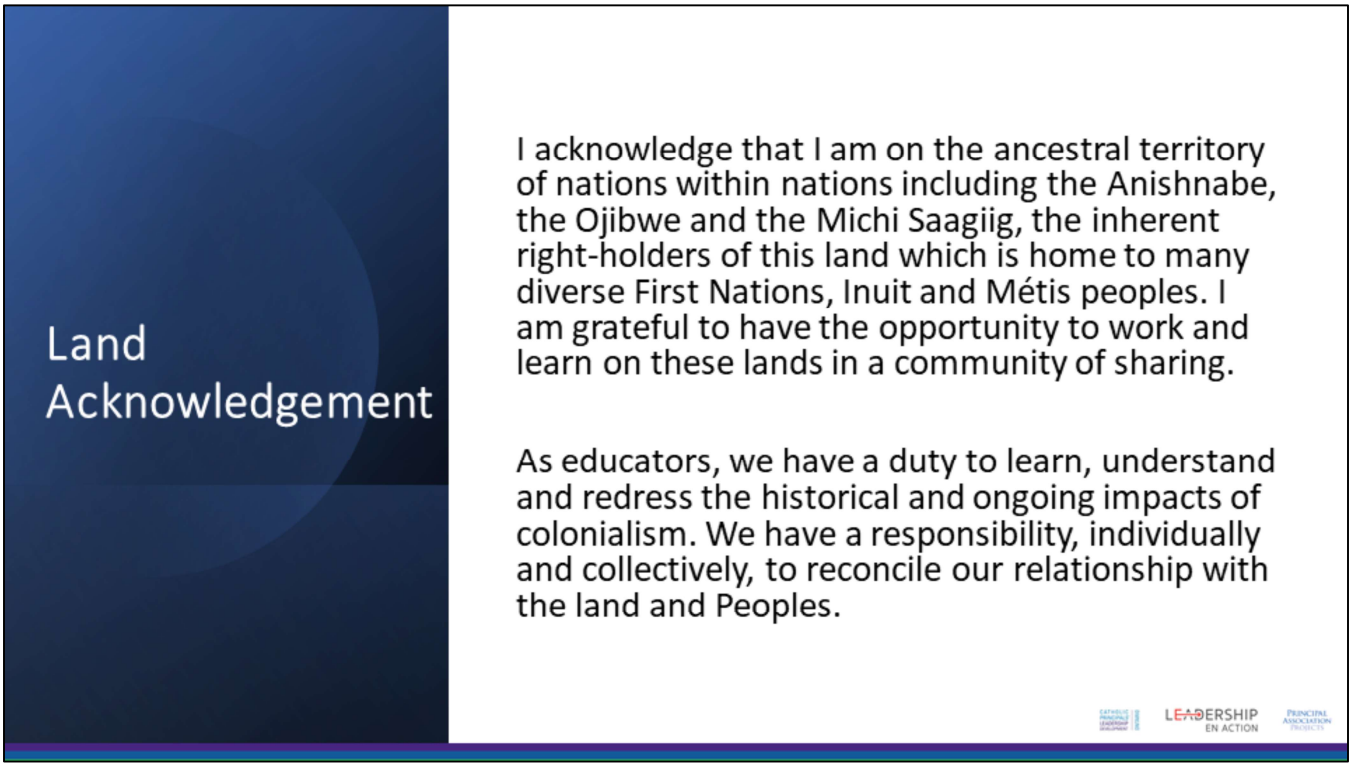
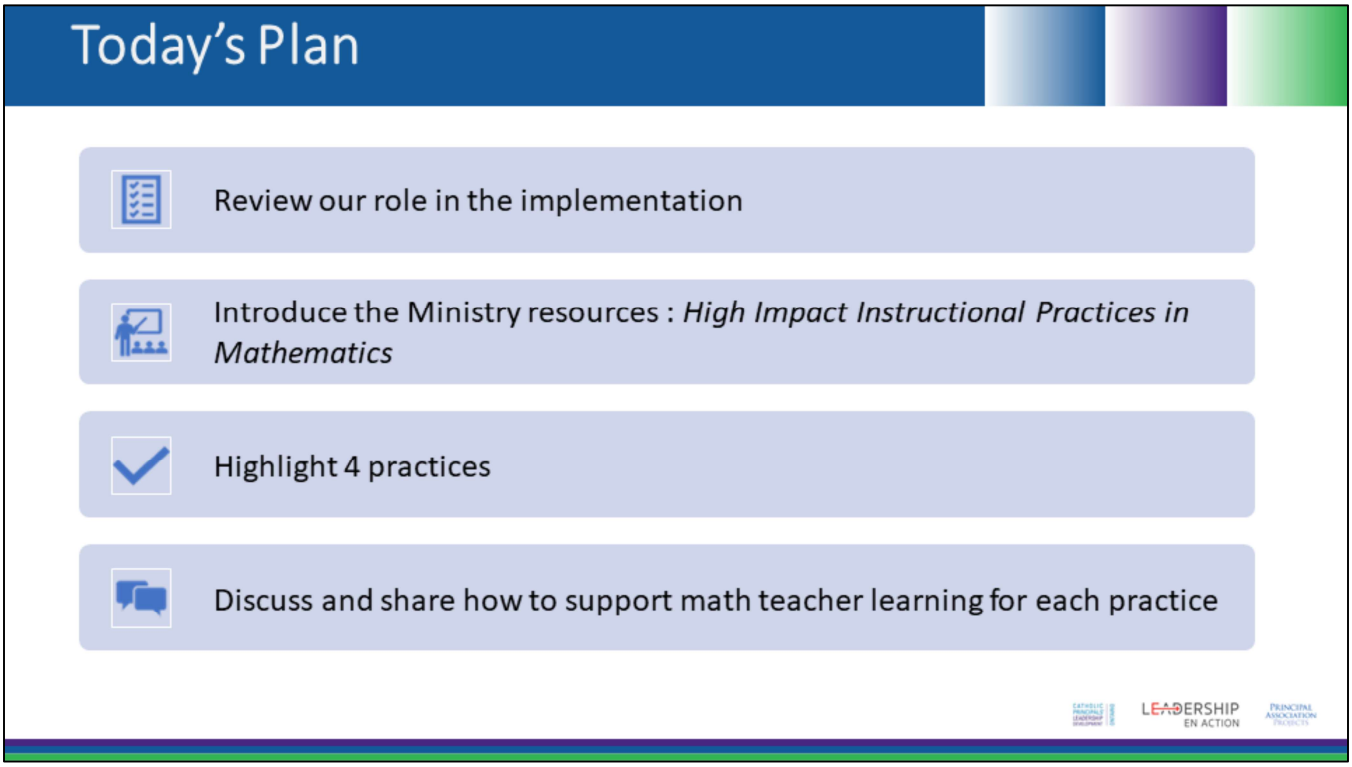
Destreamed Grade 9 Math Leading the Implementation

Professional Learning Network # 1: Supporting Teachers



We will read this and each presenter will “say” something briefly specific to their place and invite the participants (while presenters are sharing) to add in the chat window something specific to where they are

De: in udgsb which covers the ancestral and traditional territories of Mississaugas of the Credit, the Six nations of the grand river and Saugeen Ojibway Nation Territories

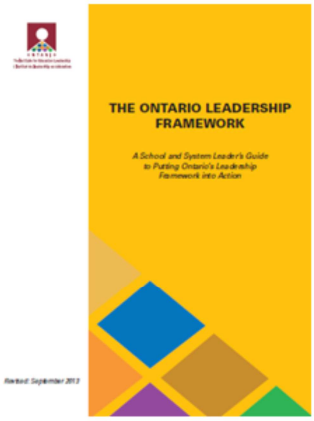


This is our plan for today

School Leadership Framework (Principals TPA document)

3. Promoting Collaborative Learning Cultures

This capacity is about enabling schools, school communities and districts to work together and to learn from each other with a central focus on **improved teaching quality** and student achievement and well-being.



Five Core Leadership Capacities

For the purpose of professional development, the ministry has identified five Core *Leadership Capacities* (CLCs) that the research suggests are key to making progress toward the province's current educational goals. These five CLCs, described below, are embedded in all provincially-sponsored professional learning and resources for school and system leaders. It is important to note that the CLCs tend to work across domains rather than residing within a single domain of school level leadership practices and they are supported by the use of the Personal Leadership Resources.

1. Setting Goals
This capacity refers to working with others to help ensure that goals are strategic, specific, measurable, attainable, results-oriented, and time-bound (SMART) and lead to improved teaching and learning.

2. Aligning Resources with Priorities
This capacity focuses on ensuring that financial, capital, human resources, curriculum and teaching resources, professional learning resources and program allocations are tied to priorities, with student achievement and well-being as the central, unambiguous focus.

3. Promoting Collaborative Learning Cultures
This capacity is about enabling schools, school communities and districts to work together and to learn from each other with a central focus on improved teaching quality and student achievement and well-being.

4. Using Data
This capacity is about leading and engaging school teams in gathering and analyzing provincial, district, school and classroom data to identify trends, strengths and weaknesses that will inform specific actions for improvement focused on teaching and learning.

5. Engaging in Courageous Conversations
This capacity relates to challenging current practices and fostering innovation through conversation, to listen and to act on feedback, and to provide feedback that will lead to improvements in student achievement and well-being.

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In our work as principals, we are always working with teachers, helping them to be the best teacher they can be. This core capacity, as outline in the School Leadership Framework, of promoting a collaborative learning culture at our schools, connects directly to the Ministry's goals for destreaming: increasing educator capacity and increasing students achievement and well being. Today's discussion is about how to support our teachers and improve teaching quality.

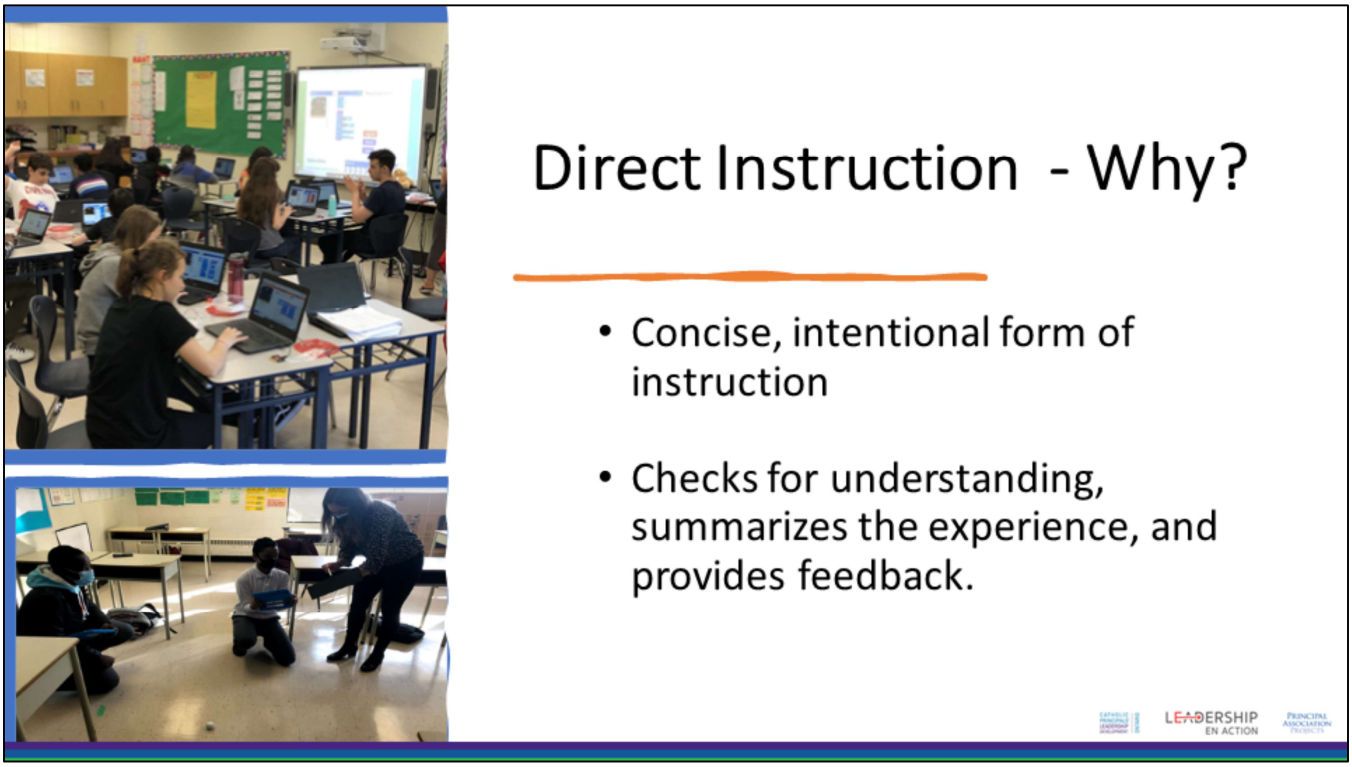
Supporting High Quality Instruction

Ministry Resource (at the curriculum site)

- intended to build a **common language and understanding** about these high-impact practices
- designed to build awareness and expand repertoires to **enhance teaching** and learning
- other factors important to math instruction are highlighted
  - knowing the learner
  - understanding the curriculum
  - providing a positive and safe learning environment

This ministry document, found on the digital curriculum site, is there to help teachers learn about and adopt high quality instruction. In addition to highlighting and expanding on several key instructional strategies it also covers other factors important to math instruction, especially in a destreamed class, such as knowing the learner, understanding curriculum, providing a safe environment and using various forms of assessment. It is a document worth exploring with your teachers. Today we are going to focus on the instructional strategies. Note post Link to document

This is the list of the *High Impact Practices* featured in the document. Today we will review the 4 highlighted strategies and then together share and discuss examples you've seen of each strategy and start to think about how to help teachers learn about and implement these strategies.


Direct Instruction - Why?
• Concise, intentional form of instruction
• Checks for understanding, summarizes the experience, and provides feedback.
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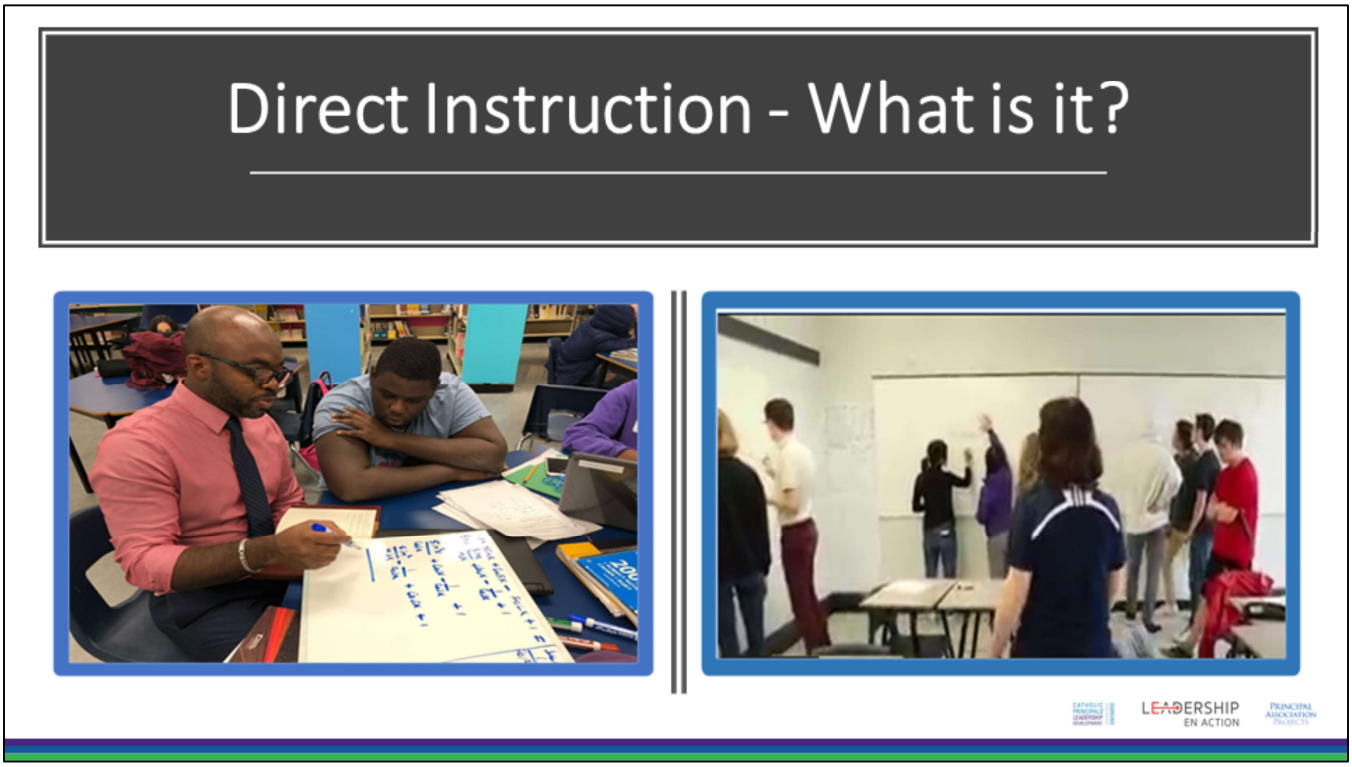
Eric:



Eric:

- Uses clearly communicated learning goals
- Introduces models and representations in context, and incorporates questioning and brief activities.
- Verbalizes thought processes, defines and uses math vocabulary, and makes key concepts and connections explicit.
- Can involve the whole class, small flexible groups, or individual students.
- Varies in duration, depending on the grade or purpose of the instruction.
- Iis always carefully planned to model, clarify, and extend mathematical thinking.
- Begins with a clear intention for the learning and identified success criteria.
- The students are engaged as the educator models, labels, questions, and checks for understanding.
- Involves guided investigation, guided practice, feedback, and a consolidation that connects ideas, concepts, and skills from the lesson.
- Ends with an opportunity for students to practise, whether independently, with a partner, or in a small group.

Vidéo Français

- Video English


Direct Instruction
- What it isn't?
• Not a lecture.
• Not didactic, educator-led talking from the front of the classroom (Hattie, 2009).
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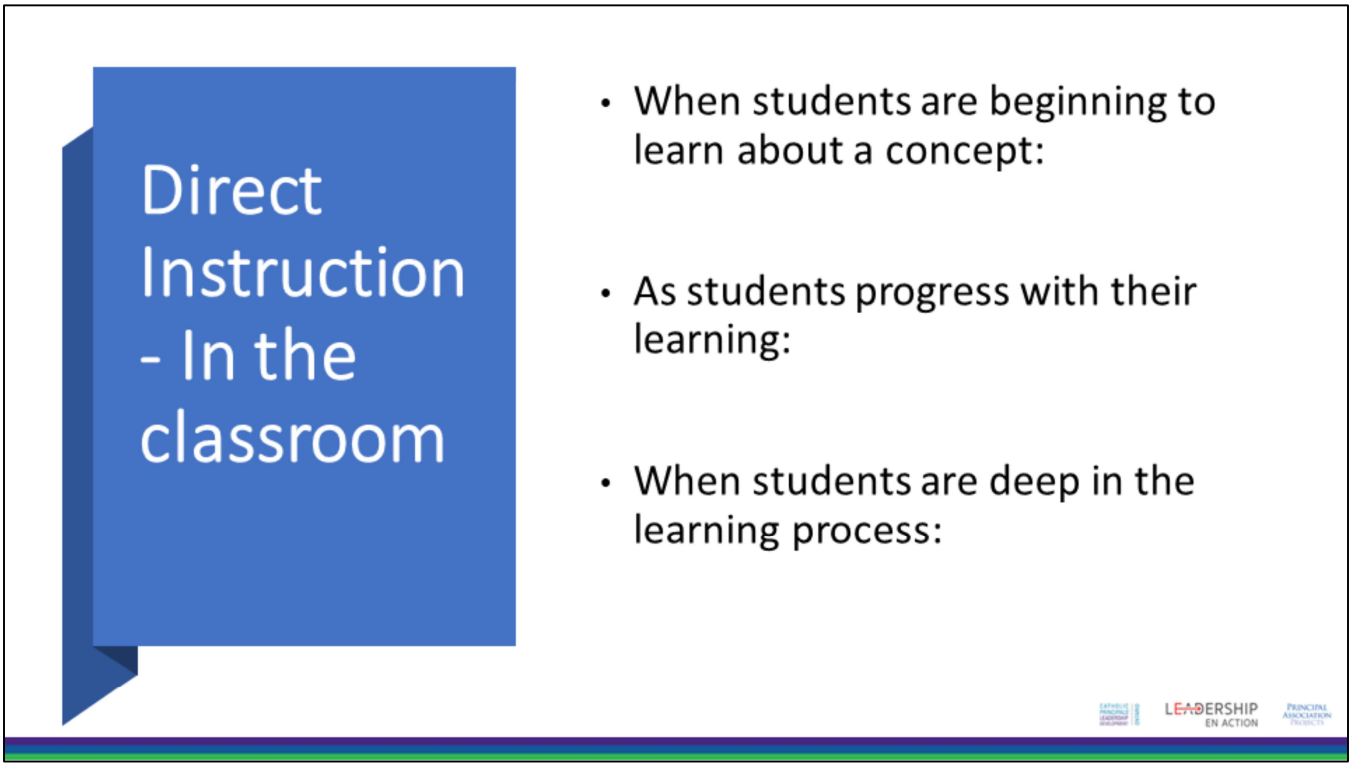
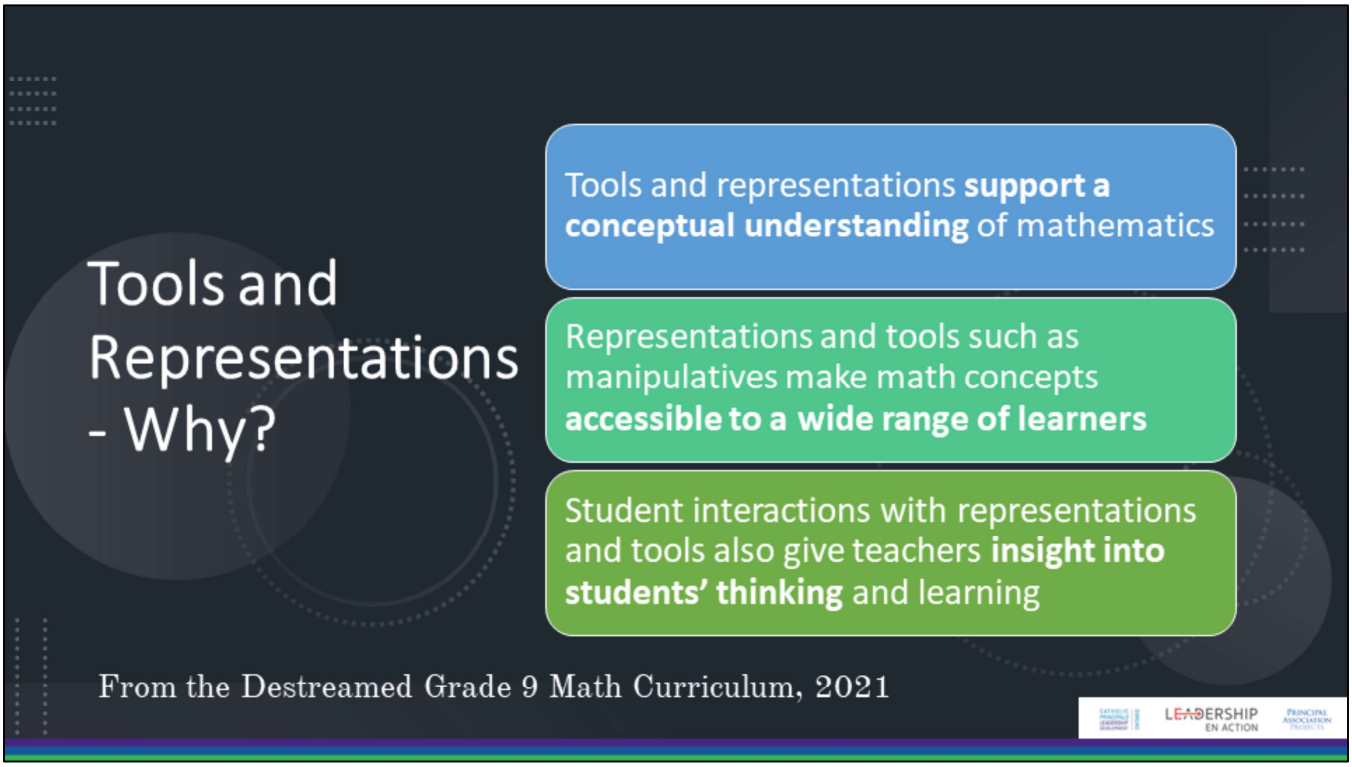
Eric:

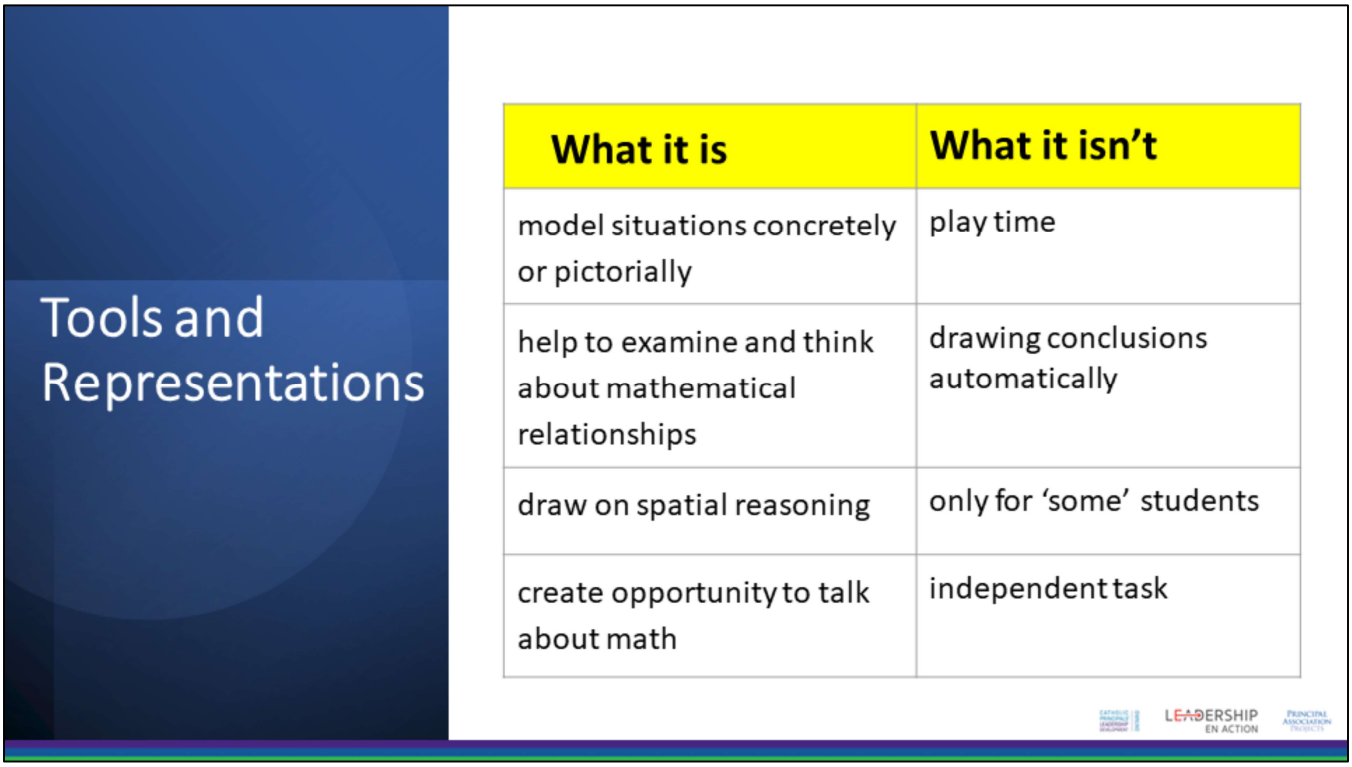


Eric:

- When students are beginning to learn about a concept:
  - activate prior knowledge and introduce new vocabulary
  - highlight key mathematical ideas from previous student work
  - connect different representations and strategies
  - model how to use manipulatives or representations
- As students progress with their learning:
  - reinforce procedures, or help students use more efficient procedures
  - highlight or introduce mathematical conventions
- When students are deep in the learning process:
  - highlight connections between tasks, strategies, representations, and concepts
  - encourage metacognition or thinking about one's own thinking.



De: Tools include concrete or virtual manipulatives, computer programs, regular and virtual calculators, dynamic geometry programs,websites with interactive problems, virtual games etc. Giving students manipulatives and access to online tools help students to explore problems and test their ideas. They also encourage different representations so all students can build understanding. Most importantly they allow insight into students thinking helping teachers to identify misconceptions and build on students understandings.



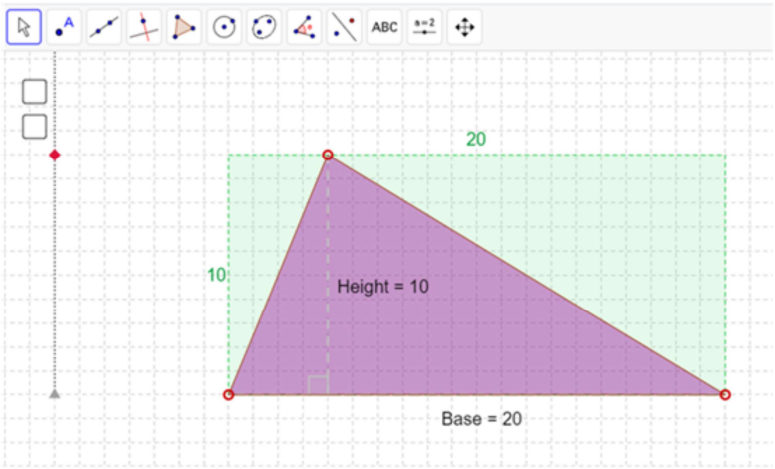
De - looking at what it is and what it isn't ...Using tools and representations gives teachers and students a way to model situations concretely or pictorially, they are not just toys for students to play with. Using tools and representations help students to examine, discover and think about mathematical relationships. They are not a quick fix in that a student will pick up a manipulative and automatically know the answer to the question but rather they help students explore and make sense of a problem. Using tools like manipulatives often draws on a students spatial reasoning and helps all students make connections and deepens understanding. The main purpose of using tools and representations is to create opportunity for talk about math. They work best when students can work together and use tools and different representations to explore, investigate and discuss different math concepts and share their thinking.

Example - Geometry & Measurement

E1.4 show how changing one or more dimensions of a two-dimensional shape and a three-dimensional object affects perimeter/circumference, area, surface area, and volume, using technology when appropriate

Can you see a relationship between the area of the rectangle and triangle?

https://www.geogebra.org/m/dysj26gn



De - This sketch is in Geogebra - students can manipulate by moving the red dots to investigate the relationship. Students move the sliders for different heights of the rectangle and can move each corner of the triangle to change the side lengths of the triangle.
In GeoGebra students can create their own images and sliders to show their thinking and understanding.

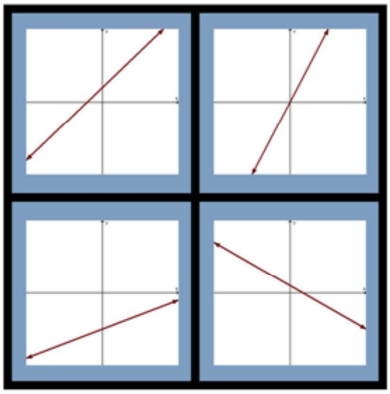
Example: Algebraic Expressions and Equations

C1.3 compare algebraic expressions using concrete, numerical, graphical, and algebraic methods to identify those that are equivalent, and justify their choices

$y = 4x + 3$	$y = -4x + 5$
$y = \frac{1}{4}x + 5$	$y = 4x - 5$

from Mishaal Surti

Which one doesn't belong?



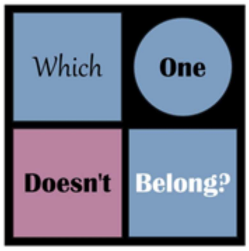
from Mary Bourassa

De -These images come from the website: *Which one doesn't belong?* In the image on the right students could be discussing and comparing slope, direction, y-intercept, and even talk about fractions. There is more than one answer so you use this image to notice lots of similarities and differences and have students explain their thinking. In image on the right, students could again discuss slope, direction, y-intercept and have more than one solution to which doesn't belong

GeoGebra

mathies

MATH is VISUAL



desmos Graphing Calculator

"Students who can represent mathematical ideas in a variety of ways demonstrate a deeper understanding of these concepts, as each representation provides a different perspective".

(High-Impact Instructional Practices in Mathematics, 2020)

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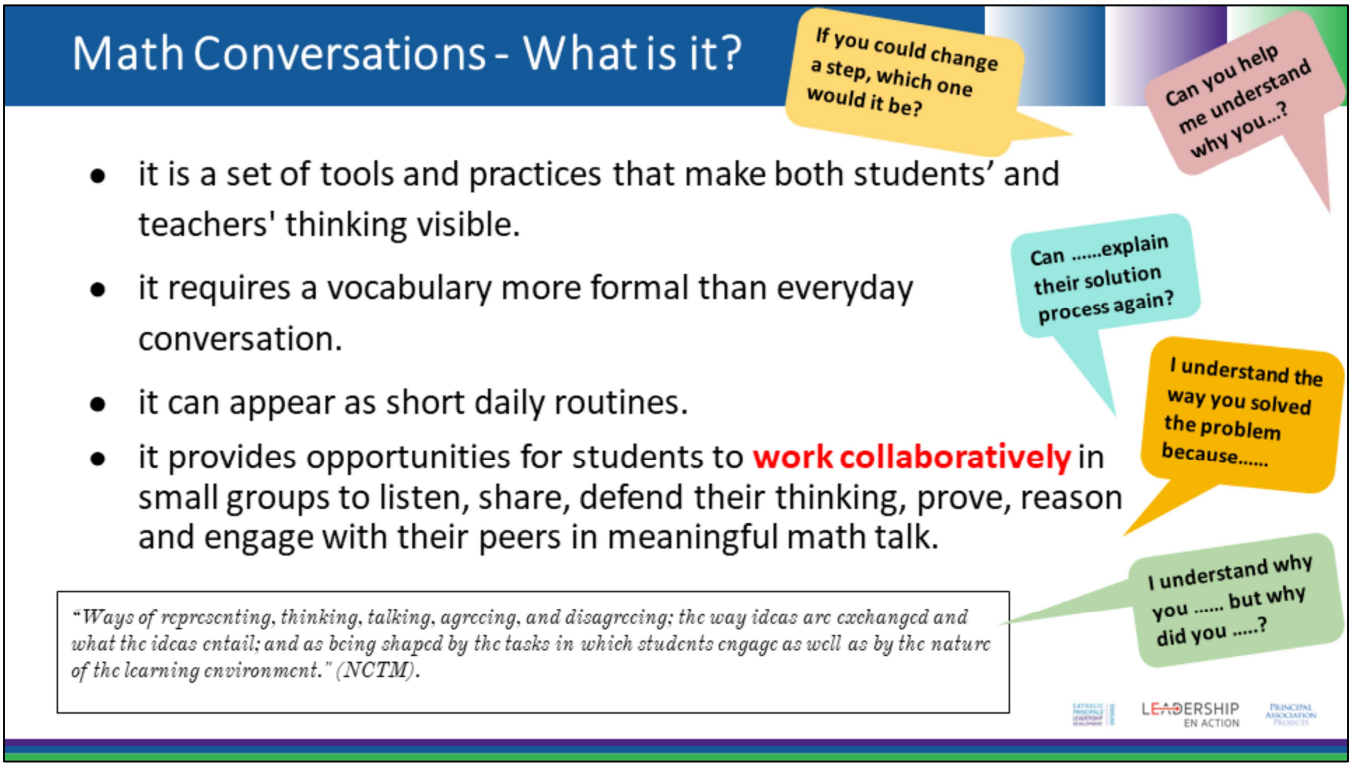
De - There are lots of different tools you can use and highlighted are just a few online ones. A key feature of these tools is they allow students to see and show different representations, which leads to a deeper understanding of concepts.

Math Conversations - Why?

- It benefits all the students and deepens their understanding of math concepts.
- One of goals of the Ontario mathematics curriculum is to provide all students with ability to communicate effectively.
- Communication is one of the four categories listed on the achievement chart.
- Communication is one of the mathematical processes that support effective learning in mathematics.

Varvara



Varvara

Math conversation is more than simply talking about math.

Students can share their ideas with a partner, a small group, or the whole class. They can share their thinking, and their peers can add to it or respectfully disagree with it. It can include a single or a sequence of computations/calculations. Educators use math conversations to make students' thinking visible. They ask good questions that move students' thinking forward, provoke discussion, or probe into specific concepts, skills, or representations. They pose open questions that engages students, highlight key concepts, and that cannot be answered with a simple "yes" or "no".

Looks like:

Students- collaboratively in small groups and are: **participating** and engaging in the discussion, sharing, comparing, their solution **strategies** with their peers, **conversing** back and forth about a problem with the teacher or another student.

Teacher -using "wait time" to **support student thinking** and encourage deep thought.

Sounds like:

Students - reflecting repeating, summarizing, rephrasing, translating, and building on thinking of others.

Teacher- using **students' ideas** and **mistakes** as learning tools, **guiding** student responses, **encouraging** students to ask questions about another student's

response.

Math Conversations - What it isn't?

- An occasional conversation between the teacher and a student or the teacher and a group of students.
- Seat work - students doing practice questions
- Seat work - practice applying a rote procedure to solve problems of a specific type.
- Teacher provides an explanation of a mathematical procedure to a student, a group, or the class.
- Teacher provides instructions to the class about an activity.
- Student asks a question about an assignment, e.g., deadline, etc,.

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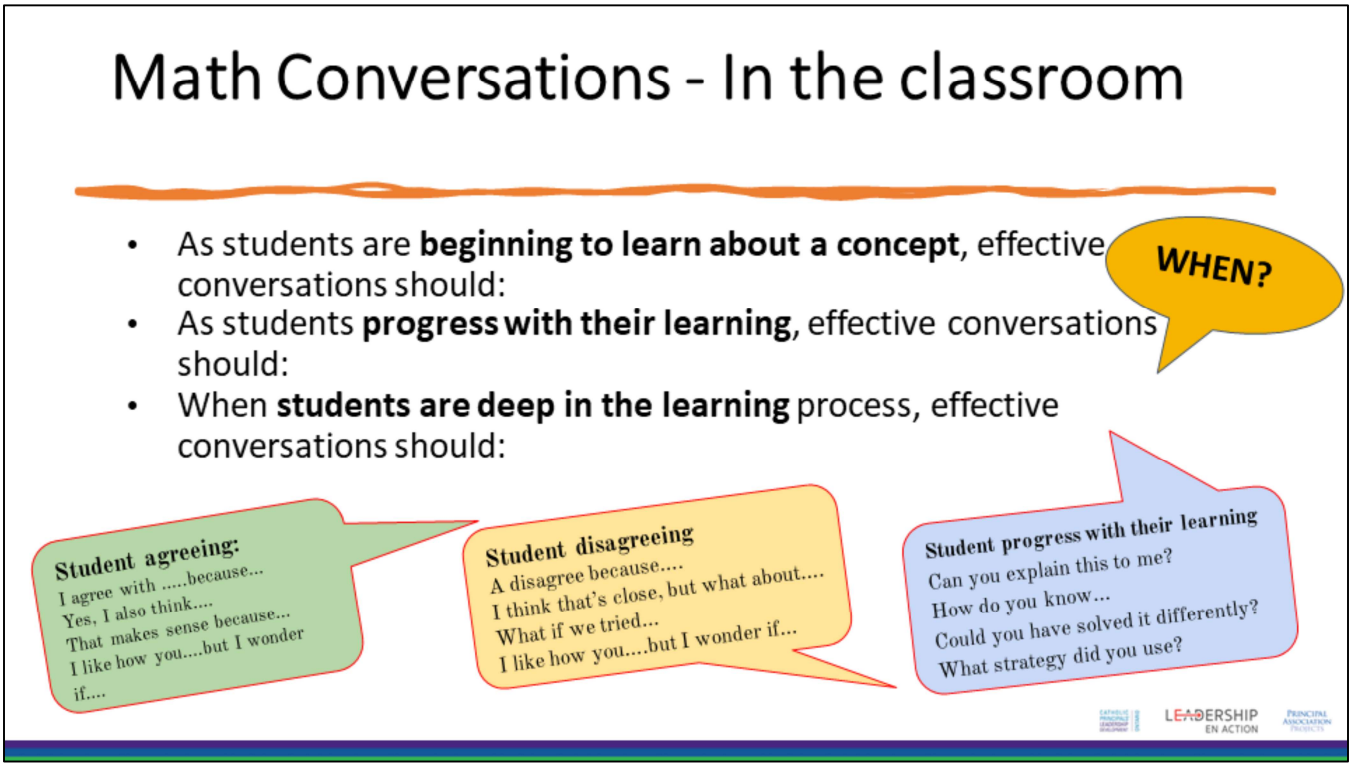
Varvara



Varvara

- Activate prior knowledge and connect the current task to previous learning. gather information about students' current level of understanding and ways of knowing
- make math explicit, probe thinking and require explanations, reveal understanding and/or misconceptions.
- support connections and transfer to other strands/content areas, require justifications and/or explanations, promote metacognition or thinking about one's own thinking.

Problem-Solving Tasks and Experiences

- Can provide multiple entry points and allow for a variety of solution strategies;
  - accessible to students at various stages of readiness,
  - give more students an opportunity to construct mathematical ideas.
- Provide opportunities for students to reason, communicate, represent, and connect, as well as to justify their thinking;
- Can be used to introduce concepts, build on prior knowledge, incorporate students' ideas, and consolidate learning.

(High-Impact Instructional Practices in Mathematics, 2020)

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Christine: Problem solving tasks are much more than the word problems that come at the end of a chapter in a textbook. Problem solving tasks are richest when they have multiple entry points for students and allow for a variety of methods or approaches to a solution. We often call them low floor-high ceiling tasks as they are accessible to all students and provide a challenge for all. These types of tasks allow students to experience mathematical processes as they reason, represent, connect, communicate, and justify their thinking. These types of tasks do not have to occur at the end of a unit to consolidate learning but can often be used at the beginning of a unit to introduce ideas, build on prior knowledge, and make student thinking visible so that teachers can built on student thinking.

A problem with multiple entry points

The Painted Cube

A 3 x 3 x 3 cube is made up of 27 smaller cubes. It is then dipped into a bucket of red paint so that the outside is completed covered in paint.

How many of the small cubes would have 1 face painted? How many would have 2 faces painted? 3 faces painted? No faces painted?

Now, try a 4 x 4 x 4 cube. How many of the small cubes would have 1 face painted? How many would have 2 faces painted? 3 faces painted? No faces painted?

- What about a 5 x 5 x 5 cube? and more?

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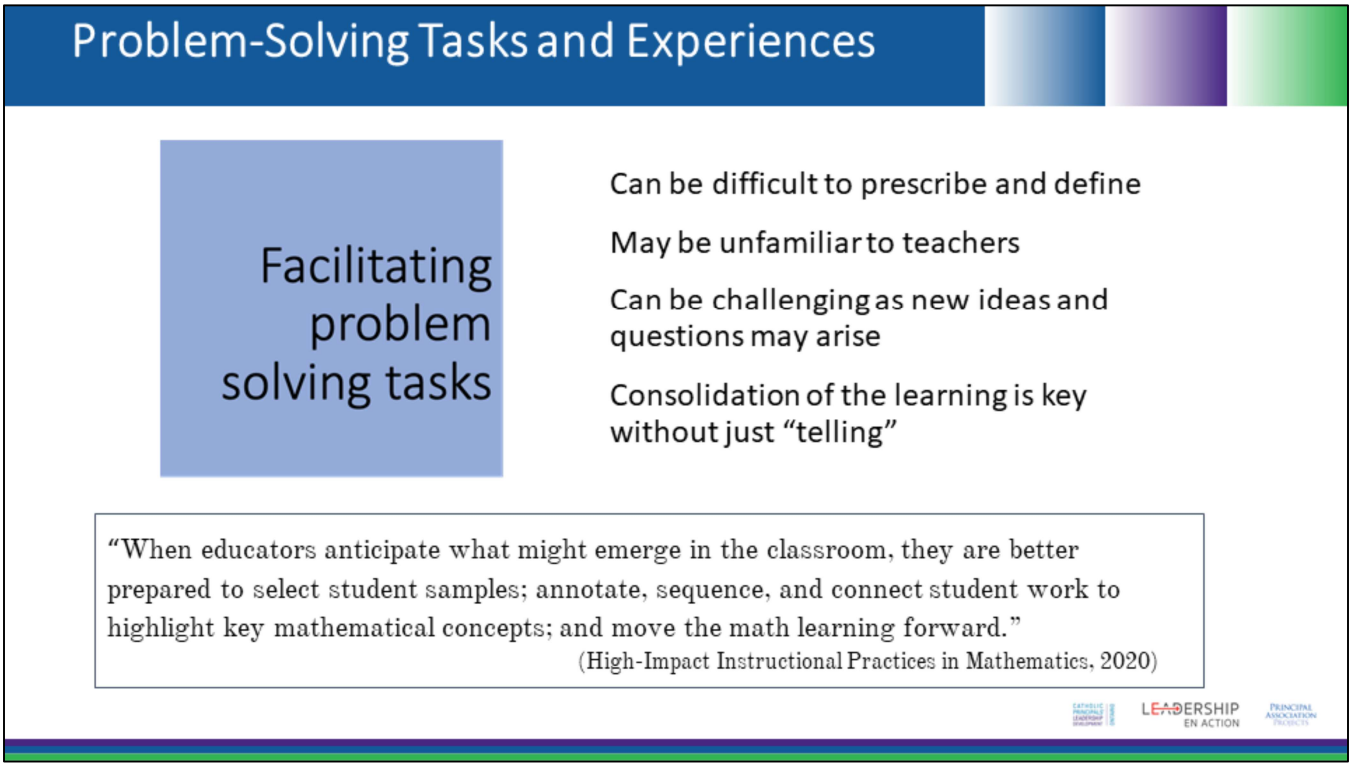
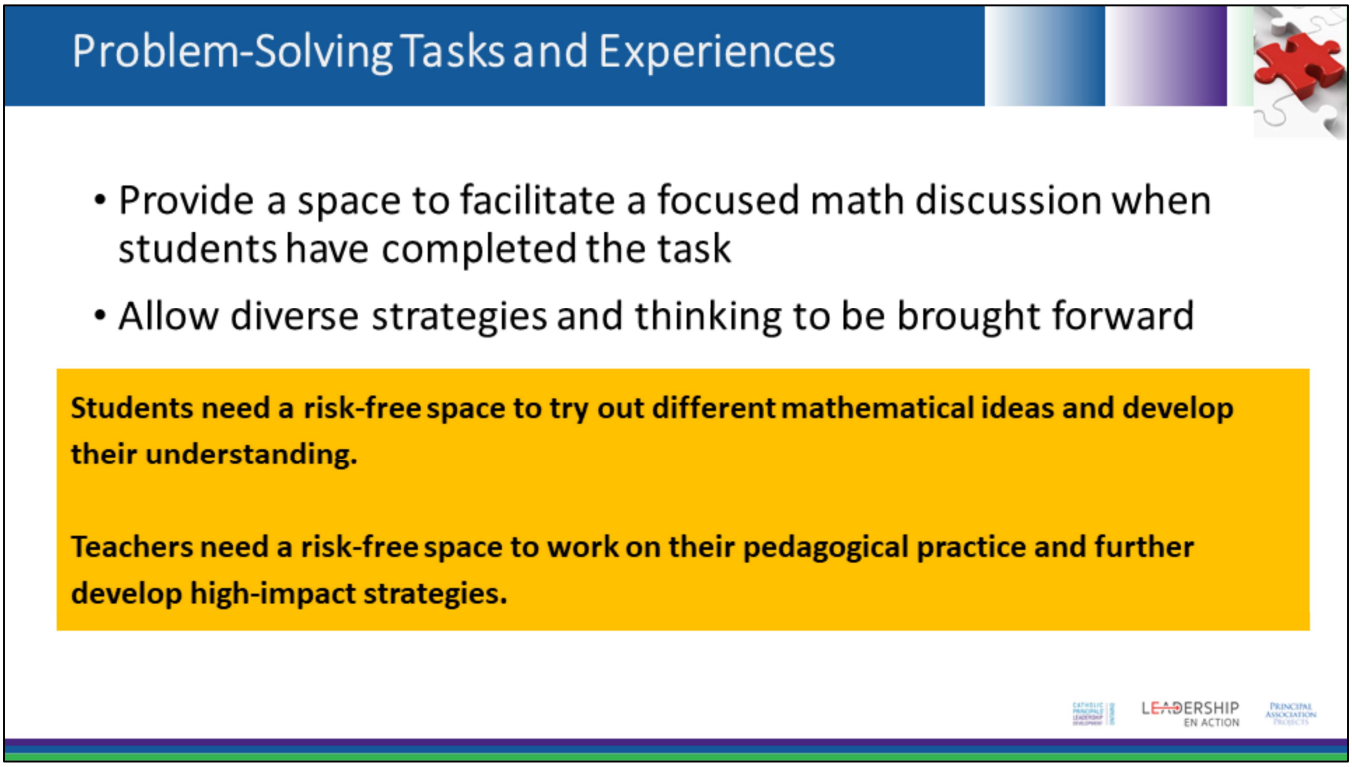
Chris: This task “the painted cube” is one that I have used at a variety of grade levels (from Grades 6 - 11) and is an example of a low-floor, high-ceiling task as I find that all students have ways to engage in the task. This task reinforces students’ spatial sense but also helps them develop a variety of patterns and and relationship emerge that can be described, graphed or symbolized. The task also represents the importance of using tools for mathematical thinking as it would be nearly impossible to engage in this task without first building this cube and getting a sense of the different ways that the cubes are exposed to a dip in the paint.



Facilitating problem tasks can be challenging for teachers. It is difficult to prescribe exactly how a less with a problem solving task will go as the teacher needs to be open to the mathematical ideas that emerge. The teacher needs to notice the new ideas that emerge and respond accordingly with prompts and probes to enhance student thinking. Furthermore, consolidating the thinking that emerges in ways that build on student thinking rather than replacing it with the teachers' thinking can pose a further challenge. My research has indicated that when teachers work together to test out problem solving tasks in their classes they feel supported. ONe resource that I have used with teachers to help them with facilitating problem solving tasks has been the book "Five Practices for Orchestrating Mathematical Discussions as it highlights some steps in the process such as anticipating possible student solutions, monitoring as students work, and selecting and sequencing student work to be presented to consolidate learning. These steps are also highlighted in the HIIPM document.



Problem solving situations provide space for students to have meaningful mathematical discussions with one another as they work together to solve rich tasks. They also learn about different strategies but listening to their peers' methods of solutions. As much as we need to create risk-free spaces for students to test out mathematical ideas, we need to create a safe space for teachers to try out new pedagogical practices. We need to consider how to support teachers to take these risk.

Activity (Jigsaw)

- Choose a high impact practice to learn more about and move to that break out room.
- Moderator will quickly review the practice.
- Guiding Questions for Discussion:
  - Can you share an example of when you saw this practice in action?
  - How have you supported teachers, at your school to learn this practice?
  - How might you support teachers in the future to learn this practice.
- Return to the main room and you will be added to a second group
- Takes turns sharing what you learned about each practice and how you plan to support your teachers.

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Welcome Back

Please complete the google survey to tell us

- ➔ If today's session was useful?
- ➔ One thing you learned
- ➔ One thing you want to learn next time

Thank You

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Resources

https://docs.google.com/document/d/1rdIAdJeUWlH9Zq9bnM-HD54AaZ9fW939Bs0vCSDWoQ/edit?usp=sharing


CATHOLIC PRINCIPALS' LEADERSHIP DEVELOPMENT ONTARIO
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PRINCIPAL ASSOCIATION PROJECTS
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Thank you….