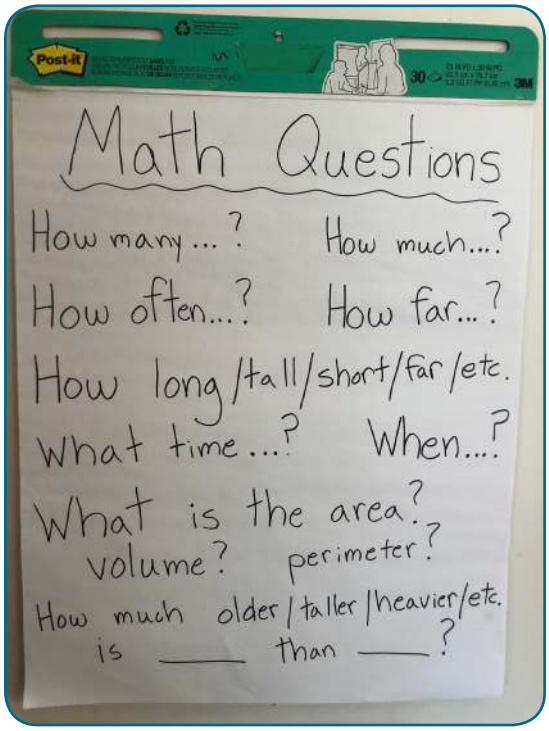
Mathematizing Student Photos Primer

Mathematizing Student Photos: What is it?

In Mathematizing Student Photos, families are invited to send or bring in photos from home* depicting a scene from their lives. The teacher projects the photo and invites the class to notice and wonder. All noticings and wonderings are accepted and written up on the whiteboard or document camera, and there is no expectation that they be math-related. The student who brought the photo does not give any background or answer questions until this phase is over.

Photos brought in by 3rd graders.

After students have had the opportunity to acquaint themselves with the photo in this way, the student whose photo it is tells the story behind the photo and answers any of the wonderings that she can. Then, the teacher asks the class to brainstorm math questions one could ask about the photo. The teacher may give the students an opportunity to brainstorm math questions with a partner before sharing out whole class. The teacher writes up all of the math questions. Some teachers have found it valuable to develop an anchor chart of sentence starters to expand students' range of math questions.



After brainstorming math questions, students are asked to write a word problem based on the picture. They can use the noticings and wonderings as well as the information the student provided. Students are encouraged to embellish with made-up numbers and information at this point. Students solve their own problem on a separate paper or whiteboard.

Finally, students trade their word problem with a partner and solve each others' problems.

What are kids working on — what's the math?

The Common Core State Standards (CCSS) highlights eight mathematical practices that describe the nature of doing mathematics and being mathematicians, several of which feature in this activity:

- **MP1, Make sense of problems and persevere in solving them:** The relevant contexts and background information that accompanies these photos and the word problems students develop support students to see problem solving as sense making.

- **MP4, Modeling with mathematics:** Modeling with mathematics is the practice of interpreting the world through a mathematical lens. When children apply their mathematical ideas to the world around them, they are modeling with mathematics.
- **MP2, Reason abstractly and quantitatively**, asks students to "decontextualize and contextualize" problem situations, which they are required to do when they abstract a situation shown in the photo in order to represent it symbolically, for example with an equation.
- **MP6, Attend to precision:** When students write problems for their peers, they learn to think carefully about language and clarity.

Teachers can also target specific content standards by selecting a student photo that lends itself to a grade level standard and then directing students to write their problems with that standard in mind. For example, a 4th grade teacher chose a student photo that would lend itself to multi-digit multiplication and then after noticing and wondering he asked them to write word problems that incorporated multi-digit multiplication. The picture was a stack of 12 books from a series that a student had read, so students could write problems about number of pages, number of minutes, etc.

What is the teacher working on — What practices of ambitious and culturally responsive math instruction are embedded?

The Mathematizing Student photos activity provides a context for teachers to work on several culturally responsive math teaching practices:

- **Positioning students competently:** There is an entry point for every student in this activity; any student can notice and wonder regardless of math skills.
- **Cultural and Community Funds of Knowledge (CCFoK):** This activity explicitly connects community and cultural contexts since students are bringing photos from their own lives. Students are asked to analyze the mathematics within a community context and how the mathematics helps them understand that context.
- **Centering student thinking and ideas:** There are multiple strategies to make student thinking public, both whole class and with partners when students solve each others' problems. As the teacher writes up every student notice, wonder and mathematical question, it establishes that all contributions are valued and respected. Students have multiple opportunities to collectively respond to each other's thinking.
- **Rehumanizing:** The freedom to make up word problems and to invent the numbers involved encourages students to bring creativity and their own experience and knowledge to the construction of mathematical ideas. Students' histories and different ways of knowing are honored and mathematics identities are affirmed as students begin to recognize the mathematics in their daily lives. Students see mathematics as a human activity.
- **Distributing mathematical authority:** In this activity students hold all of the math authority: they decide what counts as math in their lives, they bring their own interests and math knowledges to writing the word problem, and they decide what strategies to use when solving.
- **Orienting students towards each others' ideas:** This activity requires and engages students to listen and respond carefully to each other.

** It can be helpful to suggest that families send photos of situations "that have math in them." For students who are not able or willing to bring photos from home, some teachers have given them an ipad or other device and asked them to take photos around the school instead.*

Resources and Citations

Zavala, M. & Aguirre. J.M. (2020). Culturally Responsive Mathematics Teaching Tool: Short Form Recording Sheet. San Francisco State University. Unpublished Instrument.

Hintz, Alison & Smith. Anotny (2022). Mathematizing Children's Literature: Sparking Connections, Joy, and Wonder Through Read-Alouds and Discussion. Stenhouse Publishers.

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