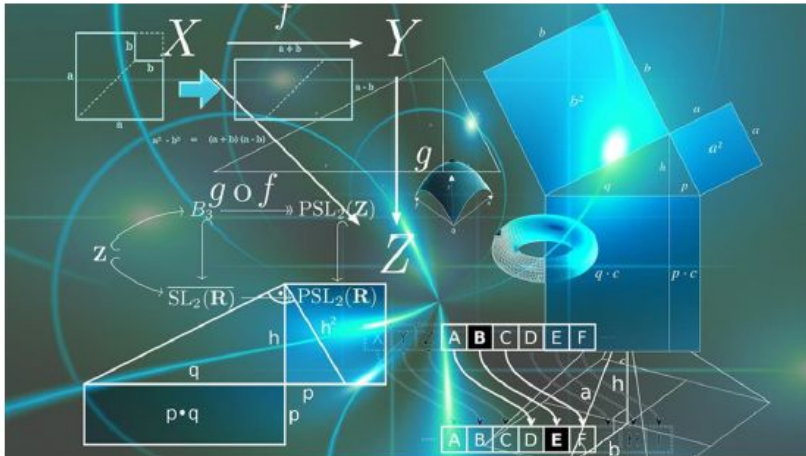


Elevating Numeracy in a 100% Digital Environment

OCMA Ontario Colleges
Mathematics Association

The Ontario Colleges
Mathematics Association
40ish Annual Conference

Augmented



CONFERENCE PROGRAM

Fern Resort
Orillia, Ontario
October 25 to 27, 2021

Presenters:

Emily Brown, Sheridan College

James Howell, Vretta Inc

INTRODUCTION



Emily Brown, Sheridan College
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James Howell, Vretta Inc
james.howell@vretta.com

AGENDA

- ❖ Impacts of the Pandemic
- ❖ +’s and -’s of online and remote learning
- ❖ Re-examining the Numeracy Gap
- ❖ Deployments
- ❖ Q & A
- ❖ Contact Us

Steps taken by ON Secondary Schools



EQAO benchmark test not administered in grades 3, 6 & 9 during the pandemic due to constraints. Data Gap of test results is now *missing* in benchmarking records for the future.

- Most school boards deferred to online/remote learning at some point during the pandemic.
- Some boards attempted to create a shorter rotary window using Quadmesters or Octomesters as an intervention to bring students back to the classroom.*
- Ontario Secondary school board, have expanded access to math tutors, engagement strategies, summer learning programs to bridge gaps between courses, grades and to transition to post-secondary.*

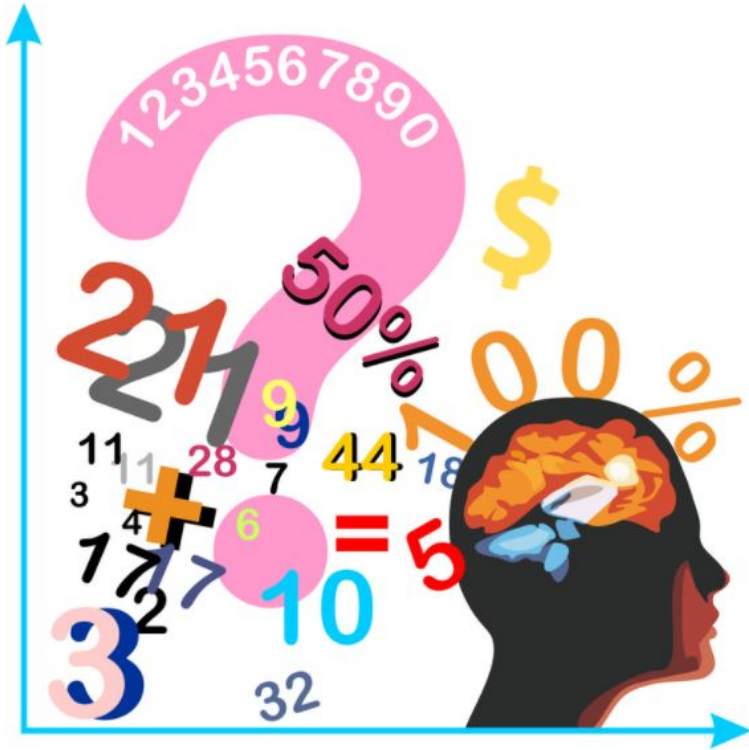
Source: [Learning Our Way Out of the Pandemic](#),
Dr. Karen Mundy & Dr. Kelly Gallagher-Mackey, (2021)

Steps taken by ON Post-secondary

- With International students, which make up a large portion of ON college students, not allowed to enter the country due to travel restrictions, many colleges were forced to deliver programs remotely.
- Pandemic Pivot to online/remote learning was *just as* stressful for post-secondary educators. Online delivery included recorded lessons, videos, synchronous/asynchronous learning, , new digital assessments wherever possible.
- Deployment of new remote proctoring services was required. During the pandemic these became overwhelmed, and capacity for post-admission placement testing was reduced at some ON institutions. A Data Gap?
- Other post-secondary institutions using the OCMT were well placed to transition to the informal platform and saw an increase in usage.



Challenges with Remote Learning



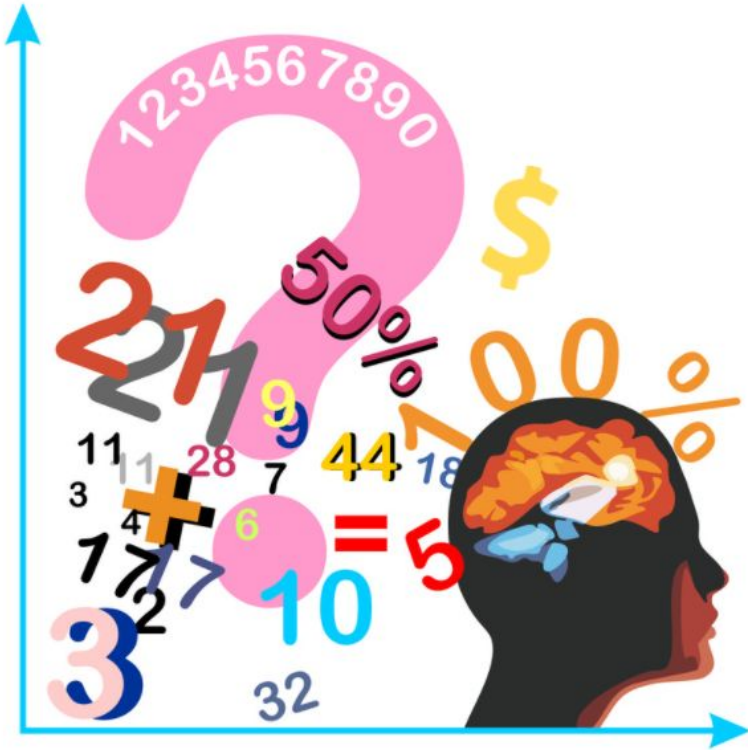
Students

- Access to their own laptop/computer that meets the needs of online learning.
- Lack of face-to-face interaction and additional support.
- Shared study space in their home, may feel invasive and discourage anxious learners.
- International students in different time zones (attendance/test taking).
- Anxiety of normal stressors magnified during the work/study from home imposed on student learners.

“All students will benefit from instructors who know how to recognize students at-risk and put forth effort to connect students to supports using standard tools such as early warning systems and retention centers that employ basic, but effective, learning analytics. As the 2020-2021 academic calendar proceeds, students are likely to be more vulnerable than ever, struggling financially and academically.”

- (Jason Openo, 2020)

Challenges with Remote Learning



Instructors

- Training for online instruction often lacking, or delivered just-in-time.
- Support to identify and utilize effective tools to supplement the in-class experience.
- Access to resources for both instructors and their students.
- Inability to know their students personally to build a relationship of trust.
- “Do my students get it?”
- Questions arise about academic quality, integrity and rigour of assessments.

*“Just over one-third (**37%**) of institutions required pedagogical training for online instruction, and only about **45** percent required LMS training....the case can be made that this training is about achieving better learning outcomes for students and not to inhibit faculty autonomy”*

- (Jason Openo, 2020)

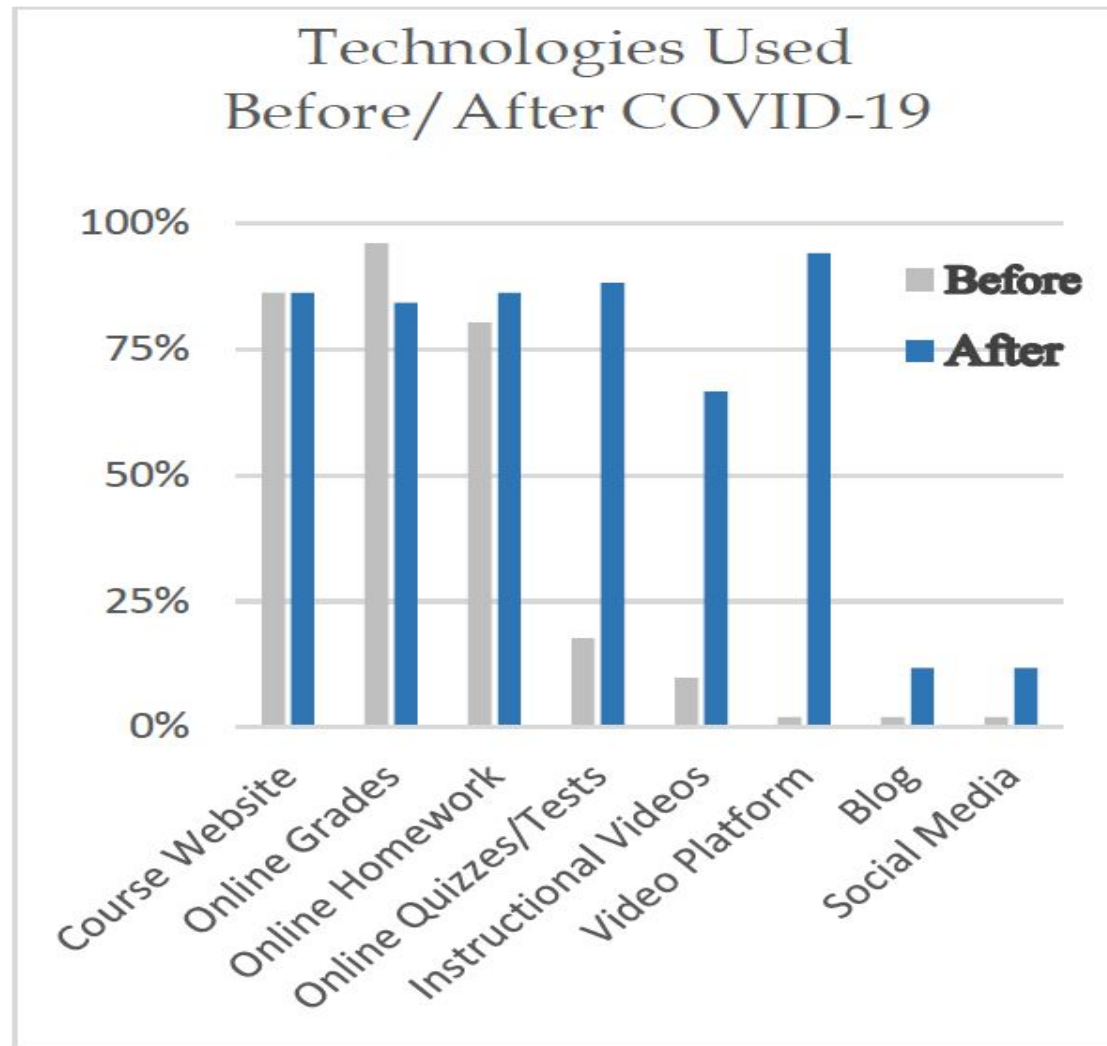
Source: [Education's Response to the COVID-19 Pandemic Reveals Online Education's Three Enduring Challenges](#), Jason Openo 2020

Challenges with Remote Learning

High	Score
Testing	83
Student to Student Interactions	81
Medium	
Instructor to Student Interactions	66
Absenteeism	63
Personal Teaching Style	61
Student Connectivity	58
Work/Life Balance	53
Time Management	48
Remote Office Hours	44
Low	
Whiteboard Use	39
HW Assignments	38
Instructor Connectivity	32
Learning Management System	16

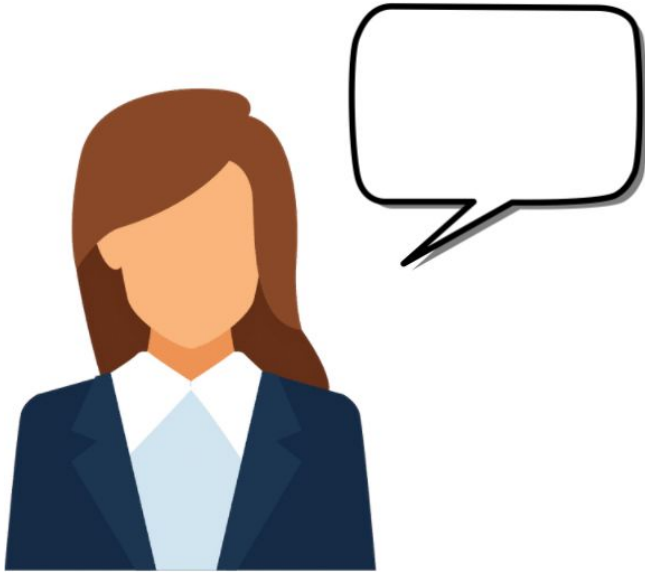
Source: [The Pandemic Pivot: The Impact of COVID-19 on Mathematics and Statistics Post-Secondary Educators](#), 2021
Sonia Rey Lopez, Glenna R. Bruun, Michael J. Mader, Robert F. Reardon Texas State University USA

Responses to Remote Learning



Source: [The Pandemic Pivot: The Impact of COVID-19 on Mathematics and Statistics Post-Secondary Educators](#), 2021
Sonia Rey Lopez, Glenna R. Bruun, Michael J. Mader, Robert F. Reardon Texas State University USA

What College Educators are saying?



Pandemic-related shift to online instruction has had a negative impact on the quality of education, & the main area of dissatisfaction is the lack of interaction & engagement (OCUFA, 2020)

*Instructor choices about how to be themselves, where to draw the line in caring for students, how much of their lives they should share, and where to draw the line between teaching and counseling.
(Cranton and Carruseta 2004)*

*All students will benefit from instructors who know how to recognize students at-risk and put forth effort to connect students to supports using standard tools such as early warning systems and retention centers that employ basic, but effective, learning analytics. As the 2020-2021 academic calendar proceeds, students are likely to be more vulnerable than ever, struggling financially and academically
(Brown & Mangan, 2020)*

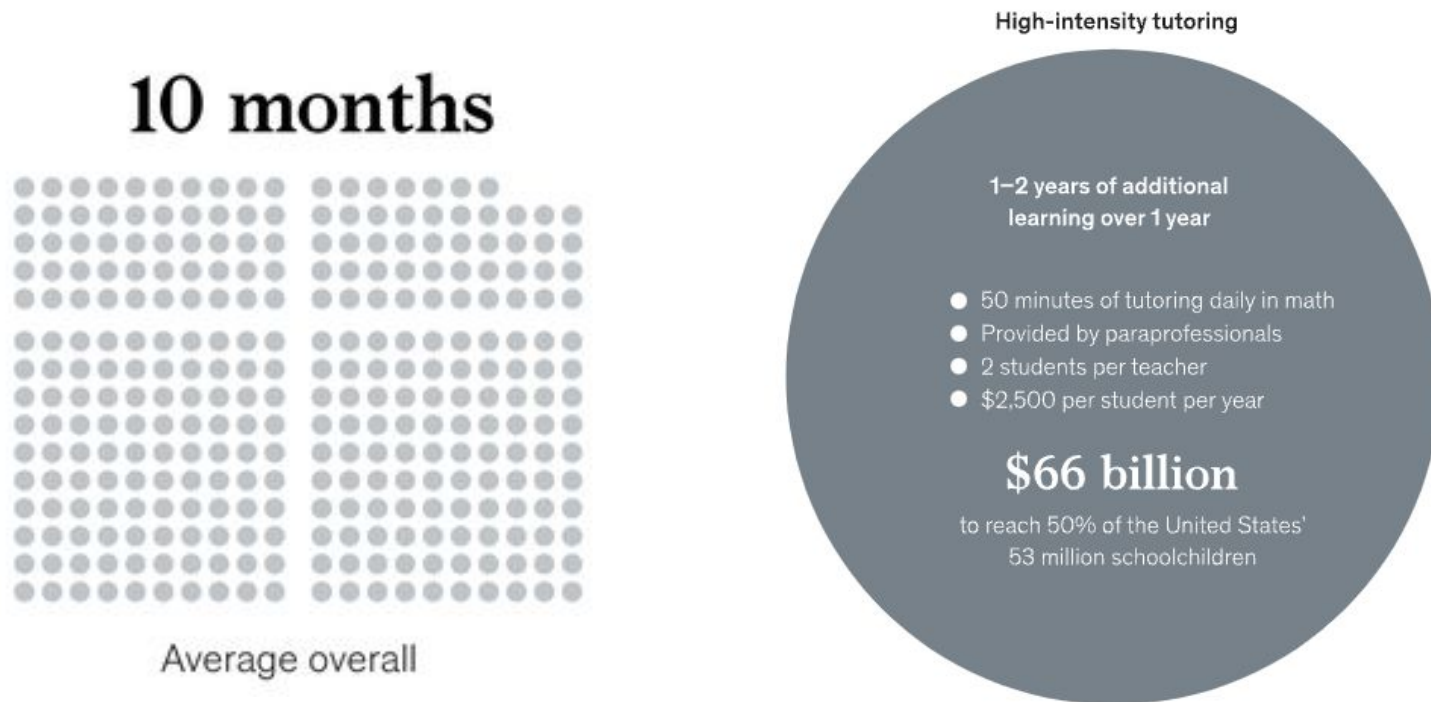
- Three Enduring Challenges:
 - Interactivity
 - Authenticity
 - Support

Source: [Education's Response to the COVID-19 Pandemic Reveals Online Education's Three Enduring Challenges](#),
Canadian Journal of Learning and Technology, Jason Openo 2020

Numeracy gap in the near term

Different learning scenarios significantly impact the scale of learning loss.

Estimated loss in mathematics learning from March 2020 to June 2021



The *Academic Debt* of Covid 19's impact on mathematics education is mounting. Ontario funding is proportionally ~10x less than what the McKinsey report's recommendations.

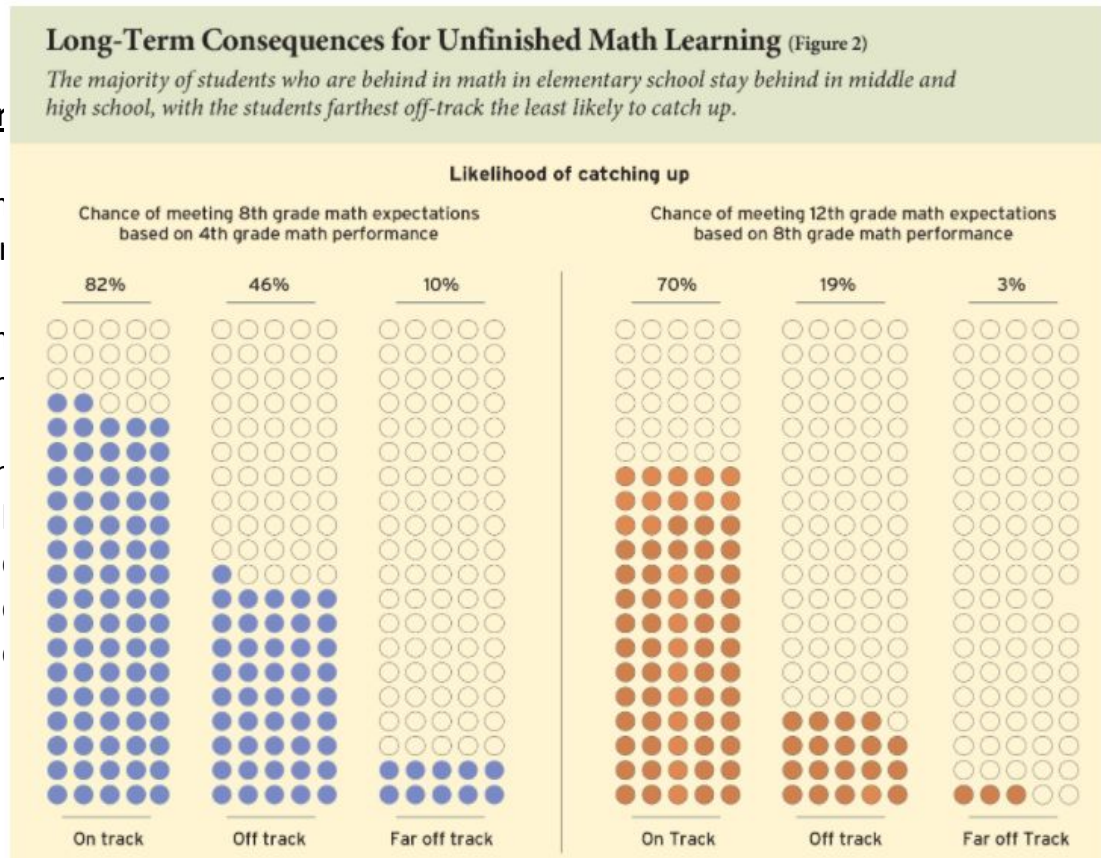
Source: [Covid-19 and learning loss: disparities grow and students need-help](#)

Emma Dorn, Bryan Hancock, Jimmy Sarakatsannis, and Ellen Viruleg, McKinsey & Company (2020)

Impact on the Numeracy Gap?

Data Gaps Mour

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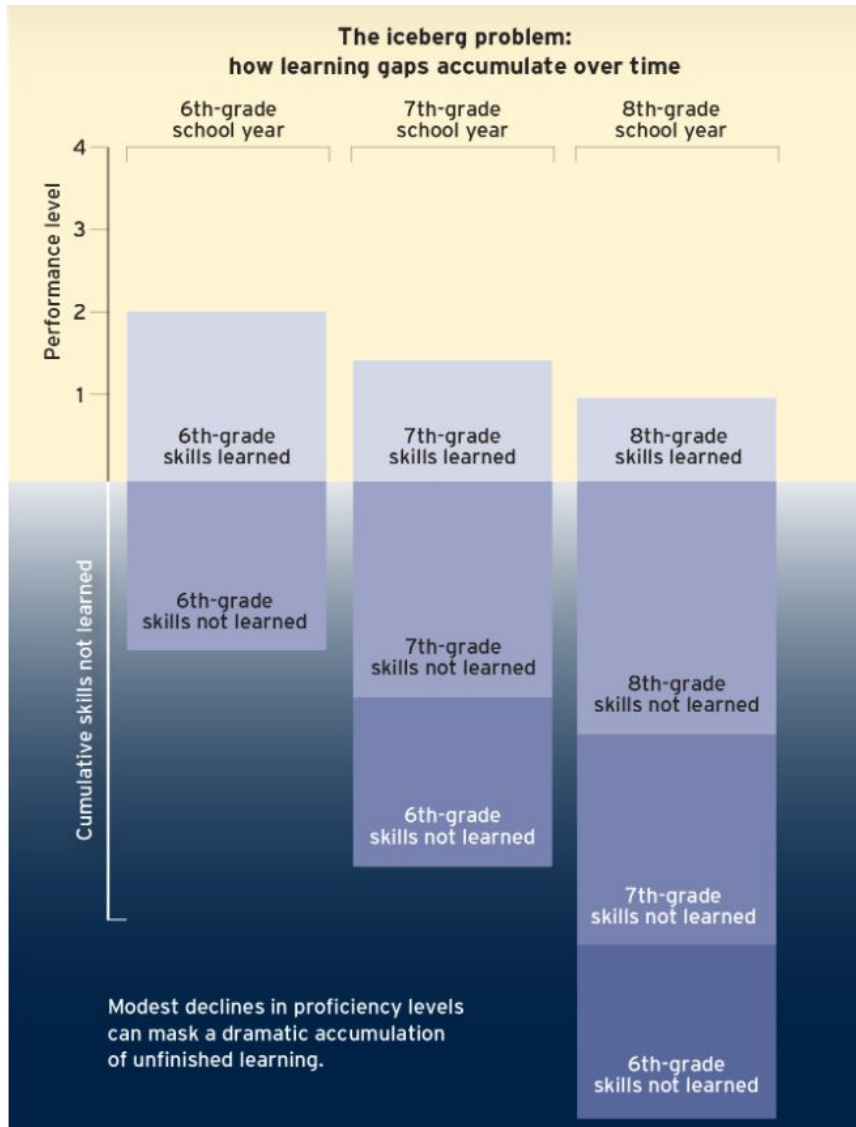
Sufficient data to respond for intervention???

How can we best prepare to respond???

School disruptions can have harsh cumulative effects, lowering chances of secondary completion and reducing labour market earnings of affected children many years later' (Jaume & Willen, 2019)

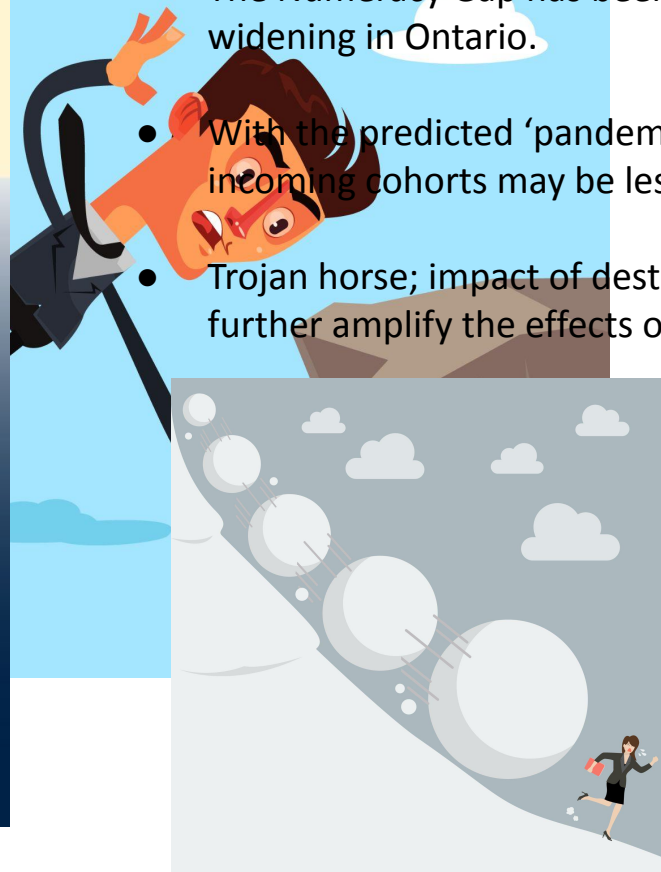
Other studies from past crises and disruptions are even more concerning. These show that learning gaps can continue to grow even after schools return to normal' (Andrabi et al., 2020)

Impact on the Numeracy Gap?



Possible Snowball Effect

- Numeracy is a key indicator of student success in college programs.
- The Numeracy Gap has been shown to be widening in Ontario.
- With the predicted 'pandemic slide' incoming cohorts may be less prepared.
- Trojan horse; impact of destreaming may further amplify the effects of this situation.



Amassing Storm on the Horizon



What best practices can we look to implement?

Online Innovation

OCMT Informal for all ON Colleges: **Provincial Wide Accessible upgrading**

- Partnership with [Ontario College Library Service](#) and [College Libraries Ontario](#) to bring the Ontario Colleges Math Test to a wider, and targeted audience
- Readily available to students remotely anywhere on any device.
- Psychometrically validated assessment items that are research backed.
- Individualized formative pieces to upskill gaps as needed.



The Learning Portal, Colleges Libraries Ontario

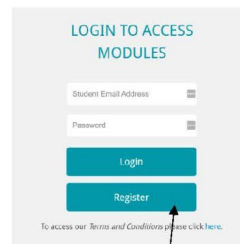
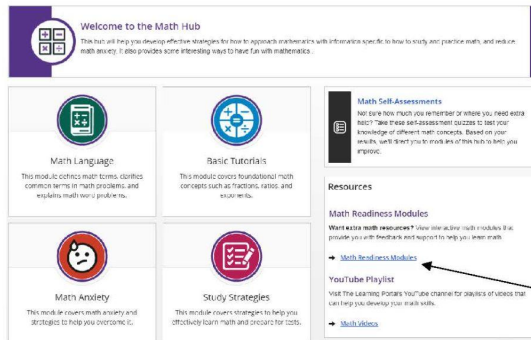


The Learning Portal
College Libraries Ontario

Math Readiness Modules

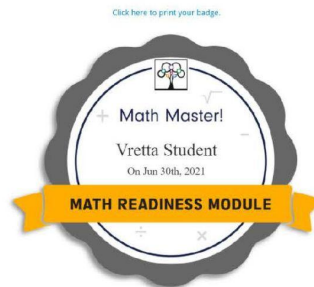
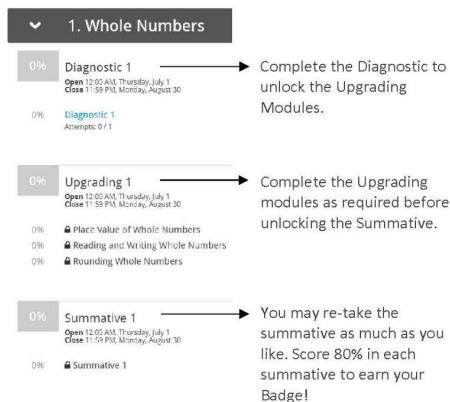
DESIGNED TO ELEVATE YOUR MATH SKILLS FOR SUCCESS

Go to: <https://tlp-lpa.ca/home/math> and Select the Math Readiness Module Link



Click "Math Readiness Modules" to Get to the login Portal.
Then Click "Register" and create an account.

After logging and entering the modules, you will see the Resource List. Read the introduction before beginning the Diagnostics.



Email support@vretta.com

We are here to support you seven days a week!

Math Readiness Booster initiative is available across the all 24 Ontario Colleges.

Complimentary access for any Ontario college student.

Libraries are encouraging the posting of the Digital Badge to share on Social Media and bring awareness to the initiative.

If you know a student who needs additional support send them to:

<https://tlp-lpa.ca/home/math>

And have them click 'Register for the Math Modules'.

OCMT

Other ON Responses?



Outreach programs created in the summer through Continuing Education to use the secondary school version of the OCMT in areas of need.

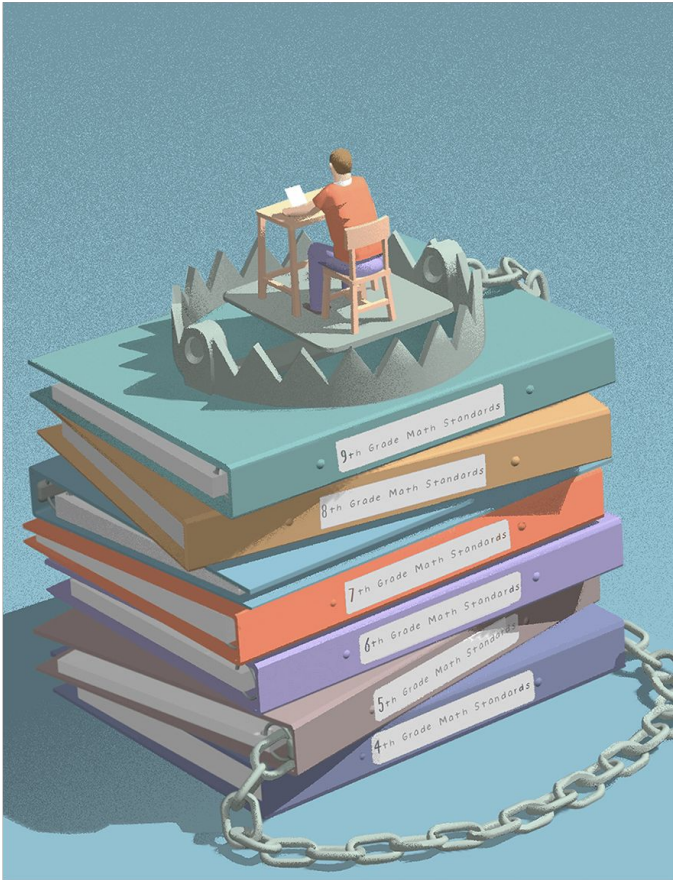


Deployment of OCMT Informal across all three campuses for incoming BSCN & PN students to target numeracy gaps from the outset of the semester.



Implementation of secondary school version of OCMT through the School Within a College Program for Pre-Business Students.

Other Provincial Responses?



Avoiding the potential trap of incoming math gaps



RED RIVER COLLEGE

Expansion of OCMT Informal from GAS into, Pre-Employment Trades, Veterinary Technician, and International Education programs to diagnose and upgrade numeracy before students' first semester.

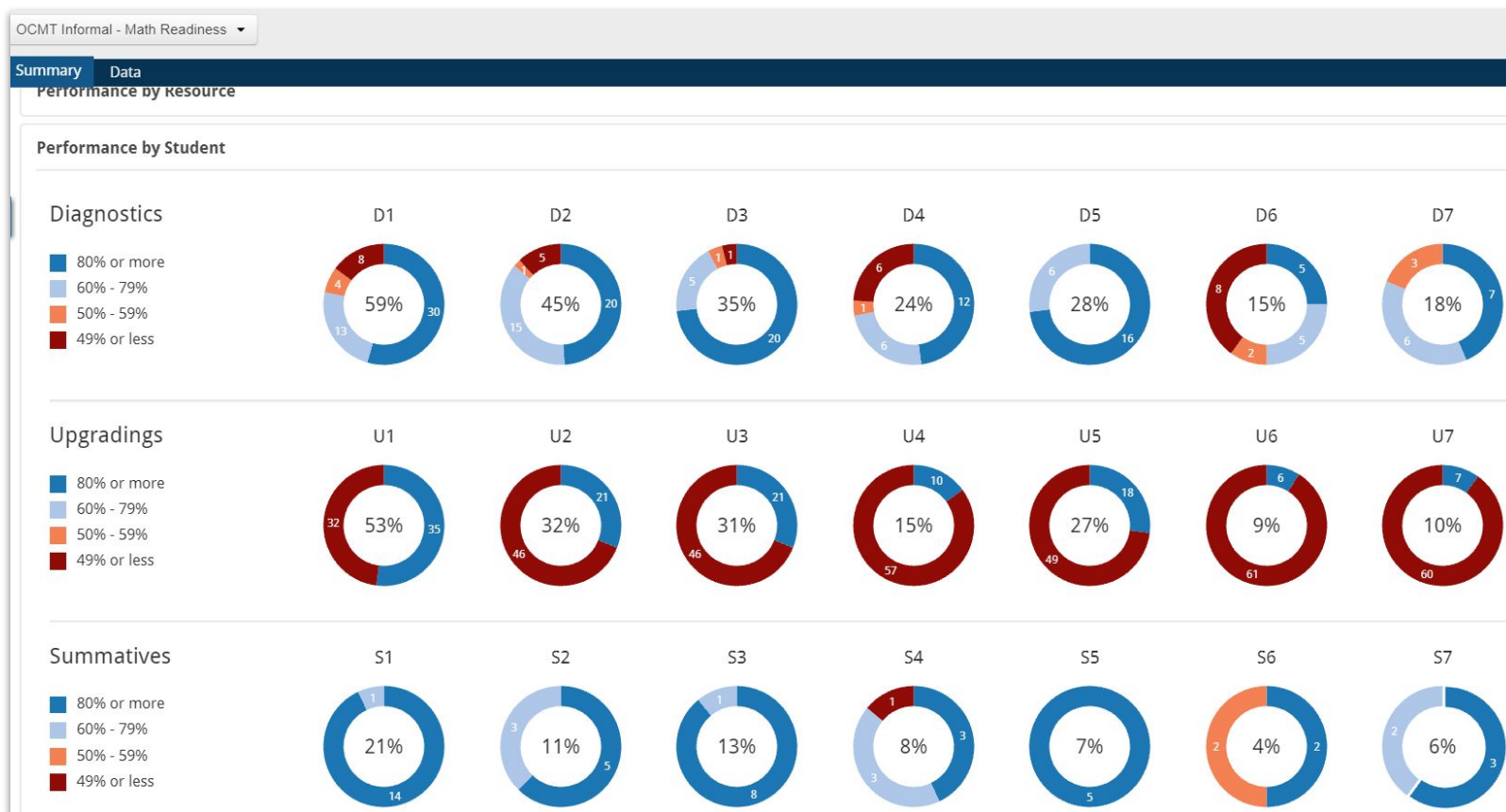


Introduction of the OCMT Informal system in the school of technology for all incoming students. Programs included Trades, and Technology streams.

A Closer Look at the Results



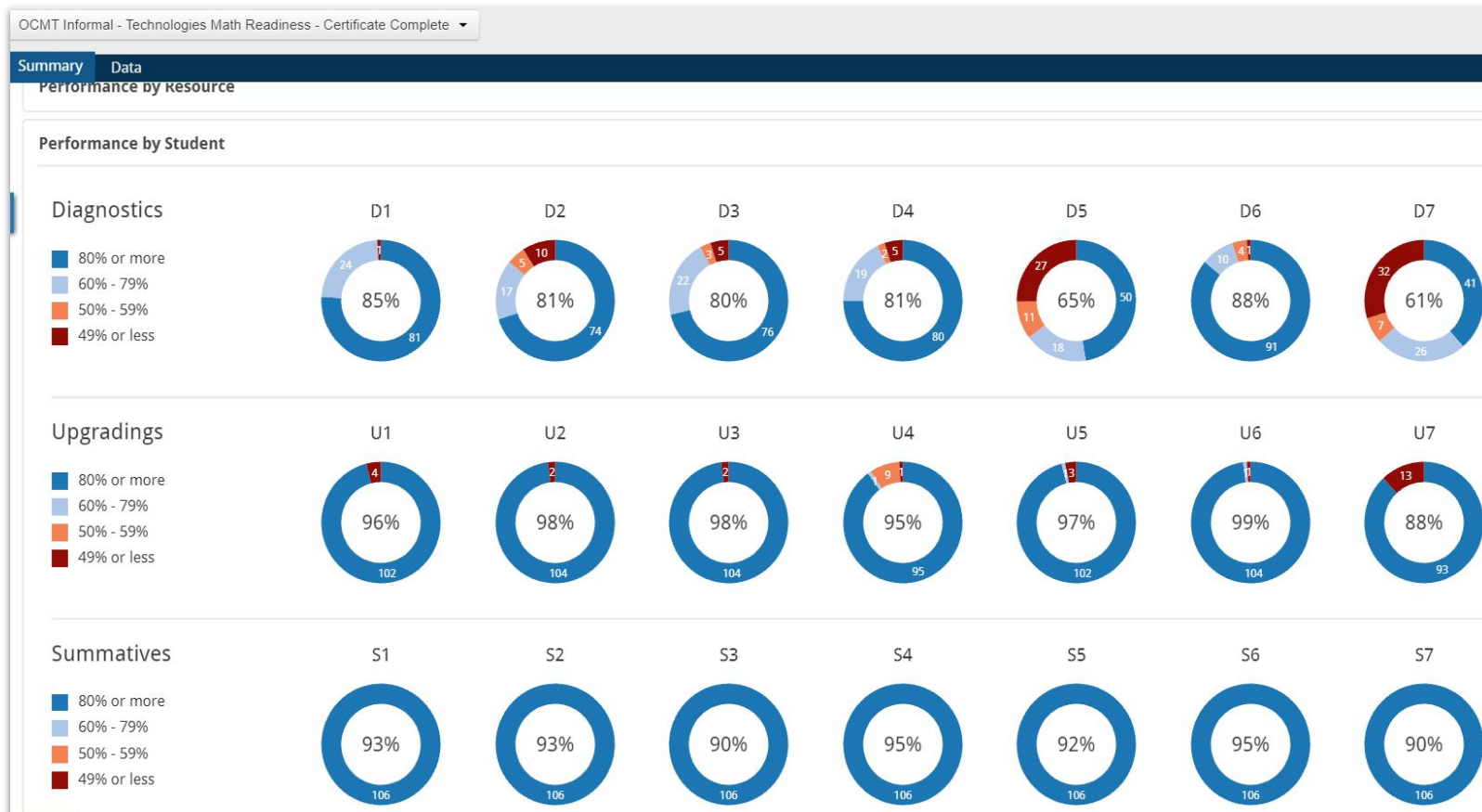
Pilot results in the midst of a pandemic were inconclusive as completion through rate was not meeting desired outcomes....



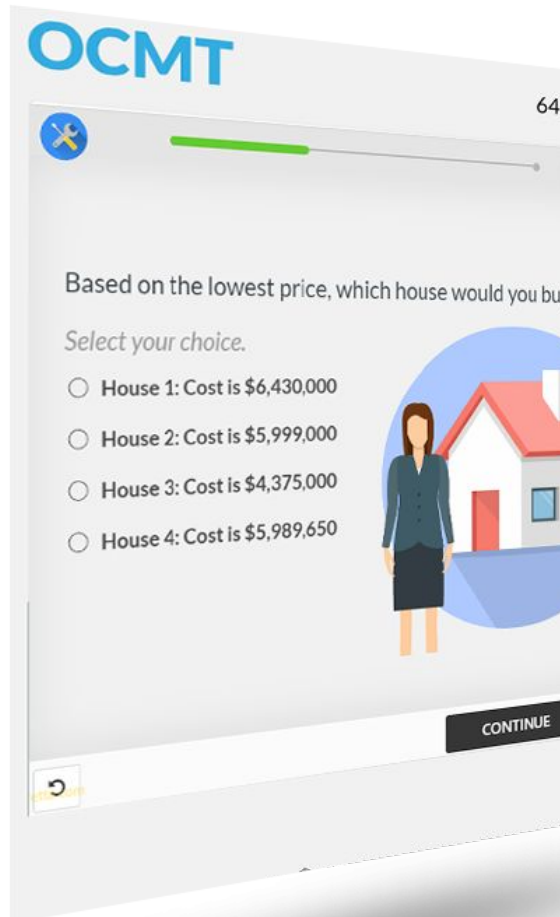
Perseverance and Re-Innovation



Second round of deployment saw massive increase in usage and improvement in outcomes in both departments.



1

**DIAGNOSTIC
ASSESSMENT****IDENTIFY NUMERACY
GAPS IN KEY TOPICS**

OCMT

64

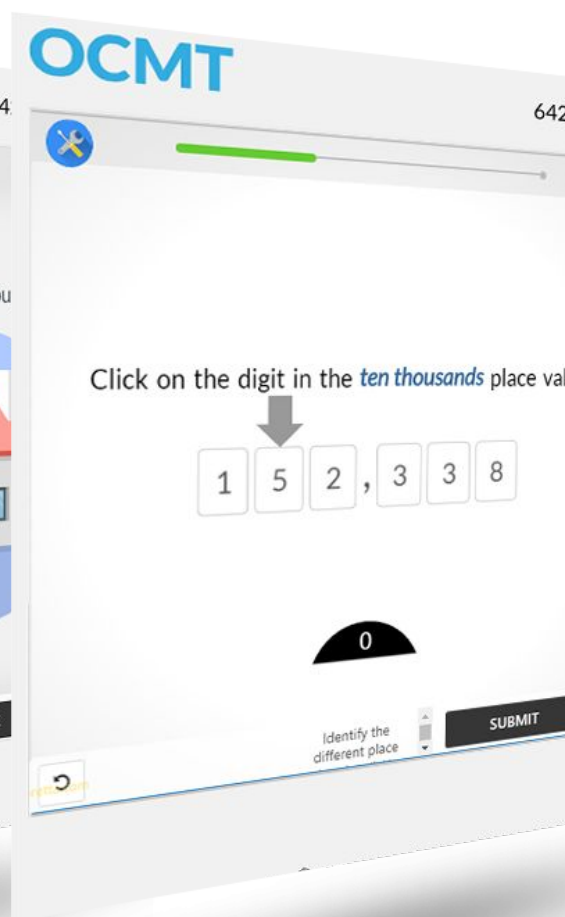
Based on the lowest price, which house would you buy?

Select your choice.

- ☐ House 1: Cost is \$6,430,000
- ☐ House 2: Cost is \$5,999,000
- ☐ House 3: Cost is \$4,375,000
- ☐ House 4: Cost is \$5,989,650

CONTINUE

2

UPGRADING**PRACTICE AND
ACHIEVE MASTERY**

OCMT

642

Click on the digit in the *ten thousands* place value.

1 5 2 , 3 3 8

0

Identify the different place

SUBMIT

3

**SUMMATIVE
ASSESSMENT****ASSESS
LEVEL OF MASTERY**

OCMT

642

James' business made a profit of \$327,721.

Express the profit rounded to the nearest hundred thousand.

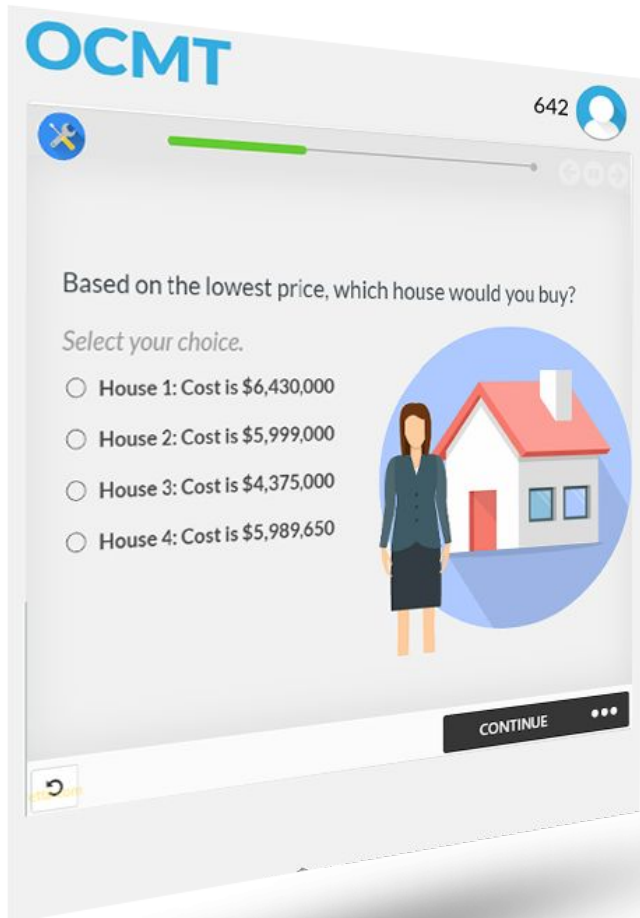
\$

CONTINUE

1

DIAGNOSTIC ASSESSMENT

IDENTIFY NUMERACY GAPS IN KEY TOPICS



Assessment Framework

- ✓ Content topics: whole numbers, arithmetic, integers, decimals, fractions, ratios and proportions, percents, basic algebra, and measurement.
- ✓ Performance expectation corresponding to the broader goals of mathematics teaching and learning: (A) Knowing, (B) Applying, and (C) Reasoning.

Assessment Items

- ✓ Constructed (written) and selected (multiple-choice) response types.
- ✓ Field tested and psychometrically validated.

Test Design

- ✓ Unique for every test taker.
- ✓ Equally representative of both content and performance expectation dimensions.
- ✓ Long enough (i.e., sufficient number of test items) to enable reliable estimates of test takers' abilities but short enough to complete in a reasonable length of time.

2 UPGRADING MODULES

ACHIEVE
MASTERY



Mastery-based Learning

- ✓ Topics are broken down to micro-steps for students to visualize, conceptualize and engage with mathematics.
- ✓ Various types of interactive practice scenarios with feedback mechanisms help students master concepts.

Individualized Learning

- ✓ Students can progress through the modules and master concepts at their own pace.

Differentiated Learning

- ✓ Provides teachers with the ability to use the modules in class, or assign them as homework, to enrich the learning experience.

3

SUMMATIVE ASSESSMENT

ASSESS
LEVEL OF MASTERY



Assessment Framework

- ✓ Developed using the same assessment framework that was used to develop the diagnostic assessment, thereby ensuring that the same topics are covered and that the same performance expectations are reflected.

Assessment Items

- ✓ Drawn from the same assessment item database and include constructed and selected response types, thereby ensuring the consistency of the student experience and the validity of the assessment.

Test Design

- ✓ Assessments are unique for every test taker .
- ✓ Assessments can be as long as 36 items or as short as 8 items and still maintain their reliability.

MOBILE COMPATIBILITY



INDIVIDUALIZED
LEARNING

IMPLEMENTATIONS



CONTACT INFO / Q&A



- For Access to the OCMT App email:
enquiries@ocmt.mathsuccess.ca

- Emily Brown
emily.brown3@sheridancollege.ca

- James Howell
james.howell@vretta.com

RESOURCES

[Education's Response to the COVID-19 Pandemic Reveals Online Education's Three Enduring Challenges](#),

Jason Openo, Medicine Hat College (2020)

[The Pandemic Pivot: The Impact of COVID-19 on Mathematics and Statistics Post-Secondary Educators](#)

Sonia Rey Lopez, Glenna R. Bruun, Michael J. Mader, Robert F. Reardon Texas State University USA (2021)

[Covid-19 and learning loss: disparities grow and students need-help](#)

Emma Dorn, Bryan Hancock, Jimmy Sarakatsannis, and Ellen Viruleg, McKinsey & Company (2020)

[Learning Our Way Out of the Pandemic](#); Beyond 'back to normal' for Canadian students,, Dr. Karen Mundy, Dr. Kelly Gallagher-Mackay (2021)

[Canada : Ontario's Learning Recovery and Renewal Plan for Students](#), Mena Report (2021)

RESOURCES

[Covid-19 and Education: the lingering effects of unfinished learning](#)

Emma Dorn, Bryan Hancock, Jimmy Sarakatsannis, and Ellen Viruleg, July 2021

[Learning loss and its impact on math education](#)

Richard Kingham, March 2021

Resources

[Adults with Inadequate Numeracy Skills](#)

[University graduates with lower levels of literacy and numeracy skills](#)

[Big Idea: A Canada-wide Transformation of Numeracy Skills](#)

[Closing the Numeracy Gap: an Urgent Assignment for Ontario](#)

Resources

[Adult Numeracy Skills](#)

[Improving Numeracy Skill of Postsecondary Students:
What is the Way Forward](#)

[Emphasizing Numeracy as an Essential Skill](#)

[Ontario to End Streaming in Mathematics in Fall 2021](#)

[Ontario's New Mathematics Curriculum](#)

INFORMAL SYSTEM UPDATES

Updated Format

▼ 6. Ratios

48%

Diagnostic 6

Open 12:00 AM, Wednesday, October 21
Close 11:59 PM, Wednesday, October 21

48%

[Diagnostic 6](#)

Attempts: 1 / 1

20%

Upgrading 6

Open 12:00 AM, Wednesday, October 21
Close 11:59 PM, Sunday, December 20

20%

[Introduction to Ratios](#)

20%

[Equivalent Ratios \(Reducing Ratios\)](#)

20%

[Ratio Calculations](#)

20%

[Proportions](#)

20%

[Pro-ratios](#)

> 7. Percents

- Home
- Lessons & Assessments
- Admin Settings
- Dashboard
- View As Student
- Review Marks
- Transfer Students
- Account Settings
- FAQ
- Logout
- Contact Us

INFORMAL SYSTEM UPDATES

The screenshot displays the OCMT Diagnostic 5 interface. At the top, a header bar shows 'BSCN - Cornwall' and a dropdown menu. Below this, a navigation sidebar on the left contains icons for home, desktop, settings, and other functions. The main content area is titled 'Diagnostic 5' and includes a close date notice: 'Close Date: Mon, Oct 5, 2020 11:59 PM | Attempt(s) will not be graded because you have passed the close date'. A list of questions is shown on the left, with 'Question 1 (1)' selected. The question text is 'Write **one thousand eleven and eleven thousandths** as a decimal number.' Below the text is a text input field. A 'SAVE PROGRESS' button is located at the bottom right of the question area. A 'Contact Us' button is visible in the bottom left corner.

BSCN - Cornwall

Diagnostic 5

Close Date: Mon, Oct 5, 2020 11:59 PM | Attempt(s) will not be graded because you have passed the close date

Questions

- Question 1 (1)
- Question 2 (1)
- Question 3 (1)
- Question 4 (1)
- Question 5 (1)
- Question 6 (1)
- Question 7 (1)
- Question 8 (1)

Question 1 of 8

Write **one thousand eleven and eleven thousandths** as a decimal number.

SAVE PROGRESS

Contact Us

- Diagnostics and summatives broken down into Goldilocks-sized assessments.
- Updated format allows for Intramath features such as randomization of buckets, logbook for students to show work, facilitator to assign topics and further studies based on results

INFORMAL SYSTEM UPDATES

The screenshot displays the OCMT Informal system interface. At the top, a header bar shows 'OCMT Informal - 1112509 - f'. Below this is a navigation sidebar with icons for home, settings, and other tools. The main content area features a math problem: 'What's Carbon's height in centimetres?'. A dog is shown next to a vertical ruler. A yellow box highlights the dog's height, which is labeled '0.52 m'. Below the ruler, a table of metric units is shown, with a yellow pin pointing to the 'Base Unit m' column. The table is as follows:

km	hm	dam	Base Unit m	dm	cm	mm
			0.52			
10^3	10^2	10^1	1	10^{-1}	10^{-2}	10^{-3}

Below the table, a text box says 'Let's bring back the metric system to help us out.' At the bottom right, there is a green 'CONTINUE' button with a right arrow. At the bottom left, there is a 'Contact Us' button with an envelope icon.

- Interactive Lesson module technology has been updated to incorporate a cleaner more user friendly experience.
- New user tools and features are deliverable in this format.

INFORMAL SYSTEM UPDATES

The screenshot shows the 'Admin Settings' page for 'Access'. A sidebar on the left contains icons for home, laptop, settings, refresh, eye, checkmark, undo, FAQ, and a contact icon. The main content area has tabs for 'Access', 'Time', 'Questions', and 'Grade'. A dropdown menu shows '(Select a student)'. A note states: 'Note: times are displayed in the timezone for Toronto'. The table below lists resources with columns for 'Resource List', 'Open Date', 'Close Date', 'Password', 'Exam Mode', and 'Lock Resource'. Resources are grouped by category: '1. Whole Numbers', '2. Arithmetic', and '3. Integers'. Each resource has an 'Edit' button and a calendar icon for date selection. The 'Exam Mode' column has a toggle switch, and the 'Lock Resource' column has a checkbox.

Resource List	Open Date	Close Date	Password	Exam Mode	Lock Resource
1. Whole Numbers					
Diagnostic 1	12:00 AM, Mon, Jul 27	11:59 PM, Thu, Dec 31		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Upgrading 1	12:00 AM, Mon, Jul 27	11:59 PM, Thu, Dec 31		<input type="checkbox"/>	<input type="checkbox"/>
Summative 1	12:00 AM, Mon, Jul 27	11:59 PM, Thu, Dec 31		<input type="checkbox"/>	<input type="checkbox"/>
2. Arithmetic					
Diagnostic 2	12:00 AM, Mon, Jul 27	11:59 PM, Thu, Dec 31		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Upgrading 2	12:00 AM, Mon, Jul 27	11:59 PM, Thu, Dec 31		<input type="checkbox"/>	<input type="checkbox"/>
Summative 2	12:00 AM, Mon, Jul 27	11:59 PM, Thu, Dec 31		<input type="checkbox"/>	<input type="checkbox"/>
3. Integers					
Diagnostic 3	12:00 AM, Mon, Jul 27	11:59 PM, Thu, Dec 31		<input checked="" type="checkbox"/>	<input type="checkbox"/>

Buttons at the bottom: 'Contact Us' and '+ Add Resource'.

- Simplified Dashboards for at-a-glance look at performance and segments of the group/cohort.
- Administrative Settings flexibility of Intromath to customize access dates to align with course delivery, or make exceptions/extensions.