

Math in *Motion*

A K–12 newsletter that fosters numeracy and mathematics awareness and shares research, resources and actions

Ontario's 2014–15 Mathematics Action Plan

Over the past couple of years, we have made a significant investment in improving the mathematics achievement of Ontario students. However, we are experiencing decline on **provincial assessments** and on some **international assessments** as well. This raises a question for all of us:

Have we been wrong in our assumptions about how to make improvements in mathematics education OR are we on the right track and just need more time?

To explore this question, the ministry invited over 100 experts this past fall – math leaders and educators from universities, school boards, associations and federations – to submit their hypotheses regarding the causes contributing to declining student results. Their submissions told us that we have been on the right track by focusing on professional capacity building in mathematics, but that we need to go deeper and broader, and become more precise, with our strategies. They suggested the four areas of focus need to be increasing educators' knowledge and skill in:

1. mathematics content knowledge for teaching
2. mathematics pedagogical knowledge
3. deep knowledge of the mathematics curriculum
4. precision in mathematics assessment

The 2014-15 Mathematics Action Plan, shared with the Council of Ontario Directors of Education at the end of January, is designed to address these areas. It builds on the steps the ministry and school boards

have already implemented to increase mathematics achievement. The plan includes increased support for learning opportunities and more tools and resources for teachers and students to build their mathematics knowledge and skills.

For the complete Mathematics Action Plan, click here. <http://www.edu.gov.on.ca/eng/policyfunding/memos/>

A Collective Call to Action

Boards contribute to the realization of the Ontario Mathematics Action Plan when their board improvement plans include:

- clearly articulated mathematics goals
- early identification and ongoing intervention for students who are struggling in mathematics
- strategic resource deployment, including human, learning and financial
- dedicated staff working on mathematics with educators and school and system leaders
- professional learning supporting educators' and school and system leaders' mathematics knowledge and skill
- leadership that monitors the implementation of their plan
- communication with parents/guardians about mathematics learning and teaching in their schools

Promising Practices – Mathematics in 11 Ontario Schools

Against the backdrop of the decline in mathematics achievement over the past five years, a small subset of schools is making significant gains on their EQAO scores. Each was below the provincial standard in 2009–10; today 75 % or more of their students are at or above it. And indeed while there are many high-achieving math schools in Ontario, only 11 meet the tough criteria for the “promising practices” study designed by the Literacy and Numeracy Secretariat (LNS) this past fall. See the graphic for details.

The 11 schools are geographically spread across the province and many are board-identified as “schools in challenging circumstances.” Following a visit to school staff, and a preliminary analysis of school profiles, LNS researchers determined a number of common themes. These processes, conditions and practices reflect the **foundational principles** for improvement in mathematics outlined in *Paying Attention to Mathematics Education*.

Focus on Mathematics

- making mathematics a whole-school focus
- using a range of instructional strategies – group work, open-ended problem-solving and use of manipulatives – to foster a deep understanding of mathematical concepts, skills and processes
- creating links to literacy and to subject areas across the curriculum

Coordinate and strengthen mathematics leadership

- strong principal leadership to ensure commitment to mathematics
- distributive leadership

Build understanding of effective mathematics instruction

- being responsive to educator and student learning needs to build capacity in promising instructional practices

Support collaborative professional learning in mathematics

- a strong school team delivers professional learning together based on school goals and responsive to student learning needs
- teacher co-learning (e.g., between seasoned staff and new staff)

Design a responsive mathematics learning environment

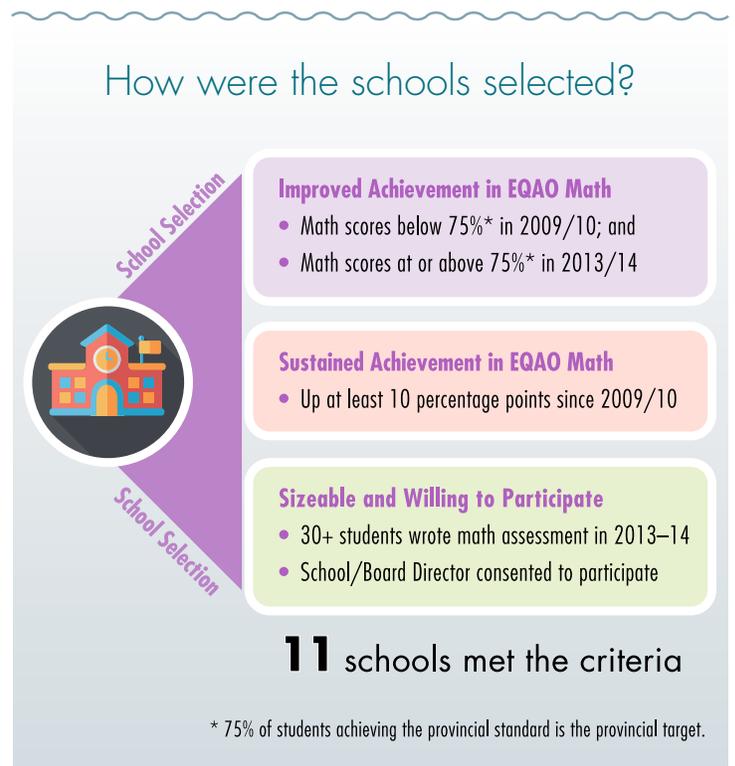
- high expectations and an asset mindset

Provide assessment and evaluation in mathematics that supports student learning

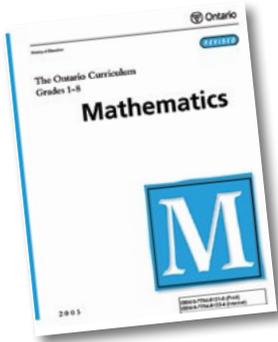
- data used to differentiate instruction
- descriptive feedback provided
- students involved in the assessment process

Facilitate access to mathematics learning resources

- use of technology encouraged



How is the Ontario Curriculum research based and evidence informed?



We often get asked what kinds of research and evidence support the development and revision of *The Ontario Curriculum*. This article explains the research process.

The current curriculum review process is a comprehensive one that builds on the world-renowned quality curriculum that is already in place. The process was developed to ensure that *The Ontario Curriculum* remains current, relevant, developmentally appropriate and aligned from Kindergarten through Grade 12.

This process includes many stages. The first stage is research, national/international scans and data analysis. The process begins with conducting national/international scans to see how *The Ontario Curriculum* compares with curriculum in other jurisdictions. This includes looking at

both the mathematical content and features of the documents. Research and data analysis are also conducted to identify how Ontario students compare to others from across the country and around the world on national tests such as the Pan-Canadian Assessment Program (PCAP) and international tests such as Trends in International Math and Science Study (TIMSS) and Programme for International Student Assessment (PISA). This analysis includes understanding the skills and knowledge that are being addressed both nationally and internationally.

Another important part of the process is to gather the most current research related to mathematics curriculum skills, knowledge, and understanding and how students learn math. For example, we might look at the learning trajectory research on how students move from additive to multiplicative thinking.

The research, national/international scans and data analysis inform the direction in which the next phase of the review cycle will take.

Young Children and Mathematics

Young children are natural learners. They seek understanding of quantity, relationships and symbols. This year's Pedagogical Leadership K-3 sessions have been using pedagogical documentation to explore mathematics and literacy learning (and the connection between them) within play- and inquiry-based learning contexts in Kindergarten to Grade 3 classrooms. They have been looking at how to:

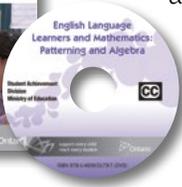
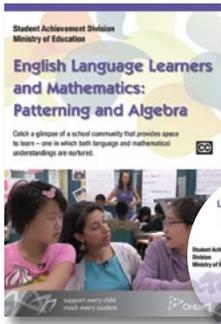
- make mathematics learning explicit and visible to children, educators and their families
- recognize the mathematics learning in all contexts throughout the day
- deepen our knowledge of the mathematics content and pedagogy

Differentiated Professional Learning Opportunities

The ministry offers a range of learning opportunities and resources to support professional learning, including but not limited to the resources and learning sessions below.

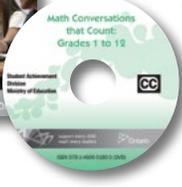
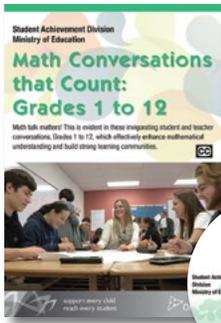
English Language Learners and Mathematics: Patterning and Algebra

In this video, you will meet English language learners in a Grade 6/7 algebra class who simultaneously improve their literacy skills and engage in challenging mathematics. Student, teacher and principal interviews tell



us about the need for supportive conditions. To watch the video [click here](#).

Math Conversations that Count: Grades 1 to 12



We know that math talk matters, not just for students who are developing conceptual understanding but also for educators as they diagnose student learning and provide descriptive feedback. To watch the video [click here](#).

Making Space for Students to Think Mathematically



In this new *What Works? Research into Practice* monograph, Dr. Christine Suurtamm, Brenna Quigley and Jill Lazarus of the University of Ottawa share a case study of how a teacher learned to foster mathematical thinking in her classroom. To read the monograph [click here](#).

Paying Attention to Proportional Reasoning in Mathematics K-12 with Dr. Marian Small

(Webconference)

On Tuesday, February 24, Dr. Marian Small will help clarify what proportional thinking can look like in Grades 4 – 8. She will share her experiences with student responses to proportional reasoning problems, demonstrate how specific manipulatives can be used to evoke proportional reasoning and provide strategies for creating rich proportional reasoning problems.

This webconference will be of particular interest to teachers, consultants/coordinators, numeracy leads, and school and system leaders interested in improving student achievement in mathematics. To attend you will need a computer, internet (ideally hardwired), and speakers.

To register for this web conference please click on the link below or cut and paste it into your browser.

<https://docs.google.com/a/mediaface.ca/forms/d/1sDAQGXaSOpu9d-RXZyxXtIR9q1yRk8fFUfz26R96MwI/edit>

Mathematics Across the Curriculum

We want your input and perspective to help us develop timely new resources on integrating mathematics in other subject areas ... Send examples of your mathematics cross-curricular successes to Dianne.Oliphant@ontario.ca.

K-12 Professional Learning Resources

Can I order additional copies from ServiceOntario?

Yes!

For step-by-step directions on how to order:
<http://learnteachlead.ca/projects/ordering-print-materials-service-ontario-publications/>

support every child reach every student