



2016

K-12 Numeracy Guiding Document

Edmonton Regional Learning Consortium



Advancing Students' Numeracy Success

Committed to providing quality professional learning, the Edmonton Regional Learning Consortium (ERLC) supports over 18 school districts and 13,000 educators as “*partners in adult learning for students' sake*”. The K-12 Numeracy Guiding Document was written in response to district requests, and in collaboration with the Numeracy Advisory Committee that supports the ERLC.

Approximately 250,000 students are enrolled in schools across the ERLC. Since numeracy is a key factor in learning, how best do we equip all students? We use “maths” in every aspect of our lives; at home, at work, and in everyday activities. Good numeracy is essential to us as educators as we help students learn. Many decisions we make in life are often based on numerical information: to make good choices, we need to be numerate.

The K-12 Numeracy Guiding Document provides support for the development, planning, and teaching of numeracy. Use the guiding questions as a starting point to engage in conversation for the purpose of achieving greater numeracy success for all students.

I would like to thank the members of the ERLC Numeracy Advisory Committee for the continued commitment to improving the professional capital of our staff.

Thérèse de Champlain-Good

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Guiding Questions



What is numeracy?



Why do we need numeracy?



Where and when do we encounter numeracy?



How is numeracy taught?



Who shares the responsibility for numeracy learning?



How can teachers support numeracy for all learners?



How can school districts "think numeracy"?



What is numeracy?

“Numeracy is the ability, confidence and willingness to engage with quantitative or spatial information to make informed decisions in all aspects of daily living” (*Alberta Education, 2015*).



Key Understandings:

- Being numerate means going *beyond the basic skills* of solving simple arithmetic problems to acquiring, creating, connecting and understanding information.
- Numeracy involves competency in both *quantitative and spatial reasoning*.
- Numeracy is a foundation for continuous learning and provides individuals with the ability to achieve personal goals, develop knowledge and potential, and participate fully in society.
- The 21st century challenges us to rethink what being a fully numerate person means.
- Responding effectively to students’ numeracy needs requires all teachers to work collaboratively to develop numeracy skills and habits of mind.
- Students need opportunities to use numeracy knowledge and skills in a variety of contexts to master and efficiently transfer them from one area to another.
- The diversity of learners in Alberta illustrates the need for a broad, inclusive approach to numeracy that addresses individual learners’ needs.

([ERLC Numeracy Learning Guide](#), Fall 2014)



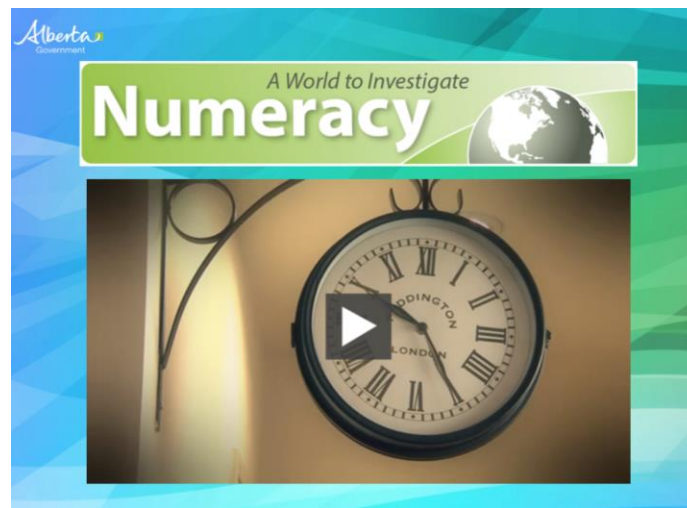


What does numeracy mean to you?

Think for a moment about this question and then watch the [Numeracy - A World to Investigate](#) video.

Reflect on:

- What did you find most interesting in the video? (e.g., images, sounds, words, technologies)
- Numeracy is foundational to all learning. How is numeracy present in your daily life? • home • work • school • social activities
- What other examples of numeracy can you envision?
- What would be the characteristics of a person who has acquired numeracy skills? (e.g., critical thinkers)
- Knowing that numeracy is foundational to all learning, how does this impact your work?



<https://education.alberta.ca/literacy-and-numeracy/numeracy/everyone/numeracy-video/>





Why do we need numeracy?

Numeracy enables individuals to reach their full potential, achieve a better quality of life, and contribute to their communities. To discover and make meaning of an increasingly complex and evolving world, students need the confidence and habits of mind to acquire, create, connect and communicate information in a variety of contexts, going beyond the basic skills of reading, writing and solving simple arithmetic problems.

(Alberta Education - Literacy and Numeracy 2015)





Where and When Do We Need Numeracy?

Numeracy skills are not just for scientists, accountants or the tax man. Many professions require at least a basic level of understanding when it comes to numeracy and mathematics. Today's workplace requires creative problem solving, usually in collaborative groups, making use of mathematical thinking when it is required. In order to make the best choices, we need to be numerate citizens. Some examples may include:



Image taken from:

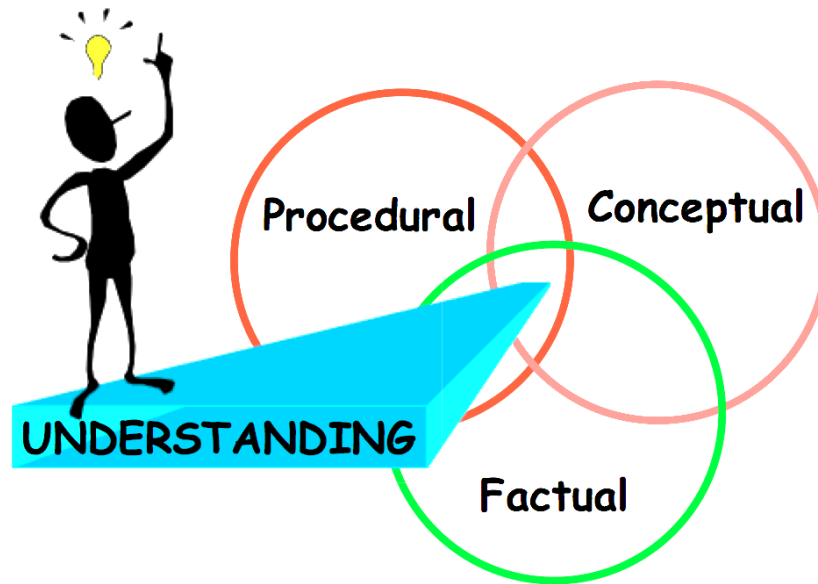
http://www.nationalnumeracy.org.uk/sites/default/files/essentials_of_numeracy_download_v2.pdf





How is numeracy taught?

National Math Advisory Panel states that teaching numeracy requires attention to three aspects of knowledge:



FACTUAL KNOWLEDGE...covers the facts within the concepts students need to know. This can be learned by memorization and repetition, such as knowing that $2 + 3 = 5$. It also refers to memory of specific events and information.

PROCEDURAL KNOWLEDGE...is knowing how to complete an activity or a task using strategy or procedure. For example, knowing how to solve $2 + 3$ by continuing to count “3, 4, 5...”

CONCEPTUAL KNOWLEDGE...is the knowledge of how and why a procedure works. For example, knowing that when we count, the last number we say represents how many items are in the set.

Since numeracy involves the application of knowledge in all aspects of daily living, these three aspects of knowledge, which mutually support each other, facilitate learning and understanding in numeracy. When designing learning tasks, teachers should provide learning opportunities that:

- allow for application of knowledge
- make connections to previous learning and experiences
- are purposeful and authentic
- enable different possibilities, strategies and products to emerge

To achieve this, teachers need to be aware of how and where numeracy lives in their subject areas, as well as use teachable moments as they occur.





Who Shares the Responsibility for Numeracy Learning?



Numeracy is for all learners and is a shared responsibility with stakeholders working together:

- Students
- Educators
- School authorities
- Parents
- Communities

To support numeracy beyond the school, it is important to provide numeracy information sessions for stakeholders to engage in conversations and develop common understanding around numeracy.

In addition, schools can include information and numeracy resources in newsletters to provide ongoing communication with parents.

Parents can continue to support their child at home by:

- discussing where numeracy comes into daily life, e.g., cooking, shopping, banking and schedules (time and calendars)
- playing games and doing puzzles
- reading
- encouraging entrepreneurship





How Can Teachers Support Numeracy for All Learners?

Steen suggests that “numeracy, like writing, must permeate the curriculum.” When it does, “it will enhance students’ understanding of all subjects and their capacity to lead informed lives” (Steen, 2001, p. 115).

1. Numeracy Rich Environment

Foster a learning environment that allows students to:

- be risk-takers
- think critically
- be reflective
- apply knowledge and skills
- use mathematics as a way to make sense of the real world
- be collaborators

2. Curricular Connections

There are concepts in each program of studies that explicitly support the development of numeracy. Teachers need to be aware of numeracy in their subject areas to help draw connections for students. Some examples include, but are not limited to:

- MATH: number sense, patterning, measurement, transformations, data, constancy
- ART: symmetry, line, perspective, ratio, scale drawings, tessellations, geometry
- SOCIAL STUDIES: statistics, mapping, scale, election data, coordinates, timelines
- SCIENCE: accuracy, rounding, algebra, climate, converting measurements, rate
- LANGUAGE ARTS: vocabulary, explaining, justifying, interpreting, discussing
- CTF/CTS: reading measurements, proportions, ratio, 3-D designs, percentages
- MUSIC: time, speed, fractions, patterns
- PHYS ED: time, distance, speed, measurement, data, mean, median, mode
- RELIGION: numbers, patterns, probability, chance

3. Ongoing Assessment

Ongoing assessment of student numeracy abilities is essential to program accordingly for individual student needs. Assessments include classroom formative and summative assessments and may also incorporate screening and diagnostic tools for teachers.

4. Professional Learning

It is the responsibility of teachers to seek out professional learning that will build their capacity related to numeracy. Professional learning opportunities may be provided through the Alberta Regional Professional Development Consortia ([ARPD](#)) or your local consortia, the Alberta Teachers’ Association ([ATA](#)), as well as district sponsored professional learning, among others.





How can districts "think numeracy"?

“It takes ongoing, intentional work to create and sustain a school culture that recognizes, emphasizes and reinforces a cross-curricular approach to numeracy. As teams explore a school-wide capacity-building approach to numeracy, they are not expected to replace the special expertise of the mathematics teacher but to encourage their colleagues to highlight the math in all subject domains. While mathematics teachers have the primary responsibility for developing students’ mathematical understanding, all teachers can work together to address the mathematical learning across the disciplines and across the day.”

[Capacity Building Series: Supporting Numeracy, p.2](#)



How can school boards help?

Develop a district-wide action plan for numeracy using the [Essential Conditions Implementation Planning Tool for Literacy and Numeracy](#) as a guide to determine your district’s next steps. Some actions to consider:

- work with schools to set student achievement goals at the system and school levels
- work with schools to identify ways to enhance student achievement and to provide the necessary resources
- provide professional learning opportunities to educational stakeholders
- share research on effective numeracy teaching methods
- build partnerships with administrators, teachers and other organizations
- share successful practices within and across school boards

(Adapted from the Literacy and Numeracy Strategy - Ontario Ministry of Education
<http://www.edu.gov.on.ca/eng/literacynumeracy/>)





References

Professional Resources

[A Mind for Numbers - How to Excel at Math and Science](#)
[Big Ideas of Early Mathematics - What Teachers of Young Children Need to Know](#)
[Building Powerful Numeracy for Middle and High School Students](#)
[Capacity Building Series - Ontario](#)
[Capacity Building - Numeracy Support](#)
[Creative Mathematics - Kim Sutton](#)
[Early Numeracy - Assessment for teaching & intervention, 2nd edition](#)
[First Steps in Math](#)
[Lessons and Activities for Building Powerful Numeracy](#)
[Making Mathematics Meaningful for Students in Primary Grades: Fostering](#)
[Making Mathematics Meaningful for Students in Intermediate Grades: Fostering Numeracy](#)
[Numeracy Infusion Course](#)
[What to Look for Understanding and Developing Student Thinking in Early Numeracy](#)
[What Teachers Need to Know about Numeracy](#)

Parent Resources

Fact Sheets and Useful Links

<https://education.alberta.ca/teachers/program/math/educator/links/>
https://education.alberta.ca/media/7442724/alberta_ed_fs_literature_en.pdf

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Steen, L. A. (Ed.). (2001). *Mathematics and democracy: The case for quantitative literacy*. The National Council on Education and the Disciplines, US.





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