

Co-creating word problems – what is it?

With co-created word problems, teachers adapt a word problem from their curriculum to make it more relevant to their students. The teacher is careful to maintain the rigor and structure of the original problem, while collaborating with the students to create a context which draws from their cultural and community funds of knowledge.

The teacher might begin by establishing one of the quantities in the problem and then eliciting a context from the students. For example, the teacher might say, *“I have 12 of something. What could I have?”*

The teacher calls on students for suggestions and the group chooses one. The teacher may have students vote on their favorite, or she might select one offered by a student who she particularly wants to engage with the problem. In this case, a student suggests basketballs:

“Ok, I have 12 basketballs. Something happened to some of them. What could have happened to some of them?” The teacher elicits possibilities for the 2nd part of the context and chooses one or asks the students to choose one. One student suggests that some roll away:

“Ok, six of them roll away.”

“What is a mathematical question we could ask about this story?” The teacher elicits ideas and settles on one for the students to solve.

“Ok, I have 12 basketballs. 6 of them roll away. Our question is, How many basketballs were left? Show how you solve.”

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 student-generated contexts support students to see problem solving as sense making. Students are more likely to persevere when problems make sense to them.
- **MP2, Reason abstractly and quantitatively,** suggests students must learn to “decontextualize and contextualize” problem situations, which this activity encourages students to do as they add their own context to naked numbers.
- **MP4, Modeling with mathematics:** Modeling with mathematics is the practice of interpreting the world through a mathematical lens. When children create a context for a set of numbers, they are creating a model of the mathematics. If they write an equation or draw a diagram that matches the story, they are creating more models.

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

Co-creating word problems provides an opportunity 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; almost 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 to math problem solving. Contexts can include shared school/class culture and popular culture as well as ethnic culture.

- **(Re) Humanizing Mathematics:** Making up word problems 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.
- **Distributing mathematical authority:** In this activity students collectively hold most of the math authority: they decide what counts as math in their lives and they bring their own interests to develop the word problem.
- **Student Thinking and Ideas:** Launching the problem this way centers students' ideas.
- **Orienting students towards each others' ideas:** Developing a word problem collaboratively encourages students to listen carefully to each other and think about each other's ideas.

Variations and Extensions

- Create a "Math Lib" out of word problem you want to launch and ask students to fill in the blanks. For example, "A store has 68 _____. They sell 29 of the _____. 6 are returned. How many _____ do they have now?"
- Take 3 suggestions for the context (ie, the first blank above,) and have students vote.
- After students become more comfortable with co-creating contexts, suggest that they can choose their own rather than the class having a shared context. If students learn how to change the context of a problem to make it meaningful any time they want, then change it back when they write the answer, they will have power over unfamiliar contexts in the future.

Process to co-create word problems.

- 1. Give a quantity, ask for a context,**
"I have 12 of something. What could I have?"
- 2. Elicit ideas from students and choose a context,**
"Ok, I have 12 basketballs."
- 3. Add on to context.**
*"Something happened to some of the basketballs.
What could have happened to them?"*
- 4. Elicit ideas and choose one,**
"Ok, 6 roll away."
- 5. Elicit possible mathematical questions,**
"What is a mathematical question I could ask about this story?"
- 6. Choose one mathematical question to solve.**
*"Our question is, how many basketballs were left?
Show how you solve."*