Administrator's Guide to Support Mathematics

The Consortium

Alberta Professional Learning Consortium

1. Rationale and Purpose

There is an abundance of research that indicates that a school changes when leadership leads that change. As a school administrator how do you ensure that your school is supporting effective math instruction? Designed to support the **LQS** and **TQS** standards, this document will provide school administrators with guidance and ideas on ways to build a strong math culture that supports equity for all students, while encouraging positive attitudes towards mathematics.

This document contains information on what is Mathematics and Numeracy, how to build a mathematical rich school environment, and strategies to successfully implement positive changes in your school. An observation checklist is included that will provide you with specific look-fors and guiding questions that may be used in your interaction with students and teachers. In addition, there are direct links to multiple resources that can support you in your mathematical journey.

According to Fullan (2006), effective change in a school occurs when these characteristics are present:

- Motivation
- Capacity building
- A bias for reflective thinking
- Engagement of community, school,
- Persistence and flexibility

A School leaders Guide To Building Sustaining Math Success: page 2

Students will learn more deeply and successfully when the school has a plan that all education stakeholders who engage with students know and follow. All stakeholders need to be aware of and ready to implement what educators in the school or district agree on the specific language and notation, representations, rules and conventions, generalizations, and overall problem-solving approaches that every educator in the building or district will use (Karp et al., 2016).

Dougherty, Barbara J.; Bush, Sarah B. and Karp, Karen S. (2020). *The Math Pact, High School: Achieving Instructional Coherence Within and Across Grades*. NCTM.

WHAT IS MATHEMATICS

Mathematics is a universal language that uses symbols and procedures to communicate ideas and solve real-life problems.

- It involves learning across various disciplines like arithmetic, algebra, geometry, statistics, and probability.
- Mathematics education connects concrete experiences to abstract concepts.
- Students acquire knowledge of basic number fact strategies that are applicable to addition, subtraction, multiplication, and division of larger numbers and decimals leading to fluency
- Mathematics helps students apply foundational knowledge to solve problems and develop confidence in their mathematical thinking.

- These skills support various needs, such as financial literacy.
- Mathematics fosters confidence and intellectual curiosity in society.

LearnAlberta Curriculum: Mathematics

> Equity is defined as the removal of systemic barriers and biases enabling all individuals to have equal opportunity to access and benefit from a program/ product/service.
>
> Alberta School Councils' Association

ALBERTA'S KINDERGARTEN TO GRADE 6 CURRICULUM (2022)

There are 8 organizing ideas that span across the grades in the Mathematics curriculum.

Organizing Ideas	Kinder-garten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Number							
Algebra							
Geometry							
Coordinate Geometry							
Measurement							
Patterns							
Time							
Statistics							

For more information: New Learn Alberta.

The existing grade 7 to 9 updated 2016 Math Curriculum can be found at Alberta Education: Mathematics (7-9) Program of Studies.

The existing High School Math curriculums from 2008 can be found at Alberta Education: Mathematics: (10-12) Programs of Study.

Grade 7 to 12 curriculum links will be updated when Alberta education releases a new secondary curriculum.

WHAT IS NUMERACY?

Numeracy involves acquiring and applying the mathematical knowledge and skills needed to engage with quantitative and spatial information in a variety of situations. (Alberta Education 2022) Numeracy is embedded in learning experiences across all subject areas. It is foundational, allowing students to make informed decisions as knowledgeable, active participants in our democratic society. The Numeracy Progressions identify knowledge and behaviours that students may demonstrate by the end of each divisional age range.

For more information: LearnAlberta Numeracy Progressions: What is Numeracy?

THE IMPORTANCE OF VOCABULARY

Research shows that explicit teaching and modeling of mathematical vocabulary and student actions (verbs) within the Learning Outcomes and KUSPs, provides the foundation for learners to develop competence. Students may excel in computation, but their ability to apply their skills will suffer if they do not understand the math vocabulary used in instructions and story problems. (Bruun, Diaz, Dykes 2015)

For more information:

ARPDC Interactive Mathematics and Financial Literacy Numbered Outcomes K-6 Vocabulary Document

Grades K-3 Resources to Support the Teaching and Learning of Math Verbs

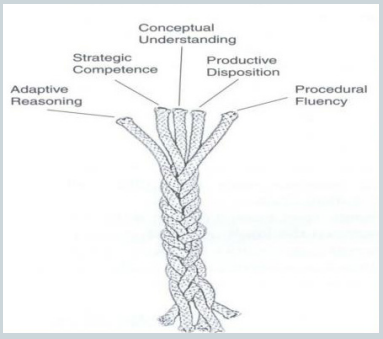
Grades 4-6 Resources to Support the Teaching and Learning of Math Verbs

Edutopia: Build Strong Math Vocabulary Skills Using These Simple Strategies

Corwin Connect: 10 Ideas for Vocabulary Instruction in Math

THE IMPORTANCE OF FLUENCY

Fluency in mathematics is more than adeptly using basic facts or implementing algorithms. Real fluency involves reasoning and creativity, and it varies by the situation at hand. Fluency is defined as able to apply procedures efficiently, flexibly and accurately. (National Research Council (NRC; Kilpatrick et al., 2001) and National Council of Teachers of Mathematics (NCTM 2014).



Intertwined strands of proficiency (NRC, 2001, p. 117)

For more information:

Bay-Williams, Jennifer M. and SanGiovanni, John J. (2021). *Figuring Out Fluency in Mathematics Teaching and Learning, Grades K-8: Moving Beyond Basic Facts and Memorization*. Corwin Mathematics.

University of Cambridge Enrich: Developing Number Fluency - What, Why and How

Stanford Graduate School of Education YouCubed: Fluency Without Fear

As teachers, administrators, and education leaders, each and every student is counting on us, our policies, and our practices to support them, support their learning, and develop them as doers of mathematics. -Karen Graham, NCTM, 2024

Reflecting on a Mathematically Rich School	
Equity	• Supportive relationships between students, teachers and the school community • Recognizing that we do not all start from the same place and must acknowledge and make adjustments to imbalances. • Achievement cannot be predicted by students' racial, ethnic, linguistic, gender, and socioeconomic backgrounds. • All students can learn math and have access to the tools and resources they need
Learning Environment	• Math learning is visible throughout the school • Welcoming and inclusive • Student voice and choice are evident • Resources, manipulatives and visuals are incorporated
Teaching and Assessment Practices	• Knowledge of and attention to Alberta curriculum • Supports the development of competencies, literacy and numeracy • Emphasis on vocabulary and fluency • Math is approached with a holistic view of the student • Differentiation of instruction and assessment • Ongoing assessment

Provided is a Principal Classroom Observation Checklist to guide your observations and/or to assist with establishing school growth plans.

Note: This observation checklist is meant to provide options for growth, with the idea of focusing on selected components within a category. Ideally, the selected components will align with your school's growth plan.

2. Building A Mathematically Rich School

A mathematically rich school supports positive nurturing relationships within the school community.

Consider these three categories: equity, learning environment and teaching/ assessment practices as you reflect on the math environment you are hoping to foster within your school.

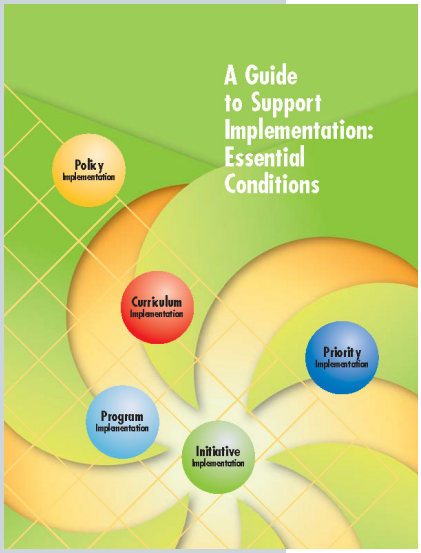
ADDITIONAL WAYS TO SUPPORT A MATHEMATICALLY RICH SCHOOL

- Dedicate an area in your schools newsletter to math and numeracy,
- Include such things as a math riddle or joke, a great article, favorite books related to math, strategies to support math learning at home or a favorite website, etc.
- Visit different teacher classrooms during staff meetings. Ask the teacher to share a successful lesson or student success story. Perhaps they could share how a math visual/tool/manipulative supported student thinking.
- Have an interactive math board outside of your office. Include open ended questions, estimation tasks, favorite math books or riddles that everyone can participate and respond to.
- Consider using collaborative planning time to share resources, tools and strategies that support mathematical thinking.
- Parent/Family night where students showcase concepts and tools. These nights can be student and/or teacher led.

3. Getting Started – Ways to Implement

A Roadmap to Successful Implementation

Successful implementation is complex work. Planning requires an understanding of the characteristics of successful implementation; coherence among plans and priorities; and the intentional efforts by education stakeholders to collaboratively address the essential conditions in mathematics.



Successful implementation is possible when education stakeholders share responsibility in a culture of learning to address the seven essential conditions – shared vision, leadership, research and evidence, resources, teacher professional growth, time and community engagement. (Essential Conditions website, 2010)

For more information visit the **Essential Conditions** website where you can find the guiding questions and templates for each condition.

HIGHLY RECOMMENDED RESOURCES TO SUPPORT YOUR JOURNEY

The School Leader's Guide to Building and Sustaining Math Success

The Math Pact, Elementary: Achieving Instructional Coherence Within and Across Grades

Everything You Need for Mathematics Coaching: Tools, Plans, and a Process That Works for Any Instructional Leader, Grades K-12, by Maggie B. McGatha et al.

Mathematical Mindsets: Unleashing Students' Potential through Creative Mathematics, Inspiring Messages and Innovative Teaching, by Jo Boaler

Corwin: Thinking Classrooms

CBE K-12 Mathematics Framework

ERLC: Guide to Numeracy Framework

Corwin Connect: 5 Fabulous Strategies to Engage As School Leaders

The Learning Pit

Math-ish

Video about mistakes making our brains grow in Mind Boosting Videos on youcubed.org

Routines such as those in My Favourite No video

RESOURCES TO HELP TEACHERS

ARPDC: Alberta K-6 Mathematics Scope and Sequence

ARPDC: Math K-3 Curriculum Implementation Toolkit

ARPDC: Math Gr 4-6 Curriculum Implementation Toolkit

Alberta Professional Learning Consortium: Math Resources

OnGoing Professional Learning Opportunities - APLC website

This document was meant to provide you, the school leader, with an overview of how to get started with building and sustaining a positive math culture in your school. We hope it has provided provocation, guidance and concrete actions to get you started.