GREATER ESSEX COUNTY DISTRICT SCHOOL BOARD

# A Vision for Mathematics

# Our Vision

***"The GECDSB provides mathematics education that engages and empowers students through collaboration, communication, inquiry, critical thinking and problem-solving, to support each student's learning and nurture a positive attitude towards mathematics."***

Whenever we strive to improve in any way, a vision of what that improvement might be is essential. We need to know what we are working towards and why that is important. We also need to know how we plan to reach that vision.

This vision has been developed specifically by and for the Greater Essex County District School Board through consultations with a wide variety of stakeholders including elementary and secondary teachers and administrators, program staff, Student Success, and Special Education. The intent of this vision, and the related strategies and approaches to mathematics teaching and learning, is to support schools and educators as they reflect on the needs of their students and how they will address them as part of their ongoing School Improvement Plans.

Within this vision there are various responsibilities we assume. As a school board, we believe our responsibilities are to create conditions for mathematics learning:

- where competent and knowledgeable educators integrate instruction and assessment;
- where educators and administrators are committed to ongoing learning about mathematics and mathematics instruction;
-where learning environments nurture positive attitudes towards mathematics; and
-where all students have opportunities and support to learn significant mathematics with depth and understanding.

It is the belief of the board that where this vision is actively pursued, and where these responsibilities are met, students

achievement in mathematics will increase.

This document will outline some of the strategies, approaches, theories, supports and resources that should be used to meet this vision and these responsibilities.

# A Picture of Mathematical Literacy

What is “Mathematical Literacy”?

- **Conceptual Understanding** is the ability to understand mathematical concepts, operations, and relationships.
- **Procedural Fluency** is the skill in carrying out procedures flexibly, accurately, and efficiently, and knowing when the procedures should be applied.
- **Adaptive Reasoning** is the capacity for logical thought, reflection, explanation, and justification.

- **Strategic Competence** is the ability to formulate, represent and solve mathematical problems using an effective strategy.
- **Productive Disposition** is the inclination to see mathematics as useful and valuable.

In order to begin any conversation around improving mathematics we need to share a common understanding of mathematical literacy.

*"**Conceptual understanding** is knowledge about the relationships or foundational ideas of a topic.*
***Procedural understanding** is knowledge of the rules and procedures used in carrying out mathematical processes and also the symbolism used to represent mathematics"*

*Elementary and Middle School Mathematics, van der Walle , Karp, Bay-Williams (2010)*

An example of this is in the task 55 x 24. The *conceptual understanding* of this problem includes the idea that the problem could be represented as repeated addition, and that the problem could be represented in terms of the area of a quadrilateral, the number of seats in a theatre, and any other scenario they can conceive. The p*rocedural knowledge* could include the ability to carry out the standard algorithm (multiply 55 by 24). The ability to go beyond this algorithm or to create an algorithm (for example, 50 x 20, plus 5 x 20, plus 50 x 4, plus 5 x 4) requires *conceptual*

*understanding* of place value and multiplication.

The Ontario Curriculum refers to ***adaptive reasoning*** when "teachers help students revisit conjectures that they have found to be true in one context to see if they are always true. For example, when teaching students in the junior grades about decimals, teachers may guide students to revisit the conjecture that multiplication always makes things bigger"

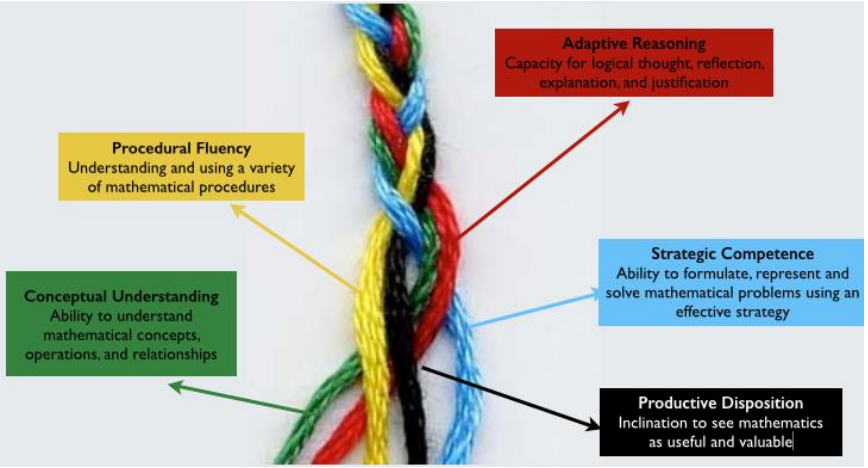
(The Ontario Curriculum Grades 1-8, Mathematics, 2005, p.14). It is tempting for teachers to define terms or provide explanations for formulas at the point where students are making conjectures. "Gallery walks and math congresses are opportunities to treat children as developing mathematicians, which emphasizes developing arguments and proofs to convince others." (Models of Intervention in Mathematics)

In approaching a problem, if you feel like you could apply a known or new strategy to solve the problem, try different approaches when the one you selected does not work, and/or create a model to represent your mathematics, this is evidence of ***strategic competence***.

Mathematically literate people believe they can be successful and are persistent in their approach to problem solving. It is vital that teachers, students, and parents all strive to develop a ***productive disposition*** towards mathematics.

The following image is adapted from

"Adding it Up" (NRC, 2001) and is used to show that the each of the elements of mathematical literacy are interwoven to reach the goal of being mathematically literate.




While conceptual and procedural understanding of any concept are essential, they are not sufficient. Being mathematically proficient encompasses all five elements of mathematical literacy. While we may place more emphasis on one element than another at any given moment in time, it is the relationships and links between them that underpin mathematical proficiency.

# Eight Considerations When Planning for Mathematical Instruction

**1. Program Scope and Planning**

Educators consider curriculum expectations, strands, mathematical processes, and big ideas when planning and using curriculum-appropriate resources.

*'By organizing content around big ideas, teachers can teach more efficiently, but most importantly, students can make connections between seemingly disparate topics that help them learn new mathematical ideas.'* Marian Small from Making Math Meaningful to Canadian Students, K-8 2013

*"Life-long learners of mathematics build new knowledge and skills in prior knowledge using the mathematical processes"* From MathGains

For more information about the math processes please go to the following website and select 'Introduction and Overview'

http://edugains.ca/newsite/math2/mathematicalprocessesvideo.html

**2. Teaching and Learning**

Educators focus instruction on providing students opportunities to engage in minds-on tasks, mathematical inquiry, and

consolidation of their developing understanding of the big ideas.

Educators consider content, process, product, readiness, interests, the student learning profile, and IEP expectations to effectively differentiate instruction to reach all students.

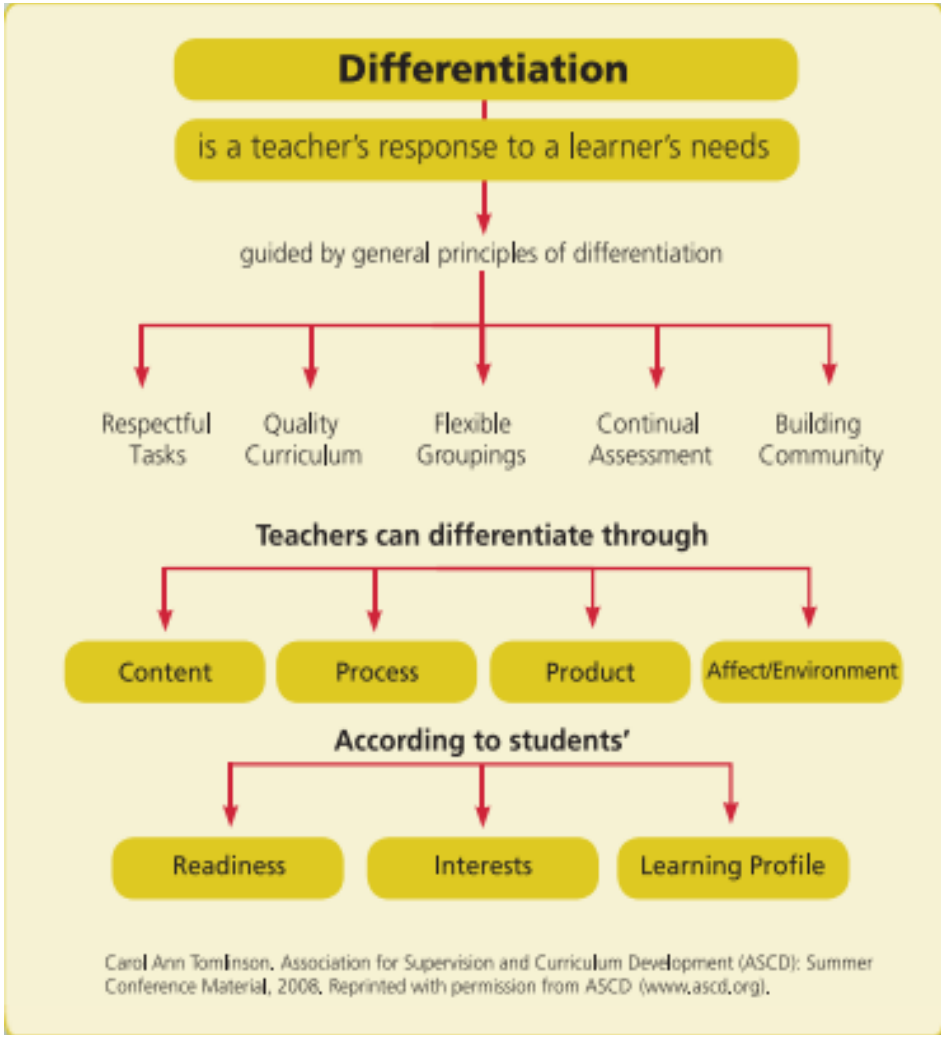
Teachers can empower students to feel that mathematics is something he or she can learn through the use of a variety of lesson styles and by differentiating instruction.

Students vary dramatically in their interests, abilities, learning styles and prior knowledge. Differentiated Instruction based on student learning profiles, allows teachers to respond, through planning, to the needs of the current math learners within their classrooms.

Using different assessment strategies, teachers determine where each student is on a landscape of learning or developmental continuum. By also identifying key math concepts and their connections to curriculum expectations, teachers can then meet the mathematical needs of students while varying other aspect of the lessons and tasks students are required to do (based on student interest and/or readiness).

Inquiry based learning in Mathematics creates a balance between learning based on procedure and learning through problem solving and actively engages all students. This

teaching strategy naturally lends itself to differentiated instruction and differentiated assessment and when all students have an entry point the outcome is increased student success. Teachers' careful selection of content rich tasks, Minds On activities that active prior knowledge and make students current thinking visible, and the effective use of consolidation, will deepen students understanding of the curriculum and ensure that all students regardless of their ability, move forward.



### 3. Learning Environment

Educators use appropriate physical classroom arrangements and group students to promote collaboration, communication and a positive, safe learning environment.

### 4. Student Tasks

Educators provide an appropriate balance of mathematical tasks including the practice of skills, application of procedures, integration of math processes, and rich problem solving. Even if students have not mastered basic skills, they have opportunities to engage in rich tasks that give them a context for these skills.

The tasks that students are asked to do help them to become mathematically literate as outlined in section 2. Tasks should address curriculum and IEP expectations and take into account the readiness, interests and learning styles of the students in the class. Tasks should be derived from multiple sources and resources, and should allow students ample opportunities to collaborate to develop new math knowledge, and communicate their understandings and wonderings about mathematics.

### 5. Constructing Knowledge

Educators recognize that a balanced approach is the foundation of the mathematics program for all students. Effective questioning activates student's prior knowledge, prompts mathematical thinking, and helps students to construct

knowledge. Educators also use a skill-based or conceptual approach when appropriate.

Educators recognize that for students to be mathematically literate, and for them to fully understand the mathematical concepts, they have both conceptual understanding and procedural knowledge, they have the capacity for logical thought, reflection, explanation, and justification (adaptive reasoning), they have the ability to formulate, represent and solve mathematical problems using an effective strategy (strategic competence) and a positive disposition towards mathematics and mathematics learning.

**6. Manipulatives and Technology**

Educators provide students opportunities to use manipulatives and make use of technology to represent mathematical concepts and procedures, solve problems, and communicate their mathematical thinking and understanding.

Educators understand that manipulatives can support students in developing deeper conceptual understandings but that they must also be able to communicate and understand the math they represent. They also recognize that technology has limited capacity to support actual problem solving, but great scope to support students in communicating their thinking and understanding of mathematics to an audience beyond their classroom. The use of technology can also help students to reflect upon their understandings, learn from the understanding of others (adaptive

reasoning), and consider different approaches to solving mathematical problems (strategic competence).

### 7. Students' Mathematical Communication

Educators provide opportunities for students to use communication as both a way to learn mathematics and a way to articulate ideas. Oral, written and physical communication make mathematical thinking observable.

*Mathematical communication is an essential process for learning mathematics because through communication, students reflect upon, clarify and expand their ideas and understanding of the mathematical relationships and mathematical arguments.*

(Ontario Ministry of Education, 2005)

The Ontario Curriculum (Ontario Ministry of Education, 2005) also emphasizes the significance of communication in mathematics, describing it as a priority of both the elementary school and the secondary school programs. Students communicate to:

• build understanding and consolidate learning;

• ask questions, make conjectures, share ideas, suggest strategies, and explain their reasoning; and

• learning to distinguish between effective and less effective strategies.

Communication in the math classroom exists in a number of forms, as illustrated in this table.

| Communication | Oral | Written | Symbolic, Graphical, or Pictorial | Physical |
|---|---|---|---|---|
| Types | Teacher-student (or small group)<br>Teacher-whole class<br>Peer talk<br>Self-talk | Personal writing;<br>Descriptive writing;<br>Process Writing;<br>Word problems | Invented symbolism;<br>Pictorial representations;<br>Graphs;<br>Dynamic;<br>Numeric;<br>Algebraic | Concrete actions |
| Opportunities | Connections to prior learning;<br>Shared problem-solving;<br>Explanations;<br>Predictions;<br>Comparison of ideas and approaches to approaches to problem-solving;<br>Manipulatives;<br>Relationships;<br>Justification | Prior to learning students can what they know about a specific topic;<br>During learning, students can write to clarify their thinking;<br>After learning, students can add new learning their prior learning or summarize their learning | Use mathematical symbols to represent ideas and demonstrate understanding;<br>Data displays, e.g., pictographs, line graphs, scatter-plots, etc.<br>Mathematical modeling using technology, e.g., virtual manipulatives, graphing software, etc. | Use of manipulatives to communicate thinking;<br>Describing or explaining a concept through demonstration, e.g., describe or explain the concept of perimeter concretely by walking the around the entire outside edge of the patio |

The use of mathematical language helps students gain insights into their own thinking and develop and express their mathematical ideas and strategies, precisely and coherently, to themselves and to others

Through listening, talking and writing about mathematics, students are prompted to organize, re-organize and consolidate their mathematical thinking and understanding, as well as analyze, evaluate and build on the mathematical thinking and strategies of others.

Small, Marian. Making Math Meaningful to Canadian Students, K-8. Nelson Education, 2009.

Education For All: The Report of the Expert Panel on Literacy and Numeracy Instruction for Students with Special Education Needs, Kindergarten to Grade 6.

Queen's Printer for Ontario, 2005.

Canadian Mathematical Society

http://cms.math.ca/

**8. Assessment**

Educators assess for different purposes using a variety of assessment strategies and tools. Assessment practices are fair, equitable, and transparent.

The fundamental purpose of assessment and reporting is to improve student learning. The first of the Seven Fundamental Principles of Growing Success; Assessment, Evaluation, and Reporting in Ontario Schools, (2010) emphasizes the need for teachers to use fair, equitable, and transparent assessment and evaluation practices and procedures to support student learning.

What does fair, equitable and transparent assessment look like in mathematics?

***Fair*** assessment and evaluation in mathematics involves…

• multiple opportunities for students to demonstrate the full range of their learning in a variety of contexts;

• curriculum expectations and learning goals that relate to the interests, learning styles and preferences, needs and experiences of all students

• multiple opportunities for students to demonstrate their learning, receive descriptive feedback, and time to act upon

that feedback prior to assessment of learning; and

• varied and parallel instructional experiences, including the use of manipulatives and technologies

***Transparent*** assessment and evaluation in mathematics involves…

- ongoing descriptive feedback to students that is clear, specific, meaningful and timely to support improved learning and achievement; and

• learning goals shared with students to identify the intended student learning; and

• success criteria that describe what successful demonstration of the learning goal(s) looks like.

***Equitable*** assessment and evaluation in mathematics involves…

• inclusive support for all students, with attention to those with special education needs, those who are learning the language of instruction (English or French) and those who are First Nation, Métis or Inuit;

• a focus on the same knowledge and skills, while differentiating to meet student needs;

• self-assessment opportunities where students assess their own learning, set specific improvement goals and plan next steps for their learning;

• on-going assessment integrated with instruction to permit teachers to monitor student learning to guide the next steps in

teaching and learning.

Paying Attention to Mathematics

http://www.edu.gov.on.ca/eng/teachers/studentsuccess/FoundationPrinciples.pdf

Growing Success; Assessment, Evaluation, and Reporting in Ontario Schools (2010)

http://www.edu.gov.on.ca/eng/policyfunding/growsuccess.pdf

# GECDSB BELIEFS

*The responses to the following questions reflect our current understanding about mathematics instruction and learning*

**What is the Connection Between Procedural Fluency and Conceptual Understanding?**

Understanding the concepts underpinning mathematics requires individual learners to process information, to make sense of it, and to figure out how to apply it. Memorizing procedures on its own does not develop this understanding. This example from “Making Math Meaningful” by Marian Small illustrates this concept:

“A student who fully understands what 3 x 5 means not only realizes that it equals 15, but, at some point, understands all of the following as well:

• It represents the amount in 3 equal groups of 5, no matter what is in the groups;

• It represents the sum of 5 + 5 + 5;

• It represents the area of a rectangle with dimensions 3 and 5;

• It represents the number of combinations of any 3 of one type of item matched with any 5 of another type of item (e.g. 3 shirts and 5 pairs of pants = 15 outfits);

• It represents the result when a rate of 5 is applied 3 times (e.g. going 5 km/h for 3 hours); and

• It is half of 6 x 5, 5 more than 2 x 5, and 5 less than 4 x 5”

To engage students in understanding concepts, teachers provide opportunities to learn through problem solving, to use manipulatives as models, and to engage in math talk where students explain ideas and consider the ideas of others.

Introducing formal procedures or algorithms too quickly limits opportunities for students to fully understand math concepts, however without their introduction at some point in the learning students will not necessarily be able to explore and expand upon the concepts they are considering, nor will they have solid foundations to make judgments over the

reasonableness of their answers and efficiency of their methodology. Students who have opportunities to play with invented procedures and consider alternative procedures shared by peers, learning concepts through problem solving will develop the competency to use procedures and algorithms strategically or with procedural fluency, and to judge their own methods against those used traditionally used in mathematics.

Review the previous section on "Mathematical Literacy" to learn more about the relationship between conceptual understanding, procedural knowledge, adaptive reasoning, strategic competence and productive disposition.

**What is Math Talk?**

A Math-Talk Learning Community is a community where individuals assist one another's learning of mathematics by engaging in meaningful mathematical discourse. (Hufferd-Ackles, Fuson and Sherin 2004 p. 82)

Despite the importance of high quality math talk, left on their own students are not likely to engage in such talk. Teachers play a pivotal role in facilitating these opportunities.

Dr. Catherine D. Bruce, an assistant professor at Trent University in Peterborough, Ontario, and the author of the LNS Monograph Student Interaction in the Math Classroom, identifies five challenges that teachers face when trying

to engage students in high quality interactions during math. These are:

- complexities of teaching mathematics in ways they did not experience as students;

- discomfort with their own mathematics knowledge;

- lack of sustained professional development opportunities;

- greater requirement for facilitation skills and attention to classroom dynamics; and

- lack of time, especially in face of curricular demands.

She outlines five strategies for teachers to encourage high-quality interactions, along with evidence for why each is important and how it works:

- The use of rich math tasks;

- Justification of solutions;

- Students questioning one another;

- Use of wait time; and

- Use of guidelines for math-talk.

Whole class discussions can be facilitated using techniques such as Gallery Walk, Math Congress and Bansho. Although there are many similarities and differences in these strategies (which are listed in the "Communication in the Math Classroom Monograph"), the main purpose for all three is to develop student's communication abilities in math.

Increasing math talk provides students with the opportunity to explain, defend,

and justify their mathematical thinking with confidence.

## What is the Impact of Teacher Attitudes and Comfort with Mathematics?

*"Teachers model and nurture positive attitudes, self-efficacy and engagement in mathematics. As educators gain the mathematical knowledge for teaching, they become more capable –and confident – in helping students extend and formalize their understanding of mathematical concepts. This can contribute to students' development of positive attitudes toward mathematics and an increase in their sense of self-efficacy. Self-efficacy, which is an individual's belief in whether he or she can succeed at a particular activity, plays an integral role in student success. Bruce and Ross discovered that "increases in teacher efficacy led to increases in student efficacy and outcome expectancy and to student achievement" (2010, p. 10). In turn, strong student self-efficacy can contribute to greater enthusiasm and engagement in mathematics" (Ross, 2007, p. 52).*

*Ministry of Education Ontario,Capacity Building Series #22, Maximizing Student Mathematical Learning in the Early Years, September 2011*

Teacher attitudes towards math matter. The Mathematics curriculum, Grades 1-8 calls on teachers to bring enthusiasm to the classroom (p.5). It is important to acknowledge that while some teachers are

uncomfortable with math, articulating that sentiment with, “I’m not good at math” should carry the same stigma as a claim to being illiterate. It is important for teachers to project a positive attitude about math for students, demonstrating for them that math can be enjoyable and achievable and that developing mathematical literacy is important for living in today’s world.

Learning Mathematics for Teaching

In the following video segment, Dr. Deborah Loewenberg-Ball explains that the knowledge that is necessary for math teaching is different from the knowledge necessary for doing mathematics. The good news for teachers who have been uncomfortable with mathematizing themselves is that anticipating student thinking, planning open questions to illicit big ideas, prompting and questioning to support conceptual understanding requires some understanding of math concepts, but more importantly, it requires instructional competency.

Click the image to link to video.

Teacher-Efficacy

In this video segment, Dr. Cathy Bruce explains how teacher-efficacy is directly connected to student learning and student achievement. She claims that teacher-efficacy is a more reliable predictor of student achievement than socioeconomic status. That is because when teachers believe they are capable of helping students learn mathematics, they persist in supporting students in the classroom, they are not afraid to engage students in rich problems or to take up incorrect responses. "They let learning take place instead of doing a lot of telling." In turn, this teacher-efficacy translates into student beliefs that they can learn. With this increased student-efficacy, students persist longer with problems. When teachers see students experiencing success with challenging problems, they realize their power to support learning. Teacher-efficacy impacts instructional practice and student-efficacy. Improved instructional practice and improved student-efficacy positively impacts student achievement.

*"Remember that how your students feel about mathematics when they begin school in September rests largely on their previous school experiences and the tone at home. But how your students feel about mathematics when they leave your classroom relies on you. It's important for you to convey, through actions and words, that mathematics is essential in today's world. Show enthusiasm for math. Tell your students that you appreciate the usefulness of math. Reinforce for them*

*that you value learning math. Of course if your own experience with learning math was difficult and these comments make you inwardly groan, don't try to fake an attitude of enthusiasm. Skip the commercial, try engaging students in a discussion of math skills that are essential for daily life and let it convey the message about the importance of math."*

*Burns & Silbey, 2000, So You Have to Teach Math? p.86*

Click the image to link to video.

## What Could Time for Math Look Like?

As well as having a significant portion of each day dedicated to math instruction and learning, it is imperative that teachers embed mathematics into other subject areas, allowing students to experience the relevance of math, practical and every day applications of math, and the contexts

within which math exists in all areas. A comprehensive approach to mathematics would be one where math is evident across the curriculum, time is dedicated for math problem-solving and inquiry, and students are supported in becoming mathematically literate.

The three-part math lesson is one effective component of a comprehensive mathematics program and emphasizes student's overall conceptual understanding through problem solving, math talk, questioning, and differentiated instruction. The three-part lesson is an inquiry based model where "students are recognized as the ones who are actively creating their own knowledge" (Marian Small).

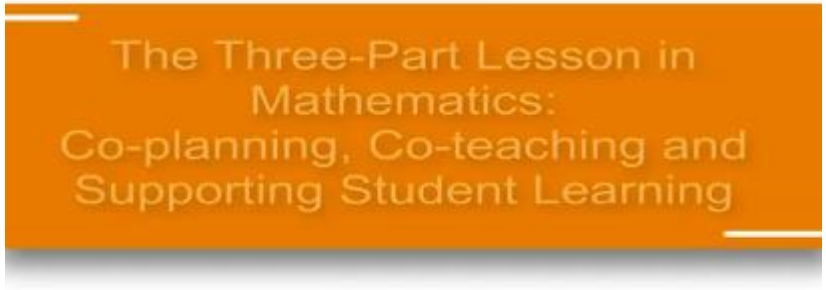
The following videos are taken from resources provided by the Literacy and Numeracy Secretariat to support instruction in mathematics and outline the key concepts and theories underpinning the three-part lesson approach, as well as breaking each part down to show what the possibilities are.

BEFORE


Click the image to link to video.

| Before/minds on | |
|---|---|
| STUDENT | TEACHER |
| - Make connections to, and reflect on, prior learning<br><br>- Share their thinking through discussion in a math talk learning community | -Model a strategy to encourage students to make connections to, and reflect on, prior learning (e.g. Think/Pair/Share, Ticket In, Video Clip, Math Language Recall etc)<br><br>- Establish expectations and procedures (e.g. roles, groupings, manipulatives, etc)<br><br>- Activate students' prior knowledge by posing a thought-provoking question/task that sets the stage for learning<br><br>- Promote a positive classroom environment using math talk learning communities |

DURING




Click the image to link to video.

| During/action | |
|---|---|
| STUDENT | TEACHER |
| - Flexible grouping; pairs, small groups, or independent<br><br>- Work to make sense of the problem in their own way to deepen and clarify their thinking<br><br>- Communicate their thinking to one another and teacher through math talk<br><br>- Use errors as an opportunity for learning<br><br>- Make their thinking visible<br><br>- Make connections to other subjects and real-life contexts | -Provide a problem with multiple points of entry<br><br>- Group students purposefully<br><br>- Ask probing questions to help focus students' thinking without leading to strategies or solutions<br><br>- Encourage accountable math talk<br><br>- Encourage students to represent and explain their thinking<br><br>- Reconvene the whole group to answer questions or clarify thinking<br><br>- Observe and assess |

AFTER


Click the image to link to video.

| After/consolidation | |
|---|---|
| STUDENT | TEACHER |
| - Make connections between mathematical ideas and strategies<br>- Apply descriptive feedback based on learning goals and success criteria<br>- Complete a final practice assessment or reflection to demonstrate consolidated learning | Strategically facilitate whole-class and small-group discussions and sharing by:<br>- Asking questions to clarify misunderstandings<br>- Encourage students to explain and understand a variety of solution strategies without evaluation<br>- Summarizing the discussion and emphasizing key points or concepts (i.e. “naming” the math). |

## What is the Role of the Textbook?

The Ontario Curriculum dictates what should be taught in all mathematics programs. Historically there has been an over-reliance on the textbook at the expense of a focus on curriculum expectations and opportunities to explore math more deeply, not to mention an oversight in the fact that the textbook and curriculum do not completely align.

The emphasis in mathematics instructions needs to be on delivering the content expected in the curriculum in a way that the student can best learn. The textbook does play a role in this process, but is not the driving force behind instruction and is merely a resource to support the teacher in structuring learning opportunities for

students. It is not the textbook itself that is a potential problem, more how it is used and what role it plays in the teaching and learning of mathematics.

The following video from math teacher Dan Meyer outlines some of the ways we need to think more critically about the resources we use to deliver curriculum and what exactly we are asking our students to do in the math lesson.


Click the image to link to video.

There are many factors teachers are asked to consider in their use of the textbook. Firstly, they need to ensure that the textbook content aligns directly to the expectations outlined in the Ontario curriculum, and from there make a judgment as to the extent to which these expectations are met. Are supplementary activities required? Does the content of the textbook meet the needs of all learners? Will the students be able to present a clear and coherent understanding of the concepts required by the curriculum through the completion of the tasks in the textbook? Is the textbook the most engaging and/or effective way for the students to learn and demonstrate understanding of these concepts? What other resources might be needed? What

other learning opportunities or assessments do the students need?

Once an educator has considered these questions, and acted upon their responses, the textbook will likely have a less prominent role in their math classroom, and other resources and approaches will be in place. The resources in section ___ will be a useful guide and support for teachers looking to evolve their teaching of mathematics.

## What is the Role of the Administrator in Supporting Mathematics?

GECDSB school administrators have a key role to play in improving the mathematics learning in a school. In all areas, not just mathematics, administrators recognize the need to improve as an ongoing process and focus on sustaining those changes that achieve increased student learning, and adjusting the changes that do not. In order to support and promote school improvement, all staff, including administrators learn current theories and best practices as mathematics education quickly evolves around us. Administrators lead all stakeholders in creating and sustaining a positive mathematics culture across the school.

Schools need a shared focused of mathematics learning for all students that has been collaboratively developed and promotes a high level of expectation from the teacher leading to increased achievement. There are going to be multiple barriers to achieving real

sustainable growth. By regularly discussing the school's shared focus administrators can encourage optimism in the face of everyday problems.

Through the GECDSB School Improvement Planning process, and the nature of "School-Based Learning", our educators have autonomy and ownership over how and what they learn. The improvement goals that drive this shift need to be identified by all stakeholders.  Administrators coordinate professional learning opportunities that value teachers knowledge and experiences and are based on student learning needs. Administrators work collaboratively with their staff to build a long-term plan, to monitor their incremental growth and to adapt their plan in response to new learning.

**How do we Communicate with Parents?**

Parents play a vital role in their child's development of mathematics. It is essential that teachers build effective communication between home and school. Teachers are encouraged to articulate with parents the importance of:

·Building strong, positive attitudes about math;

· Beginning with activities that meet your child's level of mathematical understanding;

- Using their first language to explore mathematics at home if they or their child

are more comfortable in that language.

Communication is rarely a discrete, individual act but rather occurs within the context of ongoing exchanges (Adler & Rod- man, 1994). Currently, a number of communication opportunities are available to teachers, ranging from blogs, school-to-home communication books, to face to face parent conferences. Every communication exchange, regardless of format, should reflect a thoughtful, planned approach and should be viewed as an opportunity for teachers to promote parent partnerships and, ultimately, to support student learning. Teachers are encouraged to use a variety of strategies, keeping in mind that the more proactive you are the better. The more you explain to parents up front, the less defensive work you'll have to do. As educators, if we want parents to be on our team, we must initiate, define, and practice what we want that relationship to look like.

Recent research suggests that creating a partnership climate in schools can improve math proficiency for students (Sheldon, Epstein & Galindo, 2010). Schools and teachers can go beyond communication activities to engage parents as partners in supporting student math learning. Some challenges to family involvement in math learning include:

1) Math is used differently at home but teachers haven't been guided to take students' social contexts into account when planning math instruction; and

2) Most teachers have little education about how to involve parents in supporting

children to extend their math skills.

Some ways that GECDSB teachers are currently building math partnerships with families include:

- Math Take Home Bags – Students take home a math bag once a week that has an activity they can engage in with their family, like measuring items around the home, reading a picture book and with prompts for math thinking, or conducting a survey of family members about a topic the class is investigating.

- Electronic Communication -

• Math Goal Setting – Students take home a questionnaire to complete with their parents about the child's goals for mathematics. Parents suggest possible ways they can support their child with the goal from home. Parents are then invited in to the classroom later in the year for a demonstration by students about how they are progressing towards their goals using evidence from their work in class and at home.

• Math Nights and Workshops – Schools and teachers are hosting parents for evening sessions where they engage families together in problem solving, explain about the math program and help parents to better understand how they can help support their child's math development. Parents are also given the opportunity to provide input for the school's efforts to improve mathematics.

References

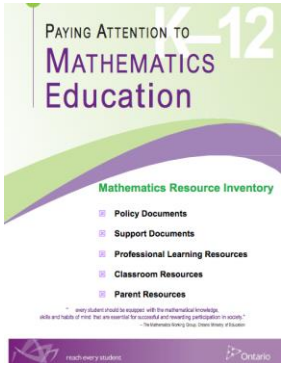
Adler, R. B., & Rodman, G. (1994). Understanding human communication. Orlando, FL: Harcourt Brace College Publishers.

More resources

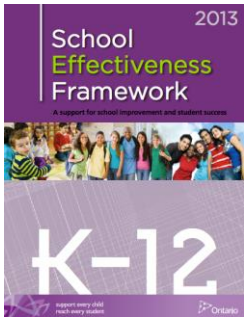
http://www.edu.gov.on.ca/eng/studentsuccess/lms/files

http://www.edu.gov.on.ca/eng/literacynumeracy/parentguidenum2012.pdf

## Resources




The Ontario Ministry of Education has developed a comprehensive list of Ministry resources, research, guides and supports for educators in Ontario. Click here to access this great resource.




The School Effectiveness Framework is a tool to guide the work in our schools. Click here to see the Framework, or click here to see which areas may be particularly pertinent to mathematics.