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All Issues About

Sex, Lies, and Word Problems

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By Cathery Yeh, posted April 24, 2017

Inspired by Anita Bright's work (2016), my preservice teachers and I had been analyzing the "hidden messages" in K-grade 6 textbooks and were surprised by what we found. Let's start with a series of problems that a preservice teacher identified in the textbook *Math Expressions*, which was being used in her fifth-grade fractions and decimals unit:

- o Amie used 7/9 yard of ribbon in her dress. Jasmine used 5/6 yard of ribbon in her dress. Which girl used more ribbon? How much more did she use?
- o In the last basketball game, Joel made 4 out of 7 free throws. Carlos made 5 out of 9 free throws. Which boy made the greater fraction of his free throws?
- o Ms. Hernandez knitted a scarf for her grandson. The scarf is 5/6 yard long and 2/9 yard wide. What is the area of the scarf?

What do you notice? What is normalized and valued in these problems? We had the opportunity to review many more word problems in this textbook, and the examples above represent typical patterns in word problems we reviewed. Contexts related to looking pretty, being helpful, and being a homemaker were attached to problems with girls' names; problems with boys' names reinforced athleticism, competition, and masculinity. Any one of these scenarios are unproblematic of and by themselves, but when looking at patterns across several problems, we see a consistent message about gender normativity—the idea that there is only one way to be a boy and another, different way to be a girl.

In the rare instances when we found a gender-fluid problem (e.g., David's dad baked a dozen cookies to share with him, his sister, and his mom), the problem continued to conflate gender with a heterosexual identity. As a class, we could not find problems involving nonnuclear families (e.g., two moms, a single dad) or gender nonconforming characters (e.g., John buying a doll at the store).

What happens when gender is seen and understood as fixed and dichotomous? A restrictive notion of gender has an adverse impact on *all* students. Gender socialization and stereotypes influence students' impressions of what is acceptable, and they shape performance, STEM-based participation patterns, and violence (Barnett and Rivers 2005; Kosciw et al. 2014; Rands 2009).

The 2013 National School Climate Survey found that 90 percent of gender variant students were verbally harassed and more than half reported gender-based physical violence in the past year (Kosciw et al. 2014). Students who are perceived to be gender nonconforming are significantly more likely than their peers to be harassed and assaulted at school (Kosciw et al. 2014).

Genderism and heteronormativity are not the only hidden message in word problems. We have found that almost all word problems have hidden messages; issues of classism, racism, and consumerism are rampant. How many math problems can you identify in your school curriculum that perpetuate competition and individualism (e.g., "Which boy made the greater fraction of his free throws?") versus collectivism and community (e.g., "What can we achieve working together?")

Schools send powerful messages to our students about what is valued and whose knowledge and experiences are deemed important. These messages have such deep historical and cultural roots that we often don't even notice them. But mathematics word problems could serve as a vehicle for students to analyze privilege and oppression, such as analyzing the gender pay gap or the differences in the rate of hate crimes and police brutality between transgender and cisgender populations.

I realize my observations are limited by my own worldviews as a cisgender female, a teacher, and a mother. My goal for writing is selfish in that I still have much to learn as an educator. I hope this series of posts encourages conversations about how we can collectively create mathematics learning spaces that are humanizing and welcoming for students learning disciplinary practices while we also embrace and leverage the diversity of children and families we serve.

Your turn

What hidden messages are found in the mathematical word problems in your textbook? How have you reframed these problems to better reflect the diversity of the students and families we serve? We want to hear from you. Post your ideas in the comments below or share your thoughts on Twitter @TCM_at_NCTM using #TCMtalk.

Join us on May 8, 2017, when we discuss the third blog post in this series, teachers' choices about number and language while implementing mathematical tasks.

References

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Cathery Yeh is an assistant professor in the College of Educational Studies at Chapman University. She is the lead author of the newly released NCTM book *Reimagining the Mathematics Classroom: Creating and Sustaining Productive Learning Environments*. Her work focuses on creating classroom spaces for generative learning, agency, community, and collective praxis.

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Jane Gillette - 5/9/2017 9:37:22 AM
This is a great article. A while ago I went through my ratio and proportion worksheets to make sure they didn't split a class into boys and girls. There are so many other ways we can split people, and if it helps a gender-creative student feel less left out, it's worth it.

Reply

Cathery Yeh - 5/18/2017 1:58:47 PM
Jane, please share some of your examples. It would be great if we can generate a repository of problems that challenge genderism.

Reply

Jane Gillette - 5/18/2017 6:32:05 PM
Not sure if this will help your collection but here are some examples:

I include. same-gender pairs:

2) Cynthia and Anne had dinner at a fancy restaurant and the bill came to \$85, with tax included. They decide to tip 18% on the \$85

a) How much do they pay in tip?

b) If they then split the bill, how much does each pay?

I opt avoid the boy/girl split - so instead of the class ratio of boys to girls is 3:8, I might have:

1. The Comet Argyle has a population of alien space worms. 3783 are spotted worms and 6984 are plaid worms. What is the ratio of plaid worms to spotted worms?

Or

2. The ratio of leaders to followers in a dance class is 3:2. (In a partnered dance class, a set of partners consists of one person who dances lead and one who dances follow).

a) If the class has 15 people, how people dance lead?

Reply

Kimberly Morrow Leong - 4/25/2017 1:12:37 AM
Thank you for pointing out the rigidity in regards to the gender roles of most textbooks. It is a subtle but pervasive issue that impacts gender identity in the mathematics classroom.

I appreciate that the word problem examples that you have selected from the textbook represent operator, part-whole, as well as area/array interpretations. I call that progress! But I know that this isn't the focus of your post here.

The fact that girls' names are associated with ribbons is less problematic to me than the fact that the reference is ignorantly done. It is reasonable to state that there are 9 free throws offered and 5 are successful. In no case could you buy, measure, or cut ribbon 5/9 of a yard long or 4/7 of a yard long. Sure, you could figure out 5/9 of a yard by unitizing 4 inches, but the store would never cut and sell you a piece 5/9 of a yard long. Furthermore, how would you wear a scarf that was 20" (5/9 yd) by 20.6" (4/7 yd) and for what reason would you need to measure it to that level of precision?

The problem here is more than an academic one. First of all, it implies that ribbons are even a thing that concerns girls. Girls who like ribbons in their hair do not tie them anymore - they buy them already tied and mounted on barrettes or headbands. In effect, they have no connection to ribbons as a hands-on activity or task. And even if they do, again they are not interested in the level of precision required by the "task." Second, by generating examples that have no meaning in reality and likely not to the intended audience of girls, while maintaining meaning in the examples ascribed to boys (for ill or for naught), the disrespect for girls' interests and concerns is the stronger message.

Please know that the issue you raised concerns me as well, but I would like to see more important and relevant examples if publishers elect to continue building examples along traditional gender lines.

Reply

Cathery Yeh - 5/18/2017 2:14:57 PM
Kimberly, I agree with you. The teachers and I have found that many of the word problems are not realistic. The context of the problem just doesn't link well to the mathematical task or the numbers in the problem lead to unrealistic solutions. I think this is extremely problematic. How can students be supported to make sense of word problems if the problem context or numbers in the problem itself are non-sensical or unrealistic? It may be a valuable activity to have children critique the logic of the problems.

Reply

Cathery Yeh - 5/18/2017 1:58:59 PM

Reply

Nicola Petty - 4/25/2017 12:36:12 AM
I love this post. So much we have been grappling with similar problems after attending a discussion group about gender in schools. So much in primary school is gendered - boys' day and girls' day, calling the roll etc. So much to think about.

Reply



RT @STEMVideoHall: #MathTeachers check out #STEMvideohall & learn how these federally funded projects are addressing #CommonCore (link: htt...



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