

DATE: March 10, 2020

TO: Board of Trustees

FROM: Darrel Robertson, Superintendent of Schools

SUBJECT: Strategic Plan Update: Numeracy

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ISSUE

The purpose of this Strategic Plan Update report is to provide the Board of Trustees with an overview of the data, strategies and initiatives used in support of high quality teaching and learning of numeracy and mathematics.

BACKGROUND

In 2018, Edmonton Public Schools formally reaffirmed the District Strategic Plan for the 2018-2022 term. The District Strategic Plan has three priority areas with supporting goals and outcomes. The plan provides common direction and alignment between the work of the Board of Trustees, the Superintendent of Schools and Division staff. The plan serves as the foundation for the organization's culture of evidence-based decision making, assurance and accountability.

To demonstrate the Division's commitment to transparency and accountability, Strategic Plan Update reports were introduced in 2016–2017 as an extension of the Annual Education Results Report (AERR). The reports are intended to provide the Board of Trustees with detailed progress towards the goals and outcomes of our Strategic Plan.

CURRENT SITUATION

This Strategic Plan Update report reflects the work in support of high quality numeracy and mathematics teaching and learning and is in direct response to Priority 1 Goal Two of the 2018-2022 District Strategic Plan, P1 G2: More students demonstrate growth and achieve student learning outcomes with a specific focus on literacy and numeracy.

KEY POINTS

This Strategic Plan Update report provides the Board of Trustees with an overview of work in support of numeracy and mathematics

ATTACHMENTS and APPENDICES

ATTACHMENT I Strategic Plan Update: Numeracy

NP:mh



Strategic Plan Update:

Numeracy

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INTRODUCTION

This Strategic Plan Update Report provides the Board of Trustees with an overview of Division efforts in support of numeracy and mathematics. Priority 1 of the 2018-2022 Strategic Plan calls for the Division to, “foster growth and success for every student by supporting their journey from early learning through high school completion and beyond”. The outcome of Priority 1 Goal 2 of the 2018-2022 Strategic Plan sets the direction that, “more students demonstrate growth and achieve student learning outcomes, with a specific focus on literacy and numeracy”.

Numeracy and literacy share many characteristics; both are critical to helping people make sense of the world around them and are foundational to learning. Over time, educators have developed approaches, tools and resources to support quality literacy teaching and learning. The effectiveness to how we approach literacy learning is serving as a construct or model to inform best practices in numeracy instruction. As we become more strategic and deliberate in our work to support numeracy learning, teachers and school leaders’ confidence in how to implement effective numeracy teaching and learning strategies across grade levels and subject areas is increasing.

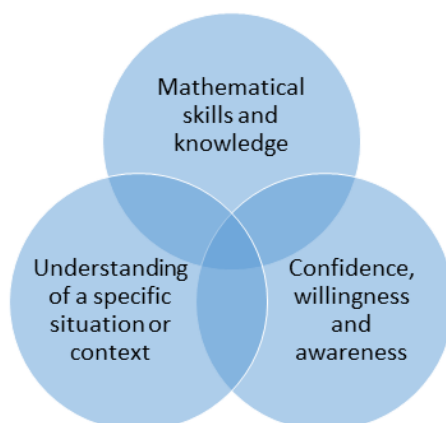
This report provides a summary of Division efforts in support of quality numeracy learning and the progress made towards improved results, with an emphasis on:

- Numeracy and mathematics contextualized within the Alberta Education curriculum
- A summary of how schools, catchments, central and the Teacher Collaboration Committee (TCC) Numeracy working groups are progressing Division efforts in support of numeracy learning
- An overview of Division student achievement in the area of mathematics on provincial indicators

Numeracy and Mathematics: A Closer Look

Alberta Education defines numeracy *as the ability, confidence and willingness to engage with quantitative and spatial information to make informed decisions in all aspects of daily living. A numerate individual has the confidence and awareness to know when and how to apply quantitative and spatial understandings at home, at school, at work or in the community.* Simply put, numeracy is the ability to use numbers and mathematical approaches to solve problems in real life.

Numeracy and mathematics draw on the same body of knowledge, but they are unique. Numeracy involves the ability to examine a context or situation and use the relevant mathematical understandings to draw conclusions. Numeracy includes both spatial and quantitative information and like literacy, we use numeracy in our daily lives to perform a wide range of basic tasks, such as balancing a bank account, calculating the distance of travel, adapting a recipe or measuring a room for a piece of furniture. Essentially, there are three overlapping aspects that come together in order for a person to be functionally numerate: mathematical skills and knowledge; understanding of a specific situation or context; and confidence, willingness and awareness.



Similar to literacy, children develop their life-long numeracy confidence and skills in a progression over time; the journey to being numerate begins early in a child's life - typically before they enter school. The following chart demonstrates the increasing complexity of numeracy learning and its application to real life:

Young children begin to develop numeracy skills by judging the distance to grab a toy, recognizing patterns, learning how to recognize shapes and using this knowledge to complete a puzzle.	Older children use numeracy to play board games, estimate the cost of a purchase with tax, judge how far to kick a ball and estimate how much time it will take to get somewhere on time.	Young adults use numeracy to interpret sports statistics, navigate their way to a new destination, track their cell phone data and budget to save up for a purchase.	Adults use numeracy to interpret voting statistics, choose a mortgage, assess nutritional content of food or complete home renovation projects.
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Numeracy and the Curriculum

The skills and applications that are foundational to numeracy are primarily taught in the mathematics classroom. However, research has shown that students do not automatically transfer these understandings to other areas of the curriculum and their learning (Thornton & Hogan, 2005). With this in mind, it is important that teachers are explicitly teaching numeric concepts across subject areas. The following chart shows examples of how numeracy learning weaves throughout Alberta curriculum:

Subject area	Numeracy Learning Area
Language Arts	plot story events on graphs or timelines; determine the accuracy of statements based on statistics in a news report
Mathematics	calculate how much carpet would be needed for a room; determine the real life implications of a change in interest rates
Social Studies	represent historical and current events on timelines; interpret economic and demographic data, including inflation, unemployment rates, and population patterns
Science	estimate and take measurements during experiments; use models to represent systems, scientific structures or processes
Fine Arts	represent perspective in artistic creations; use timing to play or compose music
Health, Life Skills and CALM	create and track progress for a balanced personal fitness plan; calculate percentage of food intake from carbohydrates, fats and proteins and compare to Canada's Food Guide

The new draft provincial curriculum continues to demonstrate numeracy progressions across subject areas. Additionally, the draft mathematics curriculum for Kindergarten to Grade 4 deepens many mathematical concepts foundational to overall numeracy, including:

- A greater emphasis in spatial reasoning at younger grades.
- The introduction of fraction concepts in Grade 1.
- Explicit expectations for learning and recalling number facts.
- The introduction of computational thinking concepts starting in K.
- Explicit introduction of financial literacy concepts as an application of other mathematical concepts.

The Division's Numeracy Learning Journey

With the emerging awareness that quality teaching and learning in the area of numeracy had many parallels to the Division's strategic and deliberate approach to literacy learning, the Mathematics and Numeracy Principal and Central Working Groups were established in 2015. This work resulted in the creation of a guiding vision and a plan that mapped out a pathway to strengthen numeracy teaching and learning. This plan envisioned:

- That each student from early learning programs through to high school and beyond will demonstrate his or her full potential in numeracy and mathematics.
- The development of a Division-wide understanding of numeracy and mathematics based on direction provided by Alberta Education.
- The development of additional resources for schools to support student achievement in mathematics and numeracy across subject areas.

The Division's 2016-2017 math achievement results on provincial measures drew attention, as they demonstrated an overall pattern of decline (see chart below presenting a high level 5 year trend of Division math results). Though the 2016-2017 results mirrored provincial trends, Division results still were concerning and warranted a closer look. Central decision units, catchments and schools all made deliberate efforts to examine the results to inform numeracy teaching and learning.

EPSB	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Grade 6 PAT	81.2	80.4	76	79	79.6
Grade 9 PAT	75.2	78.1	76.7	70.4	71.1
30-1 Diploma	76.1	72.2	73.8	77.8	78.6
30-2 Diploma	76	79.1	77.4	77.4	80.5

As part of gaining this deeper perspective, the Superintendent hosted a Teacher Collaboration Committee (TCC) for Mathematics in February 2018. The purpose of this TCC was "to provide grassroots direction to inform the work of improving mathematical achievement Division-wide". The TCC identified the following critical areas of focus for student success in the area of numeracy:

- Curricular Alignment
- Best Practices
- Intervention Strategies
- Building Staff Capacity

TCC AREAS OF FOCUS FOR NUMERACY AND MATHEMATICS

Following the TCC, a committee comprised of 32 teachers from across catchments and grade levels, eight principals and four teacher consultants was formed. The work of the committee was to build upon the feedback and four critical areas of focus generated during the TCC. The structure and composition of the committee was deliberate to support the interplay and collaboration among schools, catchments and central, making it a genuinely systemic response to improving numeracy and mathematics learning outcomes.

Curricular Alignment

The TCC identified the need for access to quality resources and strategies that would support teachers to plan more efficiently for numeracy instruction, as well as support teacher collaboration. This has resulted in the development of a database of supports for the teaching and learning of numeracy across subject areas. At this time, available supports include:

- A list of sample resources to support teaching and learning in mathematics from Kindergarten to Grade 12.
- Resources to assist teachers in supporting students in meeting the reading demands of mathematics outcomes in Grades 1 to 5.

- Curriculum-based children's literature supporting the teaching and learning of mathematics from Kindergarten to Grade 6.
- Key vocabulary in English and French to support mathematics from Kindergarten to Grade 9.
- Key vocabulary in Chinese, German and Spanish to support mathematics from Kindergarten to Grade 6.
- A question bank in English and French for Grades 4 to 9 to support Part A of the Math Provincial Achievement Test (PAT).
- A Financial Literacy Handbook was released in February 2020 to support financial literacy instruction across subject areas in Kindergarten to Grade 6.
- Documents to support the teaching and learning of Mathematics 20-2 and 30-2.

Many other supports, such as the Maximizing Math series, are under review or development and will be released after the new provincial curriculum is available.

Best Practices and Intervention Strategies

Student learning, growth and achievement in the area of numeracy is supported and informed through a cycle of assessment, intervention and quality teaching practices. Part of the work of the TCC has been to identify assessment tools, interventions and instructional resources to support high quality numeracy teaching and learning. These include:

- The Math Intervention/Programming Instrument (MIPI) for students in Grades 2 to 10.
- Two additional intervention tools that support diagnostic assessment:
 - **First Steps in Mathematics (Pearson Education)** - a developmental framework that describes phases of thinking that students progress through as they learn key mathematical concepts. It supports teachers in monitoring and assessing students' mathematics learning and provides links to developmentally appropriate learning activities.
 - **Leaps and Bounds (Nelson)** - a series of resources to support students who are struggling in math, including diagnostic assessments and intervention activities to address gaps in student understanding.
- [Anytime help, Anywhere](#) – Grades 3 to 10 digital homework support videos for parents and students; this series includes an exploration of the Shape and Space strand of the mathematics program of study.

Additionally, work is being done to support the development of a pyramid of intervention for mathematics that outlines best practices, strategies and interventions to address the diverse numeracy learning needs across our student population. This work reflects both a curricular and inclusive learning perspective to numeracy instruction. The pyramid will be available to support teachers in the fall of 2020.

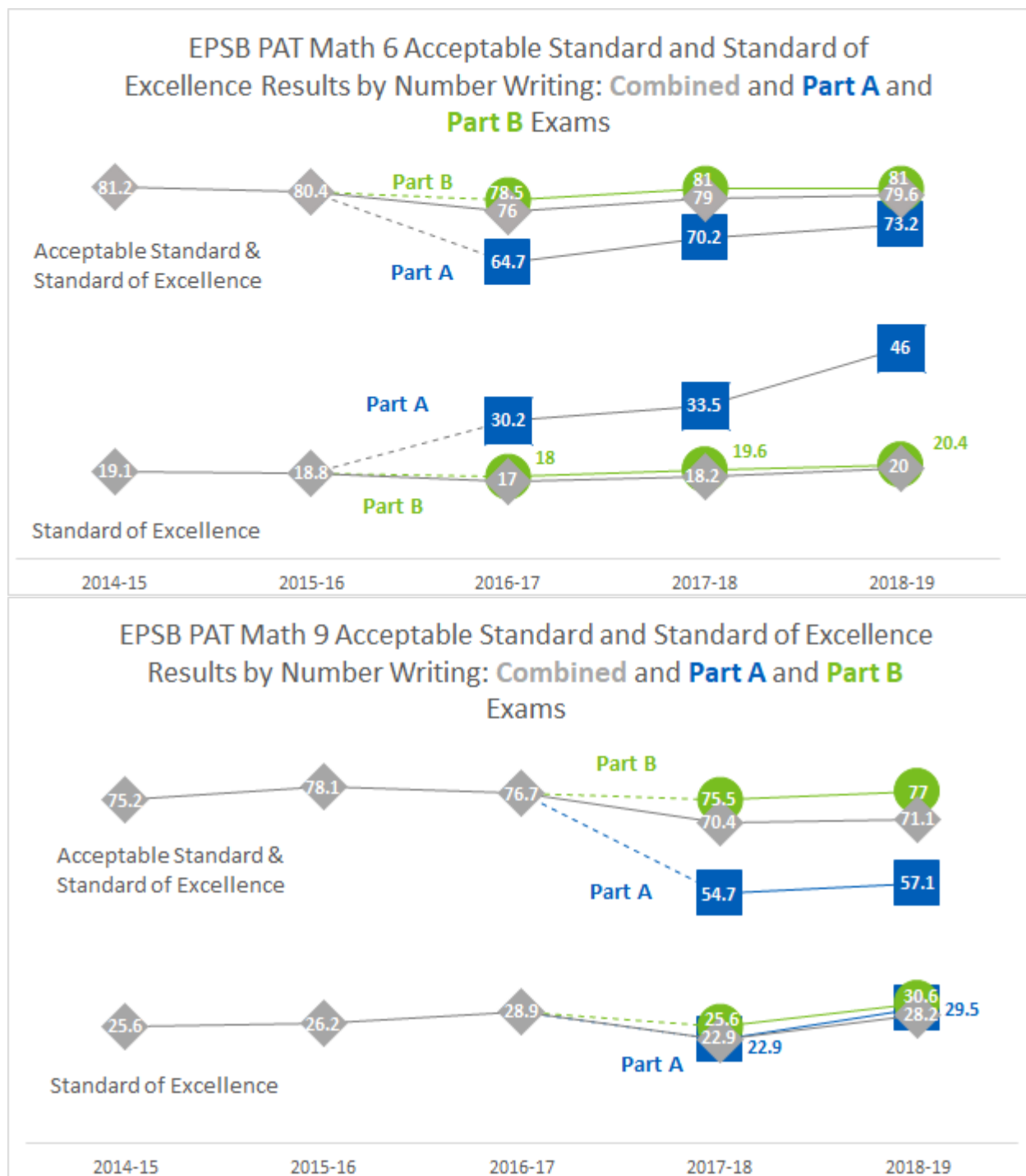
Building Staff Capacity

A critical component of the Division's numeracy and mathematics teaching and learning work is supporting the ongoing growth and capacity of staff. In response to the identification by the TCC for more professional learning (PL) in mathematics and numeracy to build teacher confidence and expertise, the Division offers several PL opportunities reflecting a range of interventions and supports for numeracy instruction such as Foundations of Mathematics and A Guided Approach to Math which are explicitly modeled on existing successful literacy PL structures.

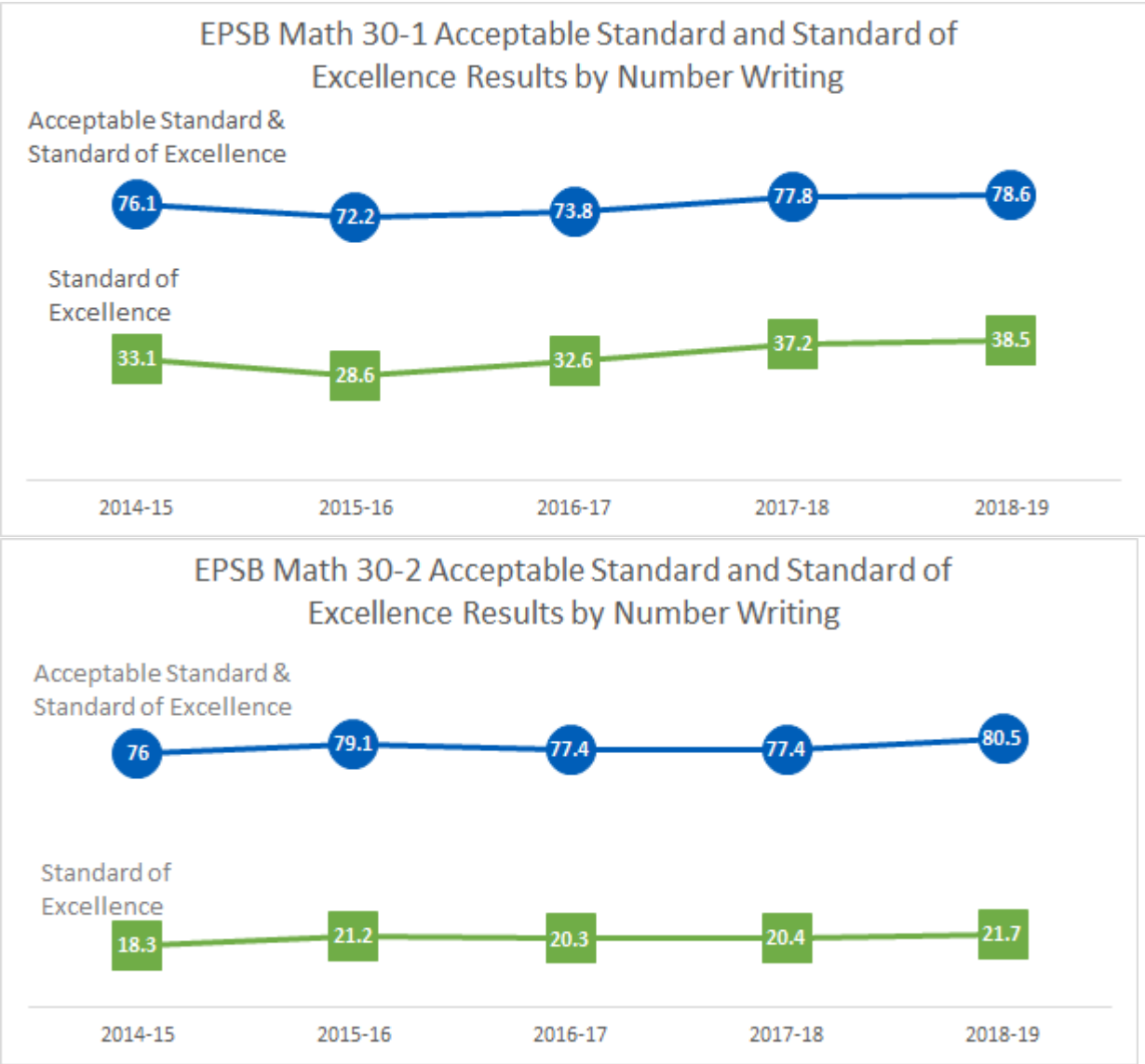
- Foundations of Mathematics (Elementary and Secondary): PL that explores the foundational elements of mathematics, effective teaching strategies and meaningful assessments to meet the needs of diverse learners.
- A Guided Approach to Math: an approach to teaching mathematics that targets the diverse needs of learners through a variety of meaningful and engaging activities. Classrooms where this approach is deliberately implemented will have targeted instruction with the teacher for a group of students while the rest of the class works independently or in small groups with familiar content.
- A range of available PL sessions, including but not limited to: Growing Numeric Learners (Kindergarten), Read All About It: Using Literature in Math, The Power of Problem Solving, Writing in the Math Classroom, Preparing for Success with the Grade 9 PAT and Collaboratively Creating Rich Math Tasks.

WHAT THE DATA TELLS

The work to support stronger learning outcomes in mathematics across the Division reflects a shared responsibility between central units, catchments and schools. The data sets on the following two pages demonstrate results of the intentional, targeted work across the Division to improve math outcomes. Grade 6 Math PAT results continue to show gains in Part A (non calculator), which is reflected in growth at the standard of excellence and a small improvement of the acceptable standard. Grade 9 Math PAT results demonstrate growth for both Part A and Part B of the exam at both the acceptable and standard of excellence, but there remains work to be done to consistently achieve strong student outcomes.



Math Diploma results continue to be encouraging, with Math 30-1 reflecting three years of improvement and Math 30-2 results continuing to be strong.



*Chart data obtained from Data Dashboard.

NEXT STEPS

The Division is confident it is on the right path to support ongoing growth and increasing student achievement in the areas of numeracy and mathematics. Our efforts are intentional and will remain centered around the key areas of curricular alignment, best practices, intervention strategies and building staff capacity.

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