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ELEMENTARY
MATH

ONTARIO ASSOCIATION FOR MATHEMATICS EDUCATION

Abacus

Volume 61 • Number 2 • December 2022

CULTURALLY RELEVANT PEDAGOGY IN THE ELEMENTARY MATHEMATICS CLASSROOM

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ABACUS CO-EDITORS



MARC HUSBAND *has taught elementary mathematics in Ontario for 20+ years. He earned his Ph.D. in Mathematics Education in 2019 and is currently an assistant professor at St. Francis Xavier University in Nova Scotia. His classroom-based research investigates using student ideas as a resource for learning mathematics in schools, teacher education, and professional learning settings. mhusband@stfx.ca*



TINA RAPKE *currently focuses on all grade levels of mathematics teaching and learning (including the education of future teachers). She is interested in how research informs classroom practice and vice versa. She has 20+ years of teaching experience and is currently an associate professor at York University. Dr. Rapke holds a joint doctoral degree in mathematics and education. trapke@edu.yorku.ca*

IN THIS ISSUE

In this issue, we will focus on Culturally Relevant Pedagogy (CRP) in the elementary mathematics classroom. Our special guest author, Dr. Wendy Mackey, from St. Francis Xavier University, whose research expertise is culturally relevant pedagogy, shares her thoughts on what this looks like in an elementary mathematics classroom. As mathematics teachers, we reflect upon Dr. Mackey's suggestions to describe what this means for us. We include a description of a lesson idea that developed as we envisioned our own journey of CRP. The lesson idea is part of the two-page lesson plan insert included in this issue. We hope that readers will leave with concrete ideas they can incorporate into their mathematics teaching easily and immediately. Yes, we find CRP to be complex, but there are many entry points that any teacher can start using thoughtfully right away.

A Publication of the OAME/AOEM

CULTURALLY RELEVANT PEDAGOGY IN THE MATH CLASSROOM: IT'S A PERSONAL JOURNEY

By Dr. Wendy Mackey

Culturally relevant pedagogy (CRP) has become a buzzword in many schools across Canada. This has become the standard question: What have you changed in your practice to increase the academic achievement of your Black and other non-White students? CRP is the common answer, and the evidence of implementation is often presented in the form of ethnic names used in word problems, the appearance of store-bought anchor charts portraying Black and other non-White people on the walls, or explanations that students are failing because of contextual and social reasons thought to be beyond the teachers' responsibilities. What needs to happen for Black and non-White students to succeed is the centering of the students' culture within the math lesson itself.

What is CRP?

As Ladson-Billings (1995) described, being culturally relevant is a way of being culturally and racially competent, socially and critically conscious, and provides a method for students to be successful. Becoming a culturally relevant teacher, who can get students, especially those historically excluded from upper-level math classrooms and professions that require a strong understanding of mathematics, begins with the work of the teacher herself (Muhammad, 2003). That work lies within the three pillars described by Ladson-Billings: cultural and racial competence, critical consciousness, and academic success. A teacher will only find success implementing CRP if they have done the work to become culturally competent and critically conscious themselves. Without these two main ingredients, the students for whom CRP is intended will continue to be excluded from academic success in the classroom.

How do I get started?

The following questions can be used to guide your journey:

1. When thinking about my most disengaged student, do I know why they are disengaged in math?
2. When thinking about my most disengaged student, have I formed deficit views about their ability to succeed in math?
3. When thinking about my most disengaged student, what do I know about my student's life outside the classroom?
4. When thinking about my most disengaged student, can I list their interests? What do they enjoy and the activities they most enjoy participating in?
5. Does my instruction include the interests of my students?
6. Does my instruction mirror how my disengaged student learns?

Answering the Questions

Do you know enough to teach me? is the title of a seminal book by Dr. Stephen Peters that gets to the crux of the matter. Setting aside time to answer the above questions will give you the opportunity to: 1) reflect on what you know about your students; 2) learn about the community in which your students live; 3) delve deeper into topics that reflect what is going on in the community; 4) reflect on your teaching style—whether it matches the way you learn or the way the students learn; 5) answer the question, *Do I know enough about this student to teach them?*

Taking time to reflect on the answers to these questions will help you develop an understanding of how to put the student at the centre of instruction. Understanding what your most disengaged students enjoy outside of school hours, what their interests are, what they know about their world and how they learned it, will become the focal point of the why of learning mathematics. Students who are disengaged in the math classroom, especially students from groups that have been historically excluded from professions with a math foundation, struggle to see themselves at the centre of their learning. They do not understand what the math has to do with them; how they can use math to solve problems; or that mathematics is fun. Mathematics is all around us. Do our students see that? Is our instruction based on our world view, perspective, and experiences? Do the problems we propose to our students answer questions that are relevant to their lives and help them find solutions?

So far in this article, I have posed many questions. Becoming a culturally relevant teacher is more than changing names in word problems to be more ethnic sounding. A teacher cannot be culturally relevant simply by following a one-size-fits-all model. The journey toward becoming culturally relevant is a personal one. The answers to the questions posed are to assist each teacher in reaching a level of critical consciousness, where they understand their motives for teaching mathematics, understand whom they are teaching, reflect on what they believe the capabilities of their students are, and create critical thinkers. Understanding who our students are will increase our ability to communicate and interact with them. This is cultural competence. It is with both cultural competence and critical consciousness that we proceed and guide changes in teaching practice required for academic success.

The Humanistic Approach

Understanding our students, their beliefs, their dreams, and their environment will also help teachers to see students as brilliant human beings, who can apply mathematical thinking to improve their world and become socially and critically conscious. Understanding our students from this perspective allows us to engage in their world and make that our motivation and focal point of our lessons. Having students succeed in mathematics requires “understanding what students know and need to learn and then challenging and supporting them to learn it well” (Mirra, 2003, p. 18). With understanding the culture of your students—their world views, perspectives, and beliefs—a teacher will be able to teach effectively.

Using What We Know

Once we have embarked on the journey to be critically conscious and culturally competent, we can use what we know and understand about our students as “a vehicle for learning” (Ladson-Billings, 1995, p. 161). This is teaching in a culturally relevant manner. To be culturally responsive to our students’ learning styles, we must use students’ everyday experiences and cultural norms as the avenue to teach (Gay, 2000). As described by Irvine et al. (2010), as teachers, we must become the bridge builders between the students and the outcomes we are teaching.

In becoming the cultural bridge builders, we transform our teaching and classrooms to a space not just where facts are regurgitated in a manner that does not make sense in the student’s world, to an environment where the student’s culture is validated, and the purpose of the instruction is aligned with the student’s ways of knowing. This level of critical consciousness requires “decolonizing, decontextualizing, and then recontextualizing the subjects to involve a student’s unique experiences and backgrounds” (Emdin, 2022).

Student Engagement

The Principles of Learning, as set out by the public school program in Nova Scotia, Canada (Department of Education and Early Childhood Development, 2022), can act as a guide for reflecting on our lessons. Each principle of learning reminds us to keep the student at the centre of instruction and that our teaching must build upon what they know and understand.

1. Students learn when their different ways of knowing and representing knowledge are affirmed and validated, and they see themselves as capable and successful.
2. Students learn when they can construct knowledge and make it meaningful in terms of their prior cultural knowledge and experiences.
3. Students learn in a social and collaborative environment, where they co-actively construct knowledge.
4. Students learn when they can view learning as an integrated whole.
5. Students learn when reflection is integral to learning.

   (Source: www.ednet.ns.ca/psp/print/206)

For our students to be academically successful, their cultural identity must be validated, and students must understand that they have a place in your classroom, teaching, and profession (Emdin, 2022; Gay, 2000; Ladson-Billings, 1995; Muhammad, 2003). The above principles of learning remind us that our students, through their varied ways of gaining knowledge, need to have their ways of doing and showing accepted by the teacher. Teachers must take the time to know and understand students' experiences to amalgamate them into learning. This way, we are culturally relevant and responsive to their learning styles.

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Being Provoked by Dr. Mackey's Article

Dr. Mackey provoked us to embark on our journey to be critically conscious and culturally competent. Alongside with reflecting on the questions above, for us, we needed to start envisioning what this might look like in a mathematics classroom. We know that tasks that best exemplify CRP had to start with what's important to students outside of classrooms and relate to their everyday lives. Many students seem to say that they enjoy listening to their favourite music artists. We started with the idea of listening to music and a mathematics problem about reading that we thought might fit the context of listening to music from a mathematics education paper about enactivism (Towers & Proulx, p. 2014):

> *"Luc has read 20 pages in 48 minutes. At this rate, how many pages will he read in 2 hours?"*

In this spirit of CRP, we rewrote the question to become:

> *"You listen to 6 songs in 24 minutes. If the songs you listen to are mostly the same duration, how many songs will you have listened to in 2 hours?*

The new context provoked us to switch the numbers within the question. It did not seem to fit that a song would only be about 2 minutes and that kids would be listening for 2 hours straight. It took some time to decide which number would best fit the new context. Switching from 1 to 2 hours and 20 pages to 6 songs resulted in demonstrating different curriculum expectations. Changing the numbers within the question was challenging and took lots of time. See lesson insert for the difference in curriculum expectations and details of mathematical solution strategies.

We are left thinking about the central idea of Dr. Mackey's article on getting to know your students. As teachers of mathematics, we see the benefits of getting to know your students in two different, but related, ways:

- Getting to know students' math ideas/preferences
- Getting to know your students for creating contexts for word problems

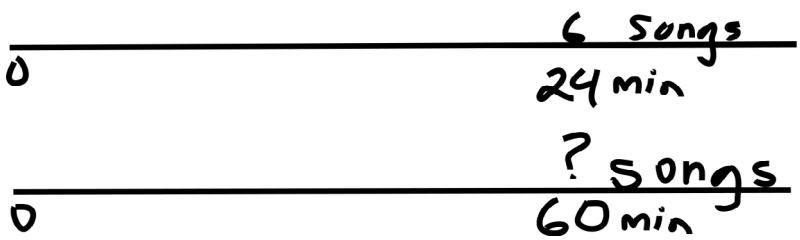
LESSON IDEA FOR CRP

PROBLEM: You listen to 6 songs in 24 minutes. If the songs you listen to are mostly the same duration, how many songs will you have listened to in 2 hours?

Curriculum Expectations:

Grade 4:	Grade 5:
B2.8 show simple multiplicative relationships involving whole-number rates, using various tools and drawings	B2.9 represent and create equivalent ratios and rates, using a variety of tools and models, in various contexts

Open number line



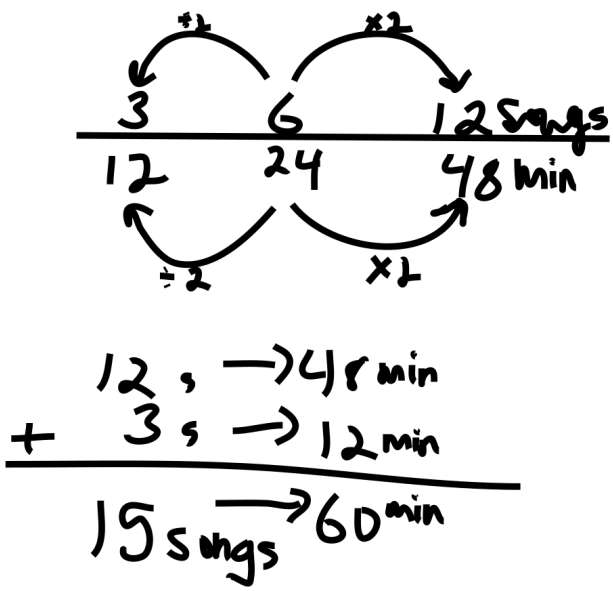
Quick Tip

Understanding the problem:

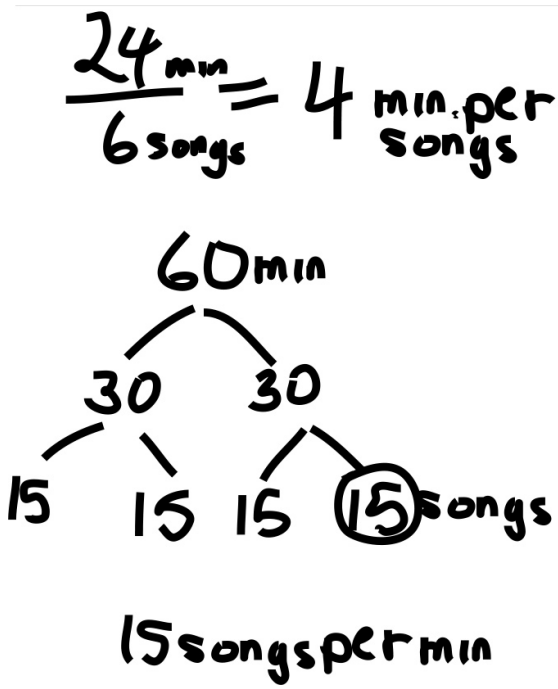
A number line might be a helpful tool for some students to visualize the problem. Consider using an open number line to record the problem.

Anticipated Solution Strategies

Doubling and Halving



Mins/song

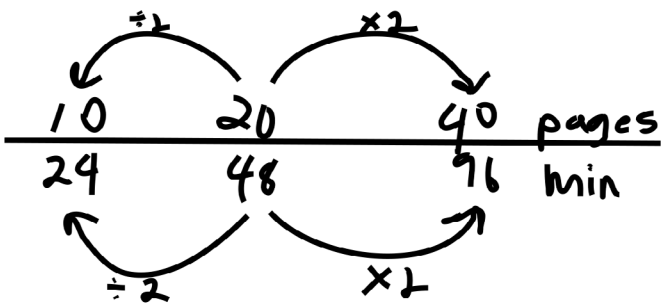


Curriculum Expectations:

Grade 5:	Grade 6:
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

Anticipated Solution Strategies for Original Problem

Doubling and Halving



40 pgs → 96 min
\+ 10 pgs → 24 min
50 pgs → 120 min

Using fractions

$\frac{20}{48} = \frac{10}{24} = \frac{5}{12}$

$\frac{5}{12} \times \frac{10}{10} = 5 \times 10$

50 pages in 2 hrs

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 make their own word problems for the question.

Contexts for crafting word problems: Dr. Mackey is very clear in telling us that to enact CRP, it is not enough to include ethnic names within word problems. We take her suggestions to mean that we need to get to know our students' interests outside of school, so that we can use these contexts to craft word problems that will be engaging for students. We see this as a first step toward a learning environment where students' culture is validated. As previously mentioned, adapting contexts can require deep understanding of mathematics. Ideally, the mathematics problems will emerge from the contexts.

Knowing students' math ideas (i.e., preferences in solution strategies): Ensuring teaching is aligned with students' ways of knowing was identified by Dr. Mackey as a crucial feature of CRP. To us, as mathematics teachers, that means that we must be listening to and focusing on how students approach/solve math problems. Students' ideas must be central in the mathematics classroom. Listening to students becomes much easier with time, meaning that the more time you spend listening to students' ideas, the more you will get to know their preferences in solution strategies.

MOVING FORWARD: CONTINUING PROFESSIONAL LEARNING

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. (2021).

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.

Graduate Students of Mathematics Education Work on Equitable Teaching

We have been working with a group of graduate students, who have been uncovering what mathematics education researchers are saying about equitable teaching practices. These graduate students have been discussing a table that can be found in Bartell et al. (2017) work. Below is a "shortened" version (i.e., contains fewer examples) of these authors' table in their paper about a framework toward equitable teaching. We will be sharing some of the graduate student work in the next issue. Specifically, graduate students will be communicating concrete steps that they take in their own classrooms so that they demonstrate the description of the provided examples.

EQUITABLE TEACHING PRACTICES	EXAMPLES
Monitor how students position each other.	Position students to use one another as mathematical resources.
Position students as capable.	Share power in the classroom by allowing students to provide meaningful input in making decisions about classroom practices, curriculum, and assessment.
Establish classroom norms for participation.	Set up and guide discussions so that students from non-dominant backgrounds develop strong mathematical identities.
Draw on students' funds of knowledge.	Have a robust knowledge of students, validate shared ideas and experiences, and connect instruction to students' experiences and interests.
Attend to students' mathematical thinking.	Recognize, understand, and build from children's understanding of mathematics.
Support the development of a socio-political disposition.	Engage students in conversation about real-world problems and how mathematics can be used to examine them.

Adapted from "Toward a Framework for Research Linking Equitable Teaching with the Standards for Mathematical Practice" by Bartell, T., Wager, A., Edwards, A., Battey, D., Foote, M., & Spencer, J., 2017, *Journal of Research in Mathematics Education, Vol 48* (1), pp. 11–12. Copyright 2017 by Journal for Research in Mathematics Education.

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