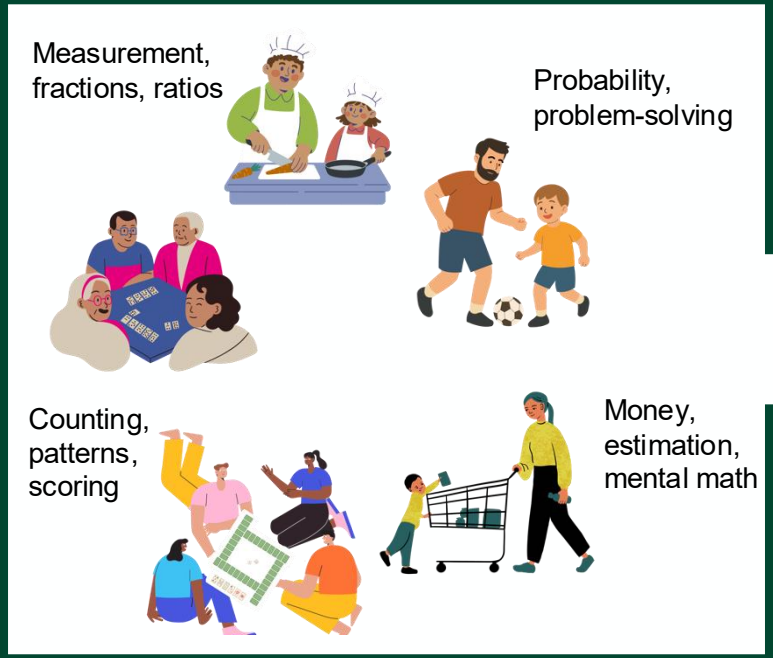
What Are Funds of Knowledge?

Funds of Knowledge refer to the personal background **knowledge, accumulated skills, life experiences, languages,** and other **ways of thinking** students bring from their homes and communities.

(González et al, 2005; Hogg, 2011; Rodriguez, 2013)

Think about it this way…

Students come to your class and likely already have had exposure to math concepts via real world experiences!



BUT

👉 It's not enough to just *know* that students have valuable experiences

👉 What matters is <u>how you actively use</u> those experiences to **shape instruction**

How do we tap into funds of knowledge?

First, it starts with a mindset shift…

FROM

- "I teach the curriculum, then scaffold to help students understand it"

TO

- "I start with what students **already understand**, then build from there"

How do I identify students' funds of knowledge?

Funds of Knowledge Inventory

Funds of Knowledge	Home/Community Practices	Classroom Application
Economics		
Geography		
Politics		
Agriculture		
Sports		
Technology		
Religion		
Language		
Health		
Childcare		
Art		
Entertainment		
Other: _____		

Funds of Knowledge Matrix from González, N., Moll, L.C., & Amanti, C.. (2005)

Scan to check out this resource:

Funds of Knowledge Toolkit

Funds of knowledge Inventory Step-By-Step

Funds of Knowledge Application Steps:

☐ **Step 1**	*Pay attention to students' cultural identities, including activities that they are involved in outside of school and in their communities.*
☐ **Step 2**	*Record information and plan out instruction using a Funds of Knowledge Inventory*
☐ **Step 3**	Identify what type of funds of knowledge academic category that relates
☐ **Step 4**	Consider ways to integrate the skills involved in that particular context to an academic lesson

Note: Integrating students' funds of knowledge into classroom lessons can be done across all content areas and within standards-based instruction!

Funds of Knowledge Inventory Matrix

Funds of Knowledge categories

Funds of Knowledge	Home/Community Practices	Classroom Application
Economics		
Geography		
Politics		
Agriculture		
Sports		
Technology		
Religion		
Language		
Health		
Childcare		
Art		
Cooking		
Entertainment		

Funds of Knowledge Inventory Matrix

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Economics		
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Cooking		
Entertainment		

Notes about home and community practices, such as hobbies, festivals, routines

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Cooking		
Entertainment		

Ideas for integrating funds of knowledge into classroom instruction

Putting It Into Practice

Mrs. Jackson, a fourth-grade teacher, has a. very diverse class this year. To ensure students' needs are being met, she has been working to prioritize the integration of culturally and linguistically responsive practices into her mathematics instruction. One approach she is using involves keeping record of information she learns about her students and intentionally using that information to develop lessons that are relevant to students' personal and cultural backgrounds and experiences.

One of her students, Priya, is originally from India but moved to the U.S. with her parents and younger brother when she was in first grade. Recently, Mrs. Jackson learned that all of Priya's extended family and close friends still live in India. She only gets to see them once per year when her family goes to Delhi for winter break. When she is in Delhi, her favorite thing to do is to go to the Chandni Chowk market for shopping with her mom to pick out new spices and dried fruits to use when cooking together.

→ **First, I am going to think about what I have learned about my student**

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→ **Next, I am going to use my Funds of Knowledge Matrix and determine the funds of knowledge categories that are relevant to what I have learned about my student.**

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→ **After that, I am going to write notes about my student in the second column of the Funds of Knowledge Matrix next to the correct funds of knowledge category from column 1.**

Funds of Knowledge	Home/Community Practices	Classroom Application
Economics	Her favorite thing to do when visiting family in India is to go shopping at the Chandni Chowk market in Delhi with her mom.	
Geography	Priya moved from India in first grade; She visits her extended family and friends every winter in Delhi.	
Politics		
Agriculture		
Sports		
Technology		
Religion		
Language		
Health		
Childcare		
Art		
Cooking	She likes to cook with her mom; They pick out spices and fruit together when at the market	
Entertainment		
¿.....?		

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→ **Last, I am going to develop ideas for integrating the funds of knowledge into classroom activities in mathematics.**

Funds of Knowledge	Home/Community Practices	Classroom Application
Economics	Her favorite thing to do when visiting family in India is to go shopping at the Chandni Chowk market in Delhi with her mom	
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Putting It Into Practice

Funds of Knowledge	Home/Community Practices	Classroom Application
Economics	Her favorite thing to do when visiting family in India is to go shopping at the Chandni Chowk market in Delhi with her mom.	has personal experience using a currency other than US coins and dollars. When we cover concepts related to money, the class can learn about various types of currency around the world and Priya can share about the Indian currency called the Rupi.

What are some other ways we can bring in Priya's experiences and culture into mathematics based on her funds of knowledge?

Bringing It Together

We Know:

- Math ability is **developed—not fixed**
- Students' **cultures, languages, and identities are assets**
- Instruction determines **access and opportunity**

We Do:

- Use **explicit, systematic instruction**
- Support **mathematical language and understanding**
- Connect learning to students' **lived experiences**
- Leverage students' **funds of knowledge and identity**

Why It Matters:

- Increases access for **students with disabilities**
- Strengthens **engagement and understanding**
- Creates more **equitable mathematics classrooms**

Wrap Up & Reflection


Which strategy or practice from today will you implement first, and how will it support your diverse students with disabilities?

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MAHALO NUI LOA

FOR YOUR TIME & ENGAGEMENT

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