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WHAT CAN EQUITY LOOK, SOUND, AND FEEL LIKE IN THE ELEMENTARY MATHEMATICS CLASSROOM?

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IN THIS ISSUE

In this issue, we will focus on equity and mathematics education. This is a topic that we ourselves have decided to put efforts toward in our own learning as mathematics teachers.

Our special guest authors, Cristina De Simone and Tori Trajanovski, share their thoughts on how forming student groups in classrooms can be thought of in terms of equity.

This issue is all about concrete strategies, benefits, and challenges in enacting recommendations about equitable teaching in mathematics classrooms. This issue is deeply influenced by the paper "Toward a Framework for Research Linking Equitable Teaching with the Standard for Mathematical Practice", by Bartell et al. (2017). We read it, and graduate students read it, and we were all challenged to consider what their recommendations look, sound, and feel like in an elementary mathematics classroom.

Here we share:

1) how grouping can be thought of as equitable,
2) a list of recommendations that graduate students crafted after engaging with research about equity, and
3) a description of a lesson we taught ourselves that came to mind while reading about equitable teaching.

The lesson idea is the two-page lesson plan insert included in this issue. We hope readers will leave with concrete ideas they can incorporate into their mathematics teaching easily and immediately.

Yes, we find equitable teaching to be complex, but there are many entry points that any teacher can start using thoughtfully right away.

PLAYING CARDS CAN BE USED AS A WAY OF EQUITABLY FORMING STUDENT GROUPS

By Cristina De Simone and Tori Trajanovski

Think about a time when you were in grade school, and the teacher was putting groups together. Did you look around the room and try to work out if you were in the "smart" group? Or did you look at your assigned group and wonder if you were one of the "weaker" students in the group? When the teacher makes groups, even if they haven't selected students by ability, children use groupings as a way to "position" themselves and each other. In a math class, this can reinforce beliefs, such as which students are viewed as more capable and which ones are not "the math people."

> *Randomized groupings…*
>
> *"sends a message to students that all contributions are valuable and each student is viewed as capable."*

Consider using random groups if you're looking for ways to make your mathematics classroom a little more equitable. When groups are random instead of teacher assigned, this sends a message to students that all contributions are valuable and each student is viewed as capable. Make sure students see you randomize the groups!

Here's how to do it with a simple deck of playing cards:

Take a deck of cards and pull out cards that are the same rank (e.g., Ace, Queen, 2, 4).

In the image below, I have pulled out nine groups of three cards for the 27 students in my class that day.



Shuffle the cards and fan them out. Ask each student to draw a card.





Students find the other students with the same rank card as them (e.g., all 4's will form a group).

You can also use online randomizers, wooden sticks with students' names, or any other way of making random groups. The key is to randomize with the students present.

> *"The more frequently you randomize the groups, the more comfortable students will become with the process!"*

If students are unhappy with the group they've been given, remind them it is only for one math class, and that it will change in the next class. The more frequently you randomize the groups, the more comfortable students will become with the process!

RESPONDING TO STUDENTS' MATHEMATICAL IDEAS IN THE MOMENT: HOW AND WHY?

Our reading of Bartell et al.'s (2017) paper, and reflecting on our own teaching, left us thinking about the following two equitable teaching practices:

1) drawing on students' funds of knowledge, and
2) establishing norms for participation.

The following lesson we enacted came to mind when we thought about:

a) using students' experiences and interests
b) recognizing that student voice has implications for power, authority, and agency, and, more generally, being responsive in the moment

The students we were teaching said they enjoyed reading with their grandparents after school. We noted that this activity was part of their lived experience. Inspired by their lived experience, we revised the following problem from a mathematics education paper about enactivism (Towers & Proulx, 2014):

Original problem:	**Revised problem:**
"Luc has read 20 pages in 48 minutes. At this rate, how many pages will he read in 2 hours?"	"Grandma reads 20 pages in 48 minutes. How much does she read in 2 hours?"

As it turns out, this revision/recontextualizing was not enough. When presented with the problem, students were provoked to ask several questions about what we know about their grandparents. In particular, the number of pages grandma read in 48 minutes did not make sense to them. Many students seemed insulted that there was a suggestion that their grandmother was a slow reader. Looking back, these unfoldings are understandable, since the original question was probably about a Grade 7 student named Luc, and not an adult.

So yes, we used students' experiences to craft the problem, but fell short in knowing or adapting to the specific context of grandparents' reading speed. To ensure that we honoured student voice, we needed to adjust the lesson in the moment.

Changing the Lesson in the Moment

In response to the student's questions, we needed to change the numbers within this question. This had to be a very thoughtful, quick decision because this question was to satisfy provincial curriculum expectations found in the Number strand (see the lesson plan insert).

So, in the moment, we doubled 20 to 40 and kept the 48 minutes. This seemed to satisfy the students' concerns.

Contexts for Crafting Word Problems

Adapting contexts can require a deep understanding of mathematics (i.e., the skill to change numbers within questions that will still align with targeted curriculum expectations).

Changing Lessons Supports Equity in Classrooms

This quick decision points to some challenges teachers can face when attempting to respond to student ideas, honour their voices, and be more equitable in our teaching. As teachers, we needed to know the math deeply in order to adjust the numbers appropriately, and to match the context and the required curriculum expectation. We have learned very quickly that it is not enough to adapt to the context, and that context adaptation can lead to changing numbers within the question as well. It is difficult to change and be responsive to students' concerns in the moment, but it can be very rewarding and help exemplify that their ideas are important (and relevant).

"We have learned very quickly that it is not enough to adapt to the context, and that context adaptation can lead to changing numbers within the question as well".

In the end, we do see that there are several strengths and challenges when it comes to equitable teaching. Moving forward, we will continue to use students' experiences to develop lesson ideas. We will respond in the moment to student concerns to signify that their ideas are valued and important, but we will change one key feature—we will start with students' culture by inviting students to develop lessons with us that will honour and exemplify their culture. We believe that this will help us enact and emphasize the other equitable teaching practices found in Bartell et al.'s (2017) paper, and specifically, that we can work on the last teaching practice about developing a socio-political disposition (one of the practices we are finding most challenging).

LIST OF IDEAS THAT EMPHASIZE EQUITABLE TEACHING FROM GRADUATE STUDENTS OF MATHEMATICS EDUCATION

Knowing that equitable teaching can be complex, we decided to expand and ask graduate students of mathematics education to give us suggestions based on what has been successful for them, and what teaching strategies of their own came to mind while reading Bartell et al.'s (2017) paper about equitable teaching. We thank these graduate students for their thoughtful offerings and provide the following nine strategies:

1. Consider randomized groupings.
2. Select an open-ended task (multiple entry points).
3. The teacher listens to students and asks questions about their mathematical ideas.
4. The teacher circulates to join in conversations.
5. Include student voice by co-creating questions based on students' lived experiences.
6. Try using interest surveys with students. Here are a few example survey questions:

   I learn best when _____.

   In math, I feel _____.

   One thing I wish my math teacher knew about me is _____.

   Some of my favourite things to do after school are _____.
7. Consider how math might be done at home (e.g., standard methods for addition might differ, depending on where you are from).
8. Consider different ways that students can demonstrate their learning.
9. Develop a sense of belonging among learners—seeing themselves as math learners.

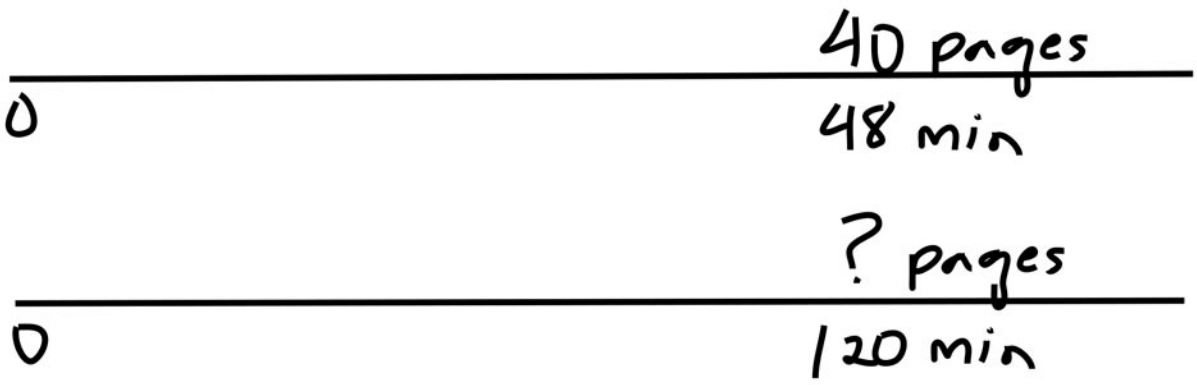
LESSON IDEA FOR PROPORTIONAL REASONING

Problem: Grandma reads 40 pages in 48 minutes. How much does she read in 2 hours?

Curriculum Expectations:

Grade 5:	Grade 6:	Grade 7:
C1.1 identify and describe repeating, growing, and shrinking patterns, including patterns found in real-life contexts	B1.6 describe relationships and show equivalences among fractions and decimal numbers up to thousandths, using appropriate tools and drawings, in various contexts	B1.7 convert between fractions, decimal numbers, and percents, in various contexts

Open number line:



Quick Tip

Understanding the problem:

A number line might be a helpful tool for some students to visualize the problem. Consider using an open number line to record the problem.

Anticipated Solution Strategies

Using Fractions

$$\frac{40}{48} = \frac{5}{6}$$

$$\frac{5}{6} \times \frac{20}{20}$$

100 page

Pages/minute

48 people share $40

$0.50 × 48 = $24
$0.30 × 48 = $14.40
$0.03 × 48 = $1.44
$0.003 × 48 = $0.1944

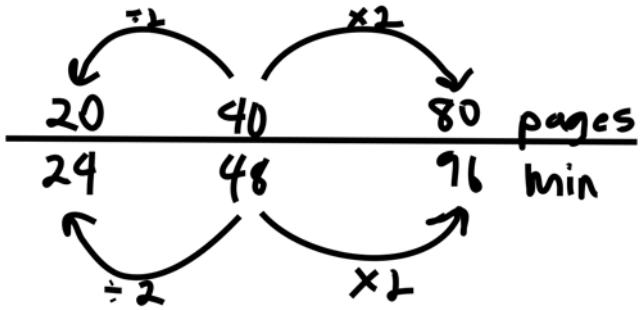
$0.83 × 48 = 40

Reading

0.83×120

$83.\overset{100}{3} + 8.\overset{10}{3} + 8.\overset{10}{3} = 100$

Doubling and Halving



80 pgs → 96 min
20 pgs → 24 min

100 pgs → 120 min

ENDING (Consolidation)

Have students analyze and compare solutions:

"How are these solutions different or the same?"

"If your solution was not talked about, which of the solutions was most similar to yours?" "Which one was it most like?" OR "Which one was most different from your solution?"

AFTER (Next steps and practice)

- If appropriate, the teacher can challenge students to pose their own questions to classmates who would use the same strategy to solve a problem.
- Students make their own written document of the strategies shared.
- Students can create their own word problems for the question.

MOVING FORWARD: CONTINUING PROFESSIONAL LEARNING

Cintron, S.M., Wadlington, D., & ChenFeng, A. (2021). *A pathway to equitable math instruction: Dismantling racism in mathematics instruction: Exercises for educators to reflect on their own biases to transform their instructional practice.* Stride 1. www.equitablemath.org/wp-content/uploads/sites/2/2020/11/1_STRIDE1.pdf

This resource provides detailed exercises for each month of a school calendar year. It is intended to be used by educators to examine their own biases and transform their instructional practice for teaching mathematics.



https://www.youtube.com/watch?v=rZSzOwyBYI8

Listen to a webinar where Professor Jodie Hunter (Massey University) discusses the use of culturally responsive approaches to teaching and learning mathematics in elementary schools.

https://theeducationhub.org.nz/

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Send your teaching-strategy ideas, problems, and student solutions to the *Abacus* Co-Editors via email abacus@oame.on.ca.