Literary Math: Cultivating Equity in a Balanced Math Classroom

NCTM Professional Development Webinar Series
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@teedjvt
What happens when we teach mathematics solely through numbers and equations?
How might a story context help?

$5 + 2 = ___$

$42 + 57 = ___$

$\frac{1}{3} \times 5 = ___$

Is it about answers?
Or is it about understanding?
What do we want students to know and be able to do in math class?

- To be curious about math
- Flexible computation
- Conceptual understanding
- Number sense
- Model mathematics in varied ways
- Communicate their mathematical thinking
- Mathematical reasoning
- Problem solving
How to help make math CONNECTED:

- Launch lessons about a particular math skill/concept with a story.
- Use the story context to teach and practice the skill.
- Focus on deep understanding and application of the skill.
Critical instructional practices:

- Step back and let students do the thinking.
- Use models to make sense of the math ideas.
- Ask deep questions to promote math talk.
- Show math in context through a story.
Windows, Mirrors, and Sliding Glass Doors...

“Books can function as

- **Windows** - a look into someone else’s world
- **Mirrors** - reflections of ourselves,
  or
- **Sliding Glass Doors** - an opportunity to not only look into someone else’s world, but step into it.”

- Dr. Bishop
“When children cannot find themselves reflected in the books they read, or when the images they see are distorted, negative, or laughable, they learn a powerful lesson about how they are devalued in the society of which they are a part.”

- Dr. Bishop
A Balanced Math Block

Number Sense Routine
Main/Mini or Focused Lesson
Workshop Time
Reflecting on Learning
Exploring Math Concepts Through Stories
Number Sense Routines

What do you see?  
What do you notice?  What do you wonder?
Number Sense Routines

What do you see?
What do you notice?  What do you wonder?
Alike and Different
Exploring Polygons
City Shapes

What do you notice?
What do you wonder?
How are these shapes alike?
How does this girl feel? Why do you think so? Why might Grandma’s purse make her happy? What might be in Grandma’s purse? Let’s read to find out.
Today my grandma Mimi is coming to visit. When Mimi comes over, she always has a new treasure to share.
After Reading:

What was in Grandma Mimi’s purse?
What special item was at the bottom of her purse? Why was it so special?
What do you think the little girl will put in her purse?
What math standards/topics could you explore through this story?
Explore: Counting with Grandma’s Purse

- Have a student reach in and pull out a bag of items.
- Turn to partner and **predict** how many are in the bag.
- **Count** how many.
- **Draw the items** on the board by drawing circles for each item.
- **Record the number** on the board.
- Give bags to pairs of students to predict, count, and record.

 Modify the number of items based on your students.
Oops!

Grandma Mimi’s purse got knocked over and everything fell out!

Work with your partner to dump out your bag of items from Grandma’s purse. What is inside?

Sort the items and count how many of each are in the bag so you can tell us what is inside.

- How did you sort them?
- How many bear counters were in the bag?
- How many cubes were in the bag?

Put the items in the bag and move to the next bag.

Watch and listen as they sort and count.
Pennies in Grandma’s Purse

Students work with partners to count pennies in bags.

Students check their counts by placing pennies on ten-frame mats.
Extend

- Students create their own bags for collections.
- Bags are filled at home with 1-10 of a couple different items.
- In school, students share and count items in the bags.
How did starting with a story enhance that lesson?
Grandma’s Purse was not written as a counting book, but it set a context for our counting experiences.
Napping House
Napping House

How many feet were there in the Napping House?

- Grandma – 2 feet
- Child – 2 feet
- Dog – 4 feet

- Cat – 4 feet
- Mouse – 4 feet
- Flea – 6 feet
Napping House

How Many Feet Live in Your Home?
Before Reading:

- What might this story be about?
- Have you ever eaten daal? Can you describe it to us?
- What can you tell about daal from the cover?
- We are going to read a story about a boy who loves daal. Listen to find out how it is made.
“Is it ready?” asks Elias.
“Can we taste?” asks Morgan.
“No,” Abu explains. “Daal takes time. We have to wait. The flavors mix together slowly. You kids go play and have fun while it cooks!”
Daal is tiny. Daal is tough. But with a little time, and a lot of patience, it becomes the softest, tastiest, best thing in the whole wide world. And the best part is sharing it with friends.
1. Honor the book.
2. Explore the math.
   What math might you choose for this story?
Explore: How Long?

- At 1:15 p.m., Abu called Bilal and his friends inside to help get dinner ready. They washed their hands, measured the ingredients, and put everything in the pot.
- At 1:40 p.m., they put the pot of daal on the stove to cook.
- How many minutes did it take them to get the daal ready to cook?
Explore: How Long?

- A perfect opportunity to introduce number lines to explore elapsed time.
- Students work in pairs to discuss and explore.
- Various possibilities are shared and discussed.
Practice the Skill

● Each player picks a card to show the time they go inside to get ready to eat.

● Spin a 2-5 spinner twice to see how many minutes it takes to get ready to eat.

● Each player uses a number line to find out when their daal is ready.

● Players compare their dinner times. The one who gets to eat earliest wins!

● Then, shuffle cards and start again.
Workshop Time
Practice: Stacks of Latkes

- Spin a 1-10 spinner.
- Multiply by 5 and say the ×5 fact.

Cover the product in one place on the game board.

The first one to cover a stack of latkes on their game board wins the round.

Benefits?
Research evidence points in one direction:

The best way to develop fluency with numbers is to develop number sense and to work with numbers in different ways, not to blindly memorize without number sense.

- Jo Boaler

*Fluency Without Fear: Research Evidence on the Best Ways to Learn Math Facts*
Prompt- Choose 1:

How was mathematics important in the fight for farmworkers' rights?

or

Some math problems are long and can feel confusing. What tips might you share with someone who faces a math problem like that?
Math + Literature

As students solve problems related to story characters and events, their focus extends beyond just *how to do math* and turns to *what math to do*. 

*Saffron Ice Cream*
Benefits of Literature + Math

- Engagement
- Read aloud provides a shared experience, so contributes to equitable math practice
- Gets students talking
- Connects math to their lives
- Nurtures problem solving
- Brings energy to math class
- Promotes math joy
Resources
To download a free list of literature correlated to math concepts:

www.MathByTheBook.com
Culturally Relevant Children’s Literature Related to Math
Math + Literature = Math Joy!

Thank you for a great session!

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