

Sarah Mayes-Tang, University of Toronto

CMESG, June 11 2021



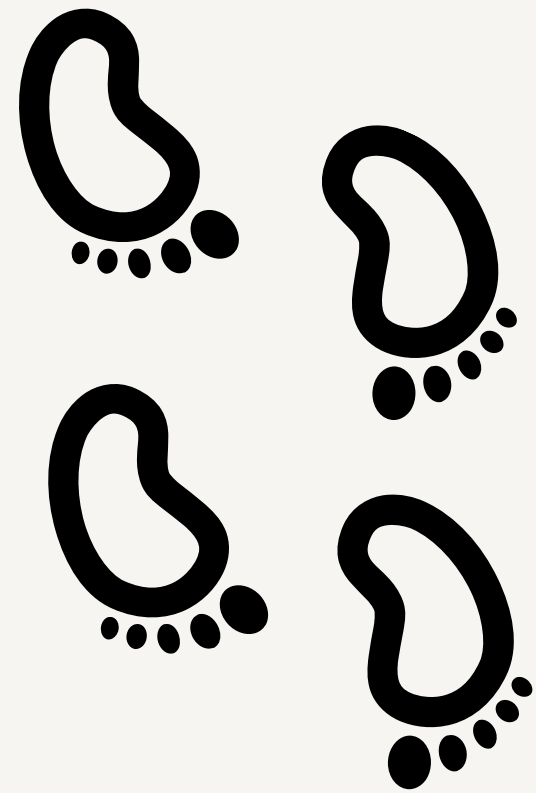
# Teaching on Empty:

Trauma, Achievement, and

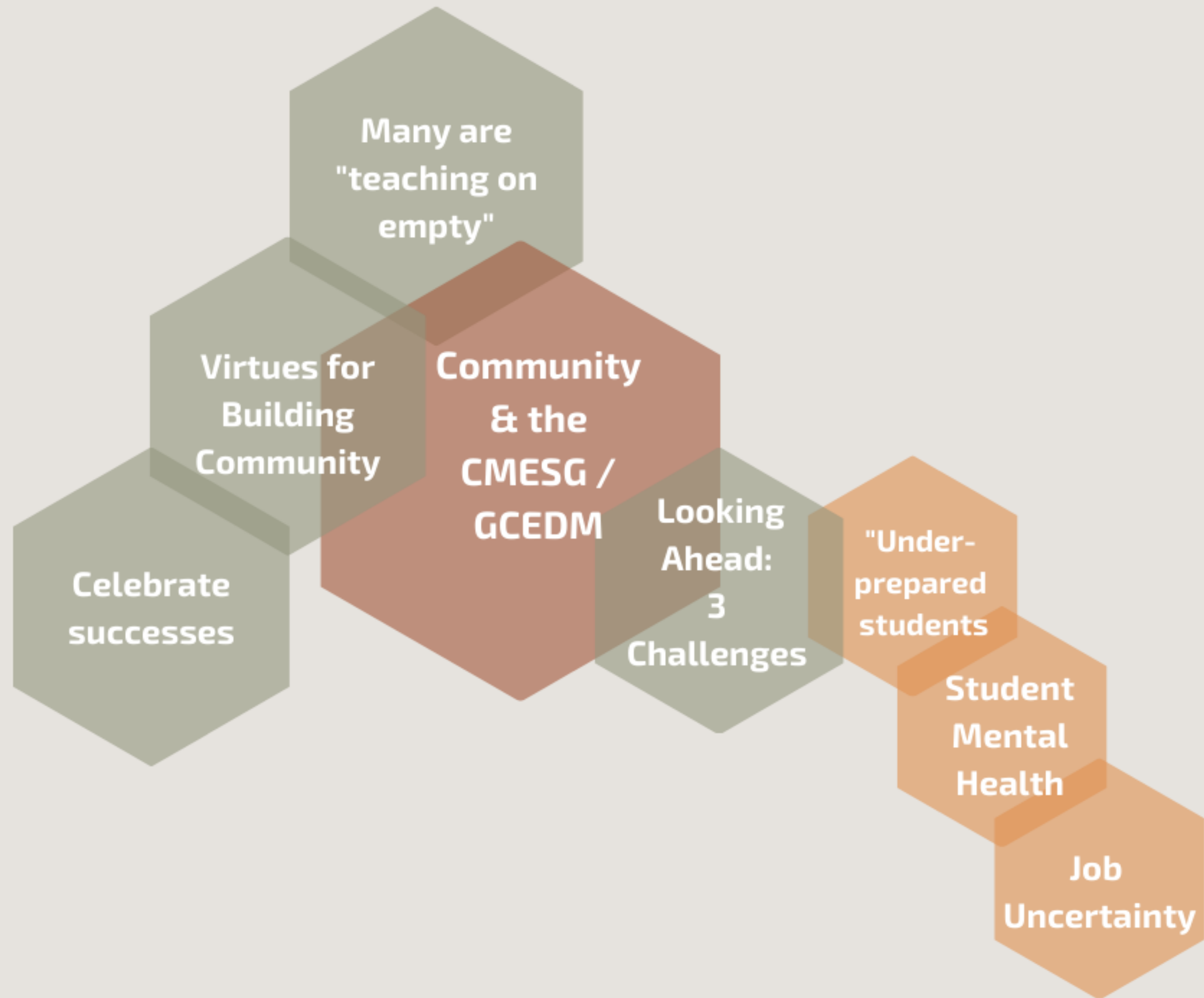
What's Next in our

Mathematical Community

# Invitation to step away











**Kristen McCullough** @KB\_McCullough · May 29

If someone comes to you for help:  
Please don't diminish their experience or interpretation.  
Please believe them.  
Please listen to them.  
Please help them.

#MeToo 🙋 #HeForShe 🌸

# THE TRAUMA SURROUNDING US

**Len** @LenParis1

The death of a young E Manon - in 2010 at the hands of Toronto police. The case is very similar to how George Floyd was murdered in 2020.

#colonialism #blacklivesmatter 🍌 #racism #policebrutality #BLM #antiblackracism

**Abdu Sharkawy** @SharkawyMD · 8h

Sleep escapes me. When I awake, will it make any more sense that hate, racism, Islamophobia & xenophobia are very much part of the country I love like none other? It won't & it must change. #OurLondonFamily #EndIslamophobia #EndRacism #HumanityFirst 🇨🇦

27 92 960

**Sandra** @SandraS47212367 · May 31

My heart grieves for these innocent babies. #215children







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**Canadian Mathematical Society** @canmathsociety · May 10

The Canadian Mathematical Society is extremely saddened by the news of Dr. Alfonso Gracia-Saz's passing.

[ow.ly/NWLi50EJdGr](https://ow.ly/NWLi50EJdGr)

La Société mathématique du Canada est extrêmement attristée par la terrible nouvelle du décès d'Alfonso Gracia-Saz.

[ow.ly/tLtd50EJdJ2](https://ow.ly/tLtd50EJdJ2)



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Norasitnurulaisyah. @NoraCTNurulAisy · Jun 5  
Stop Asian hate. Respect, love one another. #StopAsianHate  
#StopAsianHateCrimes



SENDIASS Leicester @SendiassL · May 31  
#MentalHealthMonday

A day to reflect on **children/young people** #MentalHealth and the wellbeing of their families.

**Children and young people with a learning disability are three times more likely than average to have a mental health problem** (Lavis et al, 2019)



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2 5 12

**Children's Colorado** @ChildrensColo · Jun 3  
Last week, we declared a State of Emergency in youth #MentalHealth. Read more about how we'd like to see this issue addressed and where the funds to make it happen could come from. #COHealth #COleg



Children's Hospital Colorado declares mental health state of emergency... Colorado children and teens are attempting suicide at levels never seen in the state, causing a mental health crisis.  
[coloradosun.com](https://coloradosun.com)

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#colonialism #blacklivesmatter #policebrutality #BLM #antiblackra

**Canadian Paediatric Society** @CanPaedSociety

"We cannot overstate the extent of the #mentalhealth crisis facing children and youth."





For months, educational specialists have supported university educators with the transition from in-person to online teaching, but little attention has been paid to the vulnerability and frustration faculty might experience during the process. [universityaffairs.ca/career-advice/...](https://universityaffairs.ca/career-advice/) #CdnPSE



10:46 AM · Sep 1, 2020 · TweetDeck



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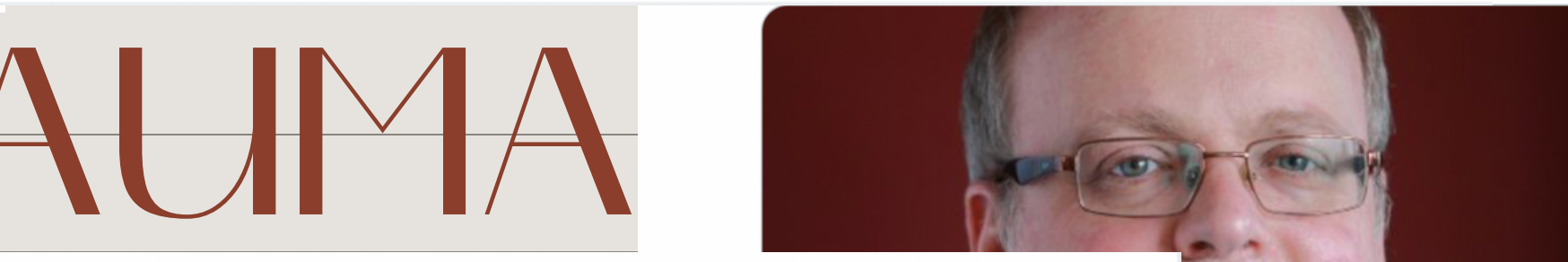
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Kristen McCullough @KB\_McCullough · May 29 If someone comes to you for help: Please don't diminish their experience or interpretation.

Joel Kisson @jrkisson · Aug 22, 2020 Doh get me wrong eh, I understand and fully support the **transition to online teaching**, but I gonna miss struggling w people around me...suffering together is more comfortable than suffering alone, misery rly like company yes sigh



HERBERT HAWKER @HawkerHerbie · Jun 2 I work in a school. Support for the **transition to online teaching** and learning was poor.





image from: Washington Post Parenting Column









# Some math



FOR PANDEMIC OVERWHELM IN OUR JOBS

net gain or  
loss from  
our jobs as  
educators

=

what we get  
out of our  
jobs as  
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—

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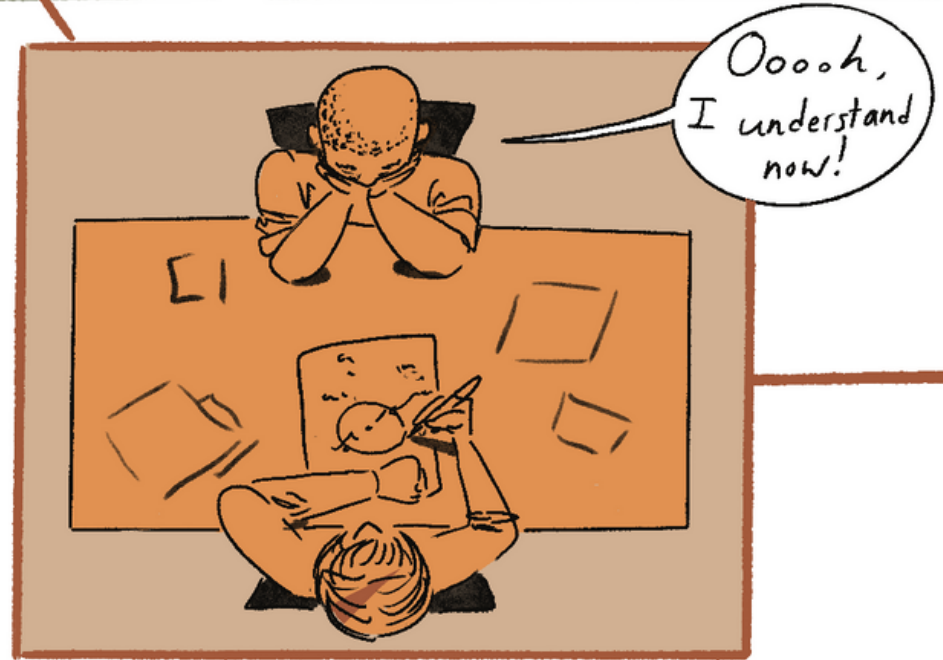
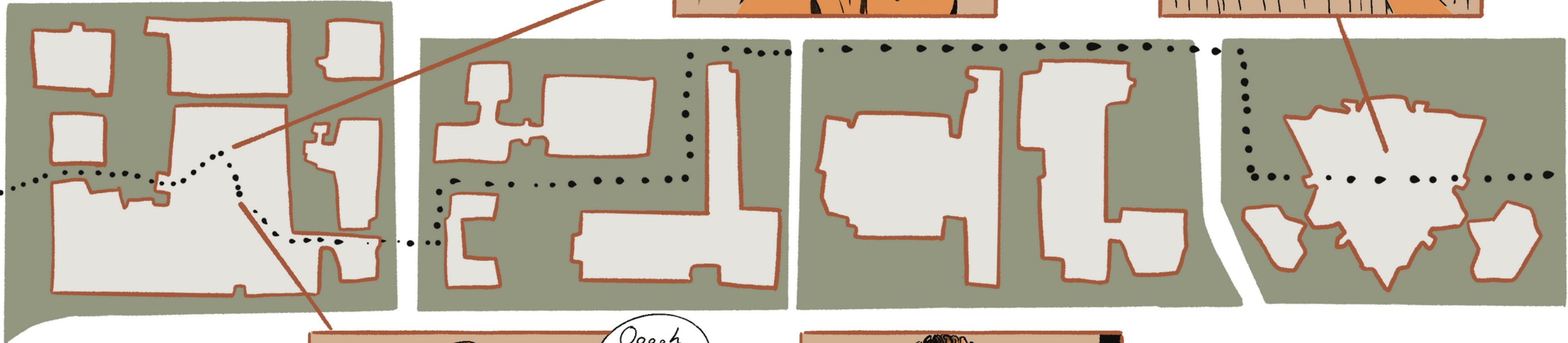
what we get  
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# Things I ♥ed about my job



# Some math



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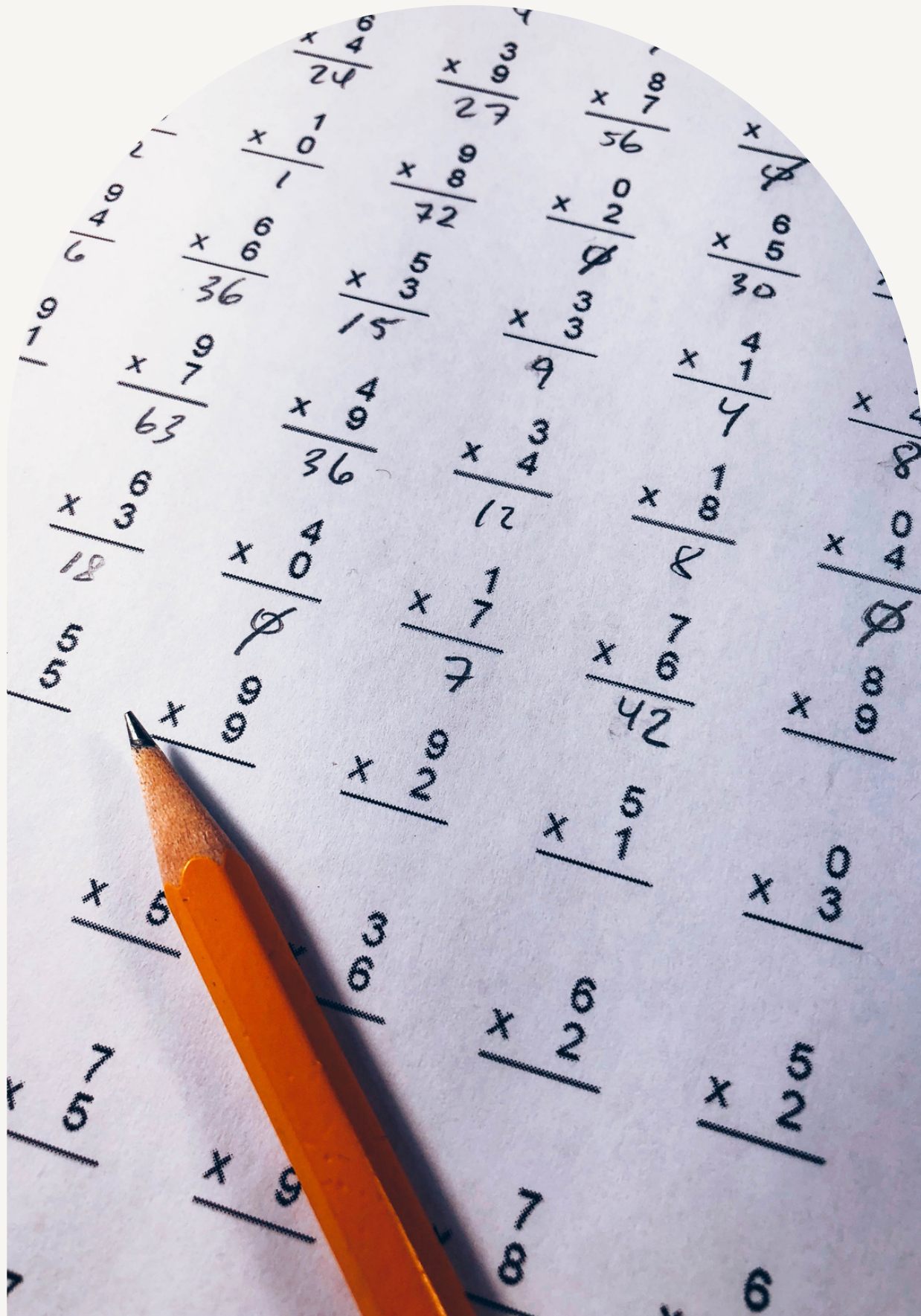
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ON PADLET:



What was a challenge you faced as a math educator this year?

[tinyurl.com/cmmsgChallenge](https://tinyurl.com/cmmsgChallenge)



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# 3 Claims

1

**Struggling now shows you care**

It is not a bad thing.

2

**We risk weakening the math education community for our lifetimes**

We must be careful about how we treat the fallout of the pandemic.

3

**This moment is an opportunity for the CMESG & Canadian math education community.**

We can relate better to those who are struggling





### 3 Cla

"Complicity often happens because professors and students alike are afraid to challenge, because that would mean more work. Engaging pedagogy is physically exhausting."

*bell hooks*

you care





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# 3 Cla

Women, Indigenous, racialized, low-income, LGBTQ+ and other vulnerable groups are worse affected by the Pandemic.

you care →

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study of pandemic stress of teachers: "this study indicates that there are higher levels of stress and anxiety among women in comparison with men."

w we treat the

Statistics Canada, May 2021 Labour report: "The number of core-aged women (25-54) participating in the labour market fell by 39,000 (-0.6%) in May and the participation rate for this group dropped for the second consecutive month, falling 0.5 percentage points to 83.1%. Participation for core-aged women had recovered in fall 2020 to pre-pandemic levels, and held relatively steady until April 2021."



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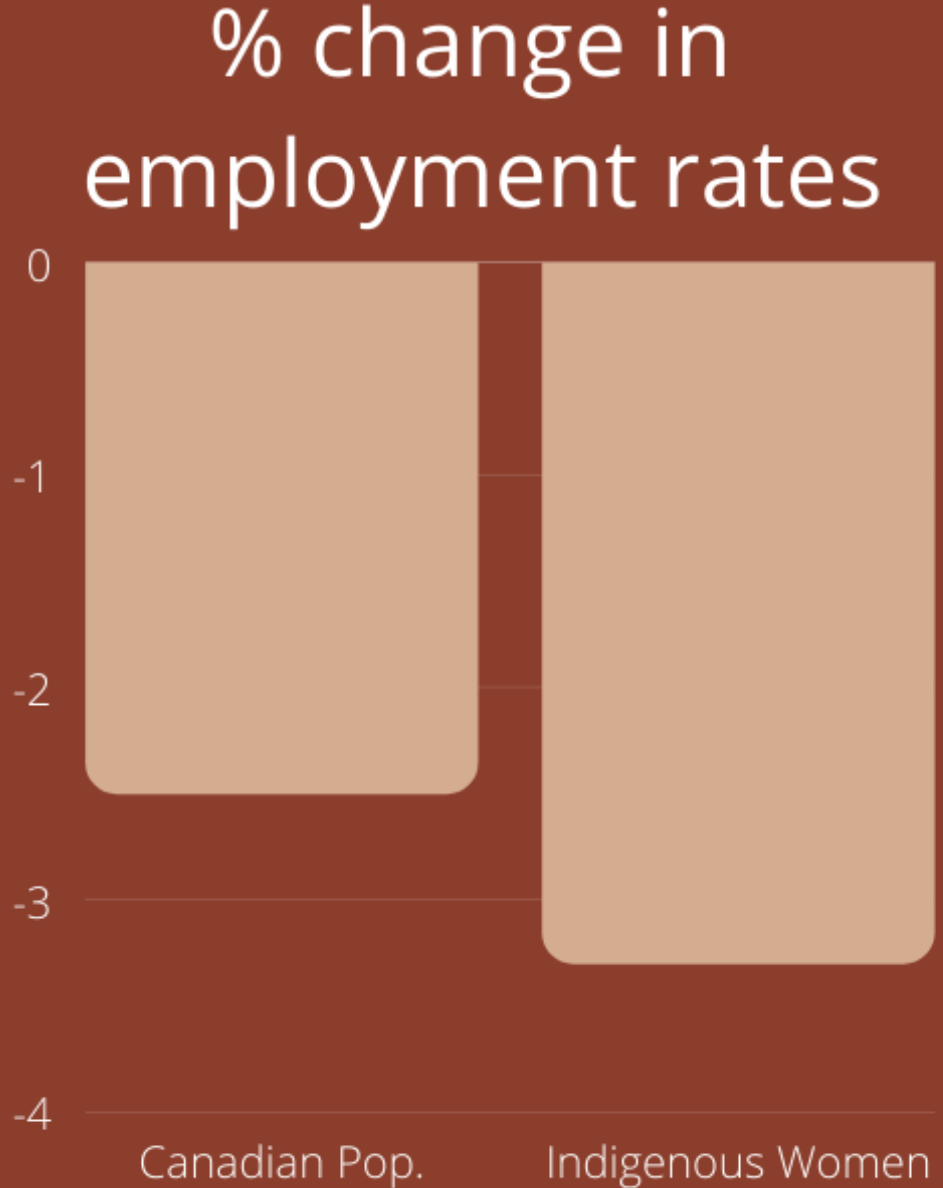
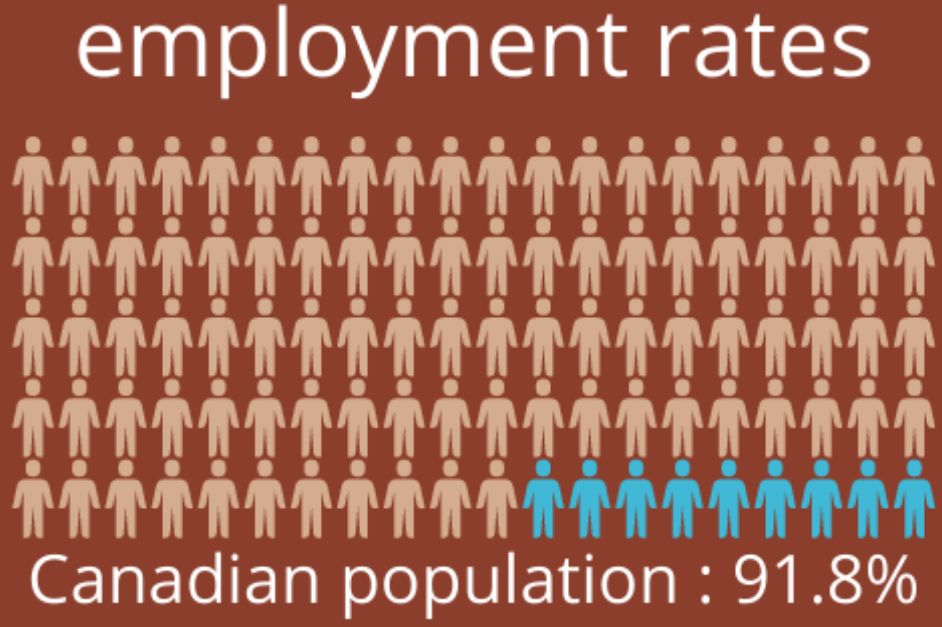
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### 3 Claim

"None of us can flourish without a supportive community - people with whom we can share joys and sorrows, hopes and fears / A community helps us normalize struggle and realize "I'm not alone in my struggle.""

*Francis Sa*

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When facing  
challenges...



NURTURE A SUPPORTIVE  
MATH COMMUNITY

When  
challenged

NURTURE

M



"Working Groups form the core of each CMESG meeting. Participants choose one of several possible topics and, for three days, **become members of a community** that meets three hours every day to exchange ideas and knowledge and, through discussions that often continue beyond the allotted time, create fresh knowledge and insights. **Throughout the three days, the group becomes much more than a sum of its parts—often in ways totally unexpected to its leaders.**"

CMESG Report, 2003

RTIVE

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CMESG/GCEDM

AS A PLACE TO BUILD COMMUNITY

Saul Freeman-



ON PADLET: \_



Dos and  
Don'ts of  
being in a  
mathematical  
community

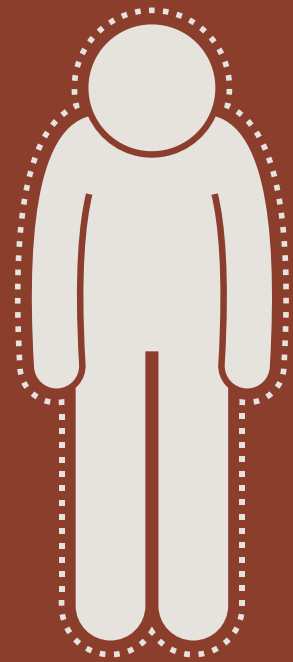
[tinyurl.com/cmmsgCommunity](https://tinyurl.com/cmmsgCommunity)



# Virtues to build math communities



FROM FRANCIS SU



**vulnerability**



**self-reflection**



**hospitality**  
(incl. disposition to affirm others)



**attention to people**

These virtues counter tendencies in math communities  
(hierarchies, implicit bias, feelings of not belonging)



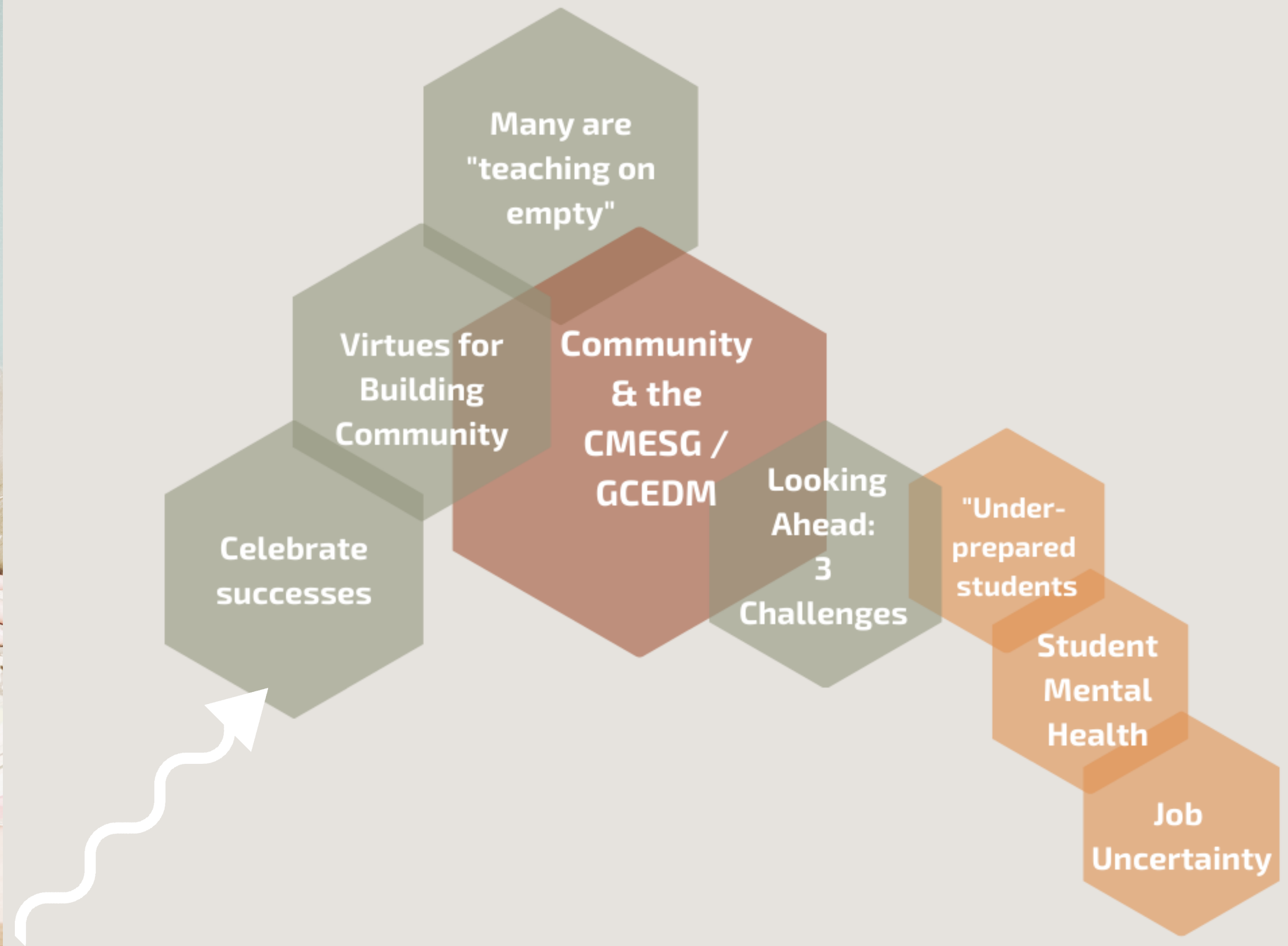


COMMUNITIES

CELEBRATE

SUCCESS!



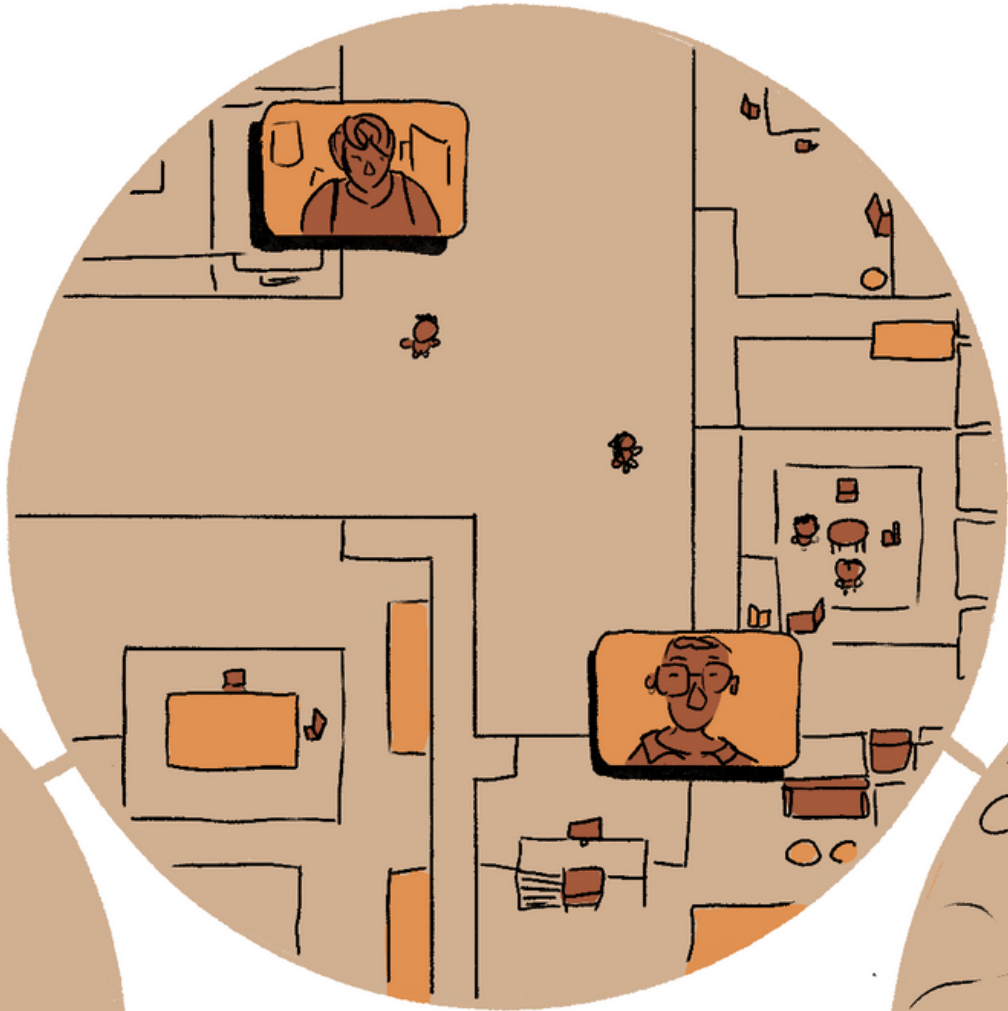




# A few successes..

DURING THIS PANDEMIC YEAR

FIRST YEAR  
MATH AND STATS  
IN CANADA  
(FYMSTC)

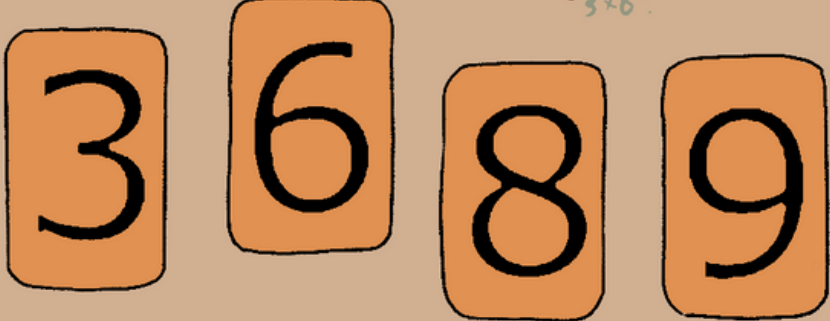


WILLIAM YU

K-12 TEACHERS  
ACROSS CANADA



COURTNEY ADAMS



Can you think of a way to combine the four numbers using only addition, subtraction, multiplication and division to get a result of 24? Share your strategies & solutions...

$8 \times 6 - 3 \times 9$ ?

$3 \times 8$ ?

$3 \times 6 - 3 \times 8$ ?



IN CHAT:



What is one  
of your  
teaching /  
career  
successes this  
year?

WE WANT TO HEAR ALL VOICES.



# 3 BIG Strides We've Made

IN MATH EDUCATION THIS  
YEAR

1

**More teachers believe in active learning and non-traditional assessments**

Online learning forced them to give it a chance... and they discovered how much better they knew their students. They want to learn more.

2

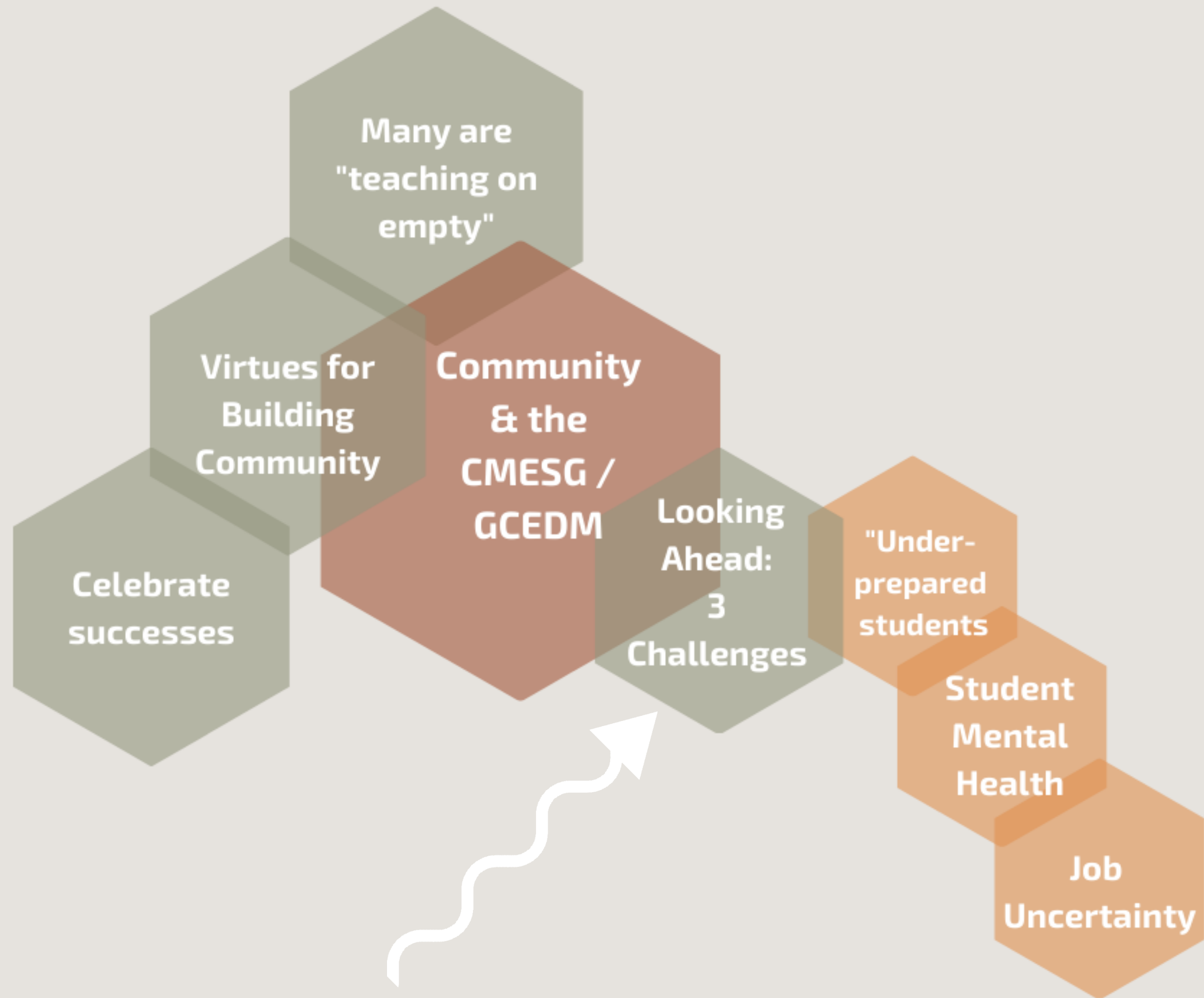
**We are now used to connecting virtually.**

Gives us the opportunity to build networks across the country and welcome more people into our communities, equitably.

3

**New opportunities for math are recognized.**

Math is at the top of the news each day... builds new and diverse needs we can respond to.





# 3 Immediate Challenges

FOR THE MATH ED COMMUNITY

①

## **Students who are "underprepared"**

There is a concern about what students learn at home, and gentler policies / assessments have made it difficult to assess.

②

## **More students in mental health crises.**

Pandemic has increased anxiety, substance abuse, and other mental health issues among children & adolescents

③

## **Uncertainty around our own jobs.**

Unstable job markets, will new demands become the norm, what will campuses look like in fall?

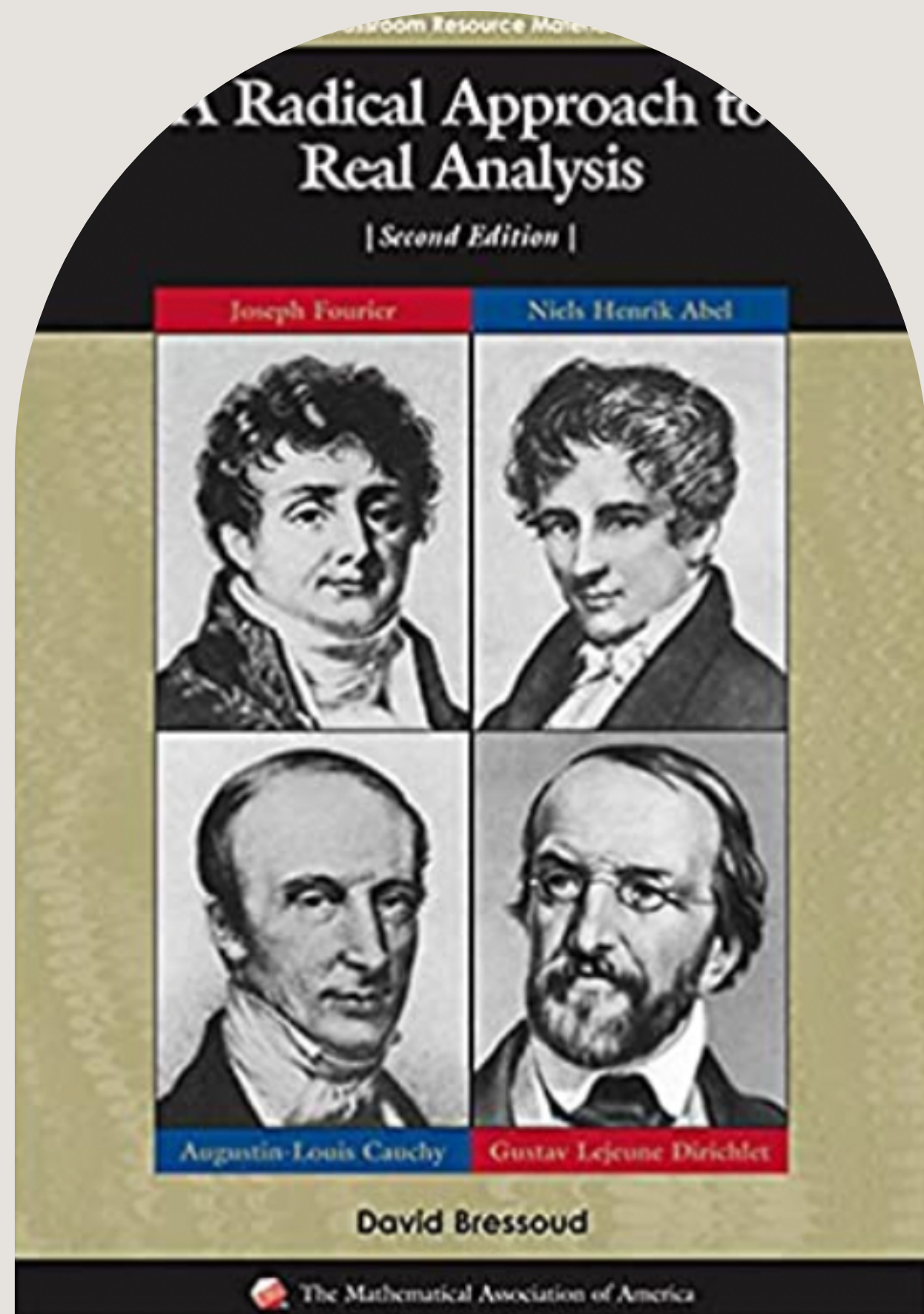


# Alternatives to Remediation



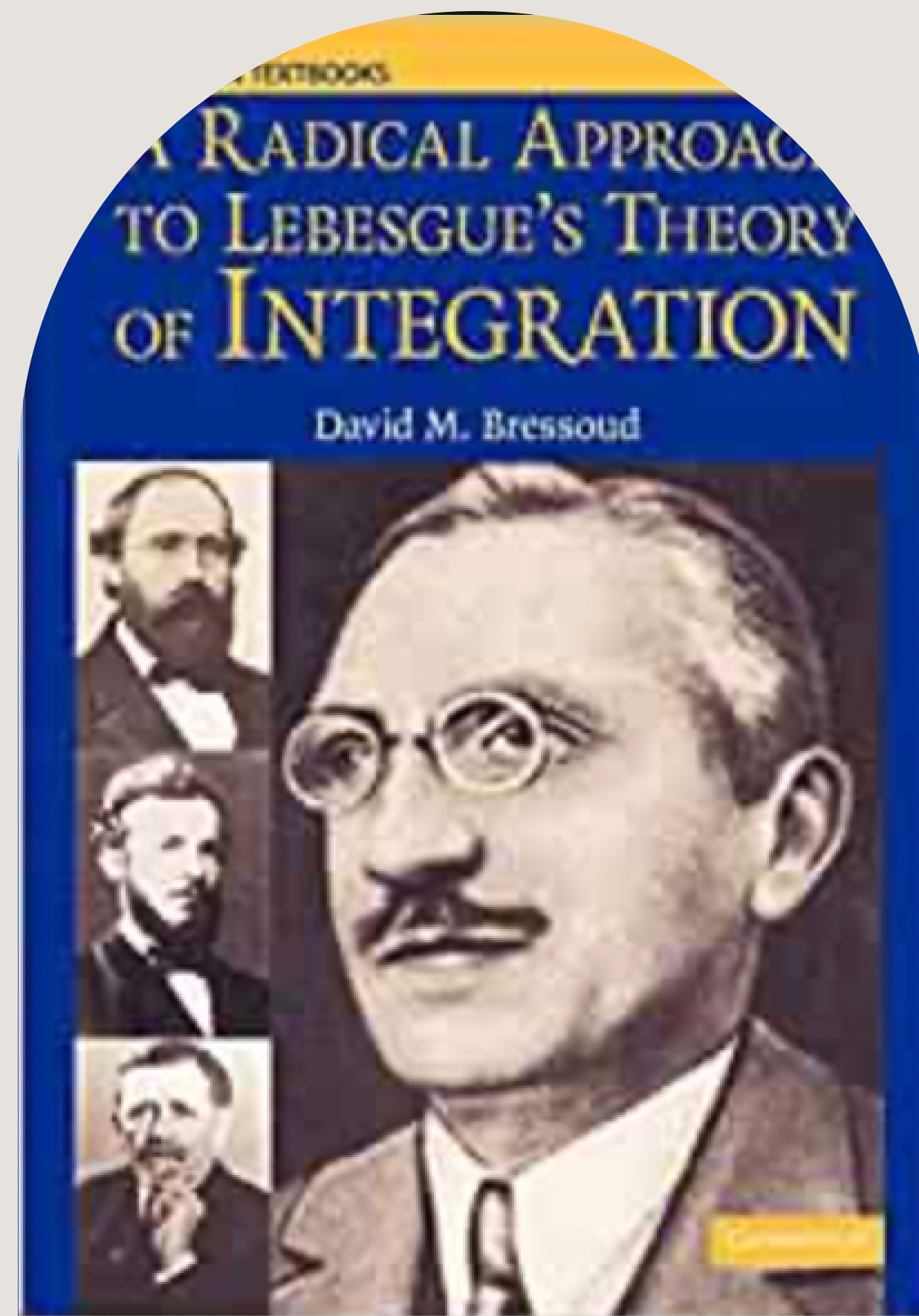


# Alternatives to Remediation



Tell the story: a historical approach

RETHINK YOUR ASSUMPTIONS







# Alternatives to Remediation





# Party Time



## Level A

Cindy had a party. She invited two guests. Her guests each invited four guests, and then those guests each invited three guests.

How many people were at Cindy's party?

## Level C

Mia, Jake, Carol, Barbara, Ford a costume party. Figure out which costume and when they arrived

- The person that arrived four
- Barbara was the last to arrive
- Jake and Mia arrived and she
- The first person was dressed
- Superman arrived right before
- The Potato Heads were always
- Ford was a Surfer Dude.
- The French Maid was not Cindy
- The Vampire arrived after she

## Level D

Your Aunt is having a baby. You have created a party game for a baby shower. It is called pick the gender. You put pink and blue tiles into a bag. You ask two guests to pick one tile out of the bag without looking. You tell your guests that if they are the same color, player A wins and if they are two different colors, then player B wins.

How many tiles of which colors did you put into the bag to make sure that both players have an equal chance of winning?

Explain your solution and why it is fair.

## Level E

A man and his wife invite 5 other couples to a dinner. When the guests arrive for drinks before dinner, they shake hands. Not everybody shakes everybody's hands, and of course each person shakes hands with his own spouse. Later, as they sit down for dinner, the host asks each other person, including himself, "how many hands you shake?" He notices, to his surprise, that each respondent shook a different number of hands.

How many did his wife shake?

Explain your solution and justify your reasoning.

# Multi-Level Problems →

## PROBLEMS OF THE MONTH FROM THE DANA CENTERS' *INSIDE MATH*

Level A: Counting to find number of guests

Level B: Partitions and simple fractions to find number of girls with short red hair

Level C: logic puzzle to match costumes, arrival time, and name

Level D: when is a party game fair for both players?

Justify

Level E: solve complex logic problem to find how many hands shaken, justify, and explain

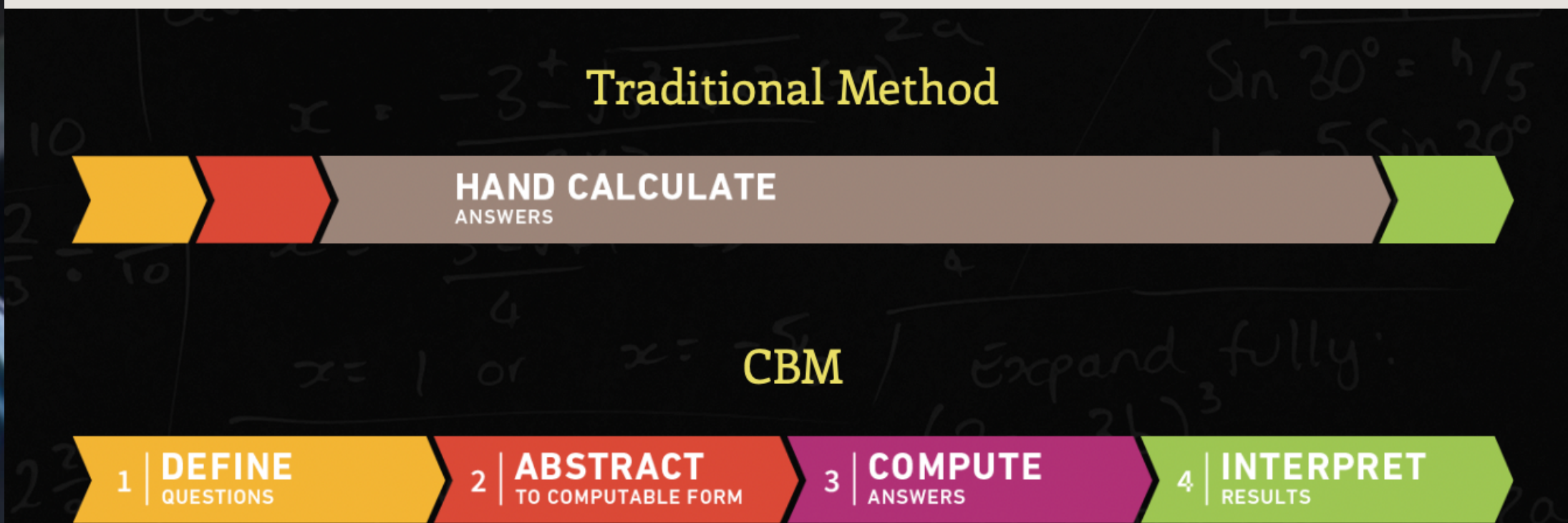
Up to Level 7 = University Level





# Alternatives to Remediation

# Alternative Course Pathways



[computerbasedmath.org](http://computerbasedmath.org)



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FOR THE MATH ED COMMUNITY

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There is a concern about what students learn at home, and gentler policies / assessments have made it difficult to assess.

2

## **More students in mental health crises.**

Pandemic has increased anxiety, substance abuse, and other mental health issues among children & adolescents

3

## **Uncertainty around our own jobs.**

Unstable job markets, will new demands become the norm, what will campuses look like in fall?



OO FACULTY



# Trauma-Aware Teaching Checklist

This doc lives at: <https://bit.ly/traumachecklist>.

*This checklist has been prepared for higher educators as a tool to reflect on their teaching and courses, regardless of modality. The [six principles of trauma-informed care](#) developed by SAMHSA (Substance Abuse and Mental Health Services Administration) are a foundational concept in the trauma field. In this checklist, they are adapted to the field of education to assist teachers in creating more trauma-aware classrooms.*





3. Peer Support

4. Collaboration & Mutuality

SUPPORT, SUGGEST,  
SUSTAIN COMMUNITIES IN  
CLASSROOMS TO SUPPORT  
MENTAL HEALTH



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"This is the picture of a flourishing mathematical community: people who have joined together in a common mission of exploration and play, bouncing ideas off each other, valuing one another's input, getting excited about the directions their ideas are taking them in, and embodying a wide variety of mathematical virtues along the way."

*Francis Su*





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ORT

*What are students going  
to do & think & say?*

not

*What am I going to do?*

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# Seek to understand your students deeply.



interview  
current & former  
students



look to authentic  
problems in  
future contexts



show them how  
to use math for  
social justice



design  
assessments  
that they will  
remember & enjoy

# Upcoming Trends to Expect

WE WILL BE PREPARED IF WE FOCUS ON GOOD TEACHING.



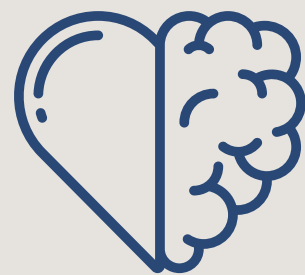
## **Demand for jobs-focused, skills-based short courses in higher education will increase.**

This has largely been based in colleges - it will now be centred in Universities. K-12 will respond to job-focused demand.



## **Online education will remain a presence.**

Canadian government and higher education sees a market for international students to receive degrees & diplomas while in home countries



## **Focus on mental health and building school community.**

Consider what you are doing in your classes to build community. It's been touch this year.





# Upcoming Trends Expect

WE WILL BE PREPARED  
FOCUS ON GOOD THINGS

- 1. How can our community prepare?*
- 2. How can we support each other in transitions?*
- 3. What do we need?*

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CMESG/GCEDM

AS A PLACE TO BUILD COMMUNITY

Saul Freeman-



When  
challenged

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"The **regular interaction and cooperation** of professors from education and mathematics departments within the Study Group remains a significant and treasurable feature...

Attendance at CMESG/GCEDM meetings has varied between 30 and 70, with most in the 50-60 range. This is a good size for the kind of meetings the Group organises: **small enough to give a feeling of community** while large enough to ensure a mix of interest and experience."


David Wheeler, *The Origins of CMESG/GCEDM*

RTIVE

y

(Extra slide cut due to time)

(Extra slide from "Tell the Story" (cut due to time)



**Number And Operations-Fractions**  
Use Equivalent Fractions As A Strategy To Add And Subtract Fractions.  
MAJOR CLUSTER

## 5.NF.A.1

Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. For example,  $2/3 + 5/4 = 8/12 + 15/12 = 23/12$ . (In general,  $a/b + c/d = (ad + bc)/bd$ .)

Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written

Map Standard

**Number And Operations-Fractions**  
Use Equivalent Fractions As A Strategy To Add And Subtract Fractions.  
MAJOR CLUSTER

## 5.NF.A.2

Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number

Map Standard

**Expressions And Equations**  
Reason About And Solve One-Variable Equations And Inequalities.  
MAJOR CLUSTER

## 6.EE.B.7

Solve real-world and mathematical problems by writing and solving equations of the form  $x + p = q$  and  $px = q$  for cases in which  $p$ ,  $q$  and  $x$  are all nonnegative rational numbers.

Map Standard

**The Number System**  
Apply And Extend Previous Understandings Of Operations With Fractions To Add, Subtract, Multiply, And Divide Rational Numbers.  
MAJOR CLUSTER

## 7.NS.A.1

Fluently add, subtract, multiply, and divide multi-digit de  
algorithm for each operation.

Map Standard

**Measurement And Data**  
Represent And Interpret Data.  
SUPPORTING CLUSTER

## 5.MD.B.2

Make a line plot to display a data set of measurements in  
1/8). Use operations on fractions for this grade to solve  
information presented in line plots. For example, given

Map Standard

**Expressions And Equations**  
Solve Real-Life And Mathematical Problems Using Num  
Expressions And Equations.  
MAJOR CLUSTER

## 7.EE.B.4

Use variables to represent quantities in a real-world or m  
construct simple equations and inequalities to solve pro  
quantities.

Map Standard

**The Number System**  
Apply And Extend Previous Understandings Of Operati  
Subtract, Multiply, And Divide Rational Numbers.  
MAJOR CLUSTER

## 7.NS.A.2

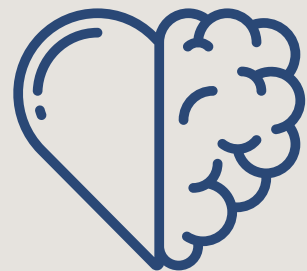


SUPPORT,  
SUGGEST,  
SUSTAIN  
COMMUNITIES  
IN  
CLASSROOMS  
TO SUPPORT  
MENTAL  
HEALTH



**Successful course design: beginning doctoral students construct proofs & present them at the board *with extensive feedback*.**

Goal is to make formal-rhetorical parts of proof process second-nature so students can focus on the problem-solving aspect of proof. (Selden & Selden, 2009)



**(Extra slide cut due to time)**