

# Math in *Motion*

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

## Tuning into Math: The OFIP Journey Continues

In 2003–04, there were 780 schools – almost one-fifth of the province’s elementary schools – identified as “low performing” according to provincial assessments.\* Today, thanks to an array of school improvement efforts over the past ten years, including the the Ontario-Focused Intervention Partnership (OFIP), there are 63. OFIP provides support for on-site professional learning to strengthen teaching skills and to increase teachers’ instructional repertoires to meet the students’ learning needs in each school. Support is provided in the form of advice, shared research into effective practices, opportunities for exchanging insights among peers and funding for release time for planning, monitoring, reflecting on and integrating what is being learned in classroom practice.

This year, the OFIP journey was launched at Professional Learning Sessions held in Ottawa (October 22), London (November 5) and Toronto (November 12). Four overarching themes, mined from 2013–14 OFIP conversations and experiences, were offered as guideposts for improvement planning in the months to come:

- Studying student experience and building a growth mindset
- Fostering reflective practice and a collaborative learning stance
- Developing a responsive pedagogy in relation to student needs
- Evolving responsive school and system structures to achieve learning for all

*\* OFIP partnership schools have been so successful in raising student achievement that the definition of a low – performing school in Ontario has had to be modified over time. At present, the OFIP designation is reserved for elementary schools where fewer than 50% of Grade 3 and Grade 6 students achieve the provincial standard in Reading, Writing and Mathematics on four of six (or two of three) assessments in each of two consecutive years.*

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Dr. Chris Suurtaam, in her keynote presentation, [Supporting Student Thinking and Learning in Mathematics](#), showed how each of these themes applies to a balanced, robust approach to teaching and learning mathematics. She began her presentation by tackling two myths about the current mathematics curriculum. She argued that (1) mathematics instruction in today’s classrooms is not all about “discovery learning” and (2) students do not have to figure out the math all by themselves. In fact, she reasoned, the Ontario mathematics curriculum is not a revolutionary new curriculum but is evolutionary; it was last updated in 2005 and that revision was a slight modification of the 1999 curriculum. Its hallmark is a “blend of problem-solving approaches and skill development” and it advocates the importance of developing conceptual understanding across all strands.

Dr. Suurtaam emphasized the power of student-generated algorithms and valuing multiple strategies to solve a problem.

### According to Dr. Suurtamm, all students need ...

- To engage in rich mathematical activity
- Opportunities to develop their own strategies for solving problems
- Time to investigate mathematical ideas
- To develop conceptual understanding
- To feel valued as mathematical thinkers

## Professional learning: It needs to start with the curriculum!

*The Ontario Curriculum: Mathematics* (2005) outlines the mandated knowledge and skills that students should have by the end of a course or grade. It stands to reason, therefore, that professional learning opportunities in mathematics need to start with the curriculum. Take for example, the following Grade 5 specific expectation from the Measurement strand (under Measurement Relationships):

- *Determine, through investigation using a variety of tools (e.g., concrete materials, dynamic geometry software, grid paper) and strategies (e.g., building arrays), the relationships between the length and width of a rectangle and its area and perimeter, and generalize to develop the formulas [i.e.,  $\text{Area} = \text{length} \times \text{width}$ ;  $\text{Perimeter} = (2 \times \text{length}) + (2 \times \text{width})$ ].*

We have come to understand through research and experience that mathematical understanding cannot simply be transmitted from teacher to student for learning to be sustained; the learner needs to make sense of the mathematics. This expectation requires students – and teachers – to investigate the relationships between length, width, area and perimeter in rectangles using various tools and strategies.

The challenge for many educators will be that meeting this expectation requires a kind of learning that they may not have experienced themselves. It requires making sense of the mathematical relationships, not just applying a formula. Professional learning must help educators to “unpack” the curriculum.



**Consider, for example, the following investigation:**

*Make a rectangle using any number of coloured linking cubes and describe how you could find its area and perimeter. Be prepared to share with another team.*

### Perimeter

The perimeter of a shape is the distance all around it. It is a measure of length.

The perimeter of the rectangle is  $4\text{ cm} + 2\text{ cm} + 4\text{ cm} + 2\text{ cm}$ , or  $12\text{ cm}$ . We know it is  $\text{cm}$  because we are using  $\text{cm}$  cubes!

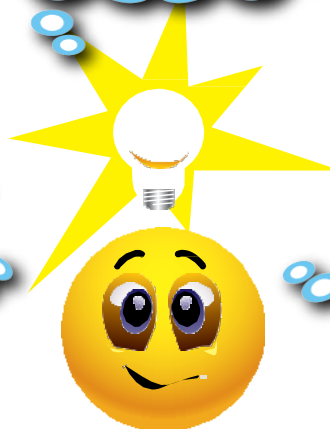
I see another way we can think about that. It is the same as  $2$  lengths plus  $2$  widths, or  $2 \times 4$  plus  $2 \times 2$  which is  $8 + 4$  or  $12$ . I wonder if that always works?

### Area

The area of the rectangle is the surface that it covers. That's  $8$  cubes!

We should look at the other models that our classmates have built so we can test our thinking!

Hey!  $8$  is the same as  $4 \times 2$ , or length  $\times$  width. I wonder if that always works?



## Key Learnings from the School Support Initiative

Introduced in 2008, the School Support Initiative (SSI) is a ministry partnership with the Ontario Principals' Council, the Catholic Principals' Council of Ontario and selected schools boards. It is designed for schools that have pass rates in Grades 9 and 10 applied compulsory courses below the provincial rate and therefore large numbers of students who may not be on track to graduate within four or five years.

The initiative offers intense differentiated support to selected schools to: build the capacity of the principal as the instructional leader, *in order to* enhance instructional practices in the classroom, *resulting in* improved student achievement.

In each of the six years since the initiative has been underway, math has been identified as the subject that shows the greatest need for – and receptiveness to – improvement. Between 2008 and 2012, OnSIS data indicate that SSI schools focused on math showed increases in math course pass rates at a greater rate than the province as a whole. In the 2013–14 school year, 13,690 students in Grades 9 and 10 Applied Math were impacted by SSI; and, indeed, over 70% of the SSI schools that focused on math showed improvements in their math course pass rates. For those students achieving at “R” (below 50%) in a pre-instruction assessment, over 65% of the students improved by one level or higher on a post-instruction assessment.

SSI enhances the instructional leadership capacity of the principal through both job-embedded learning and collaborative inquiry undertaken with a professional learning team.

As a participant in SSI, the principal is expected to:

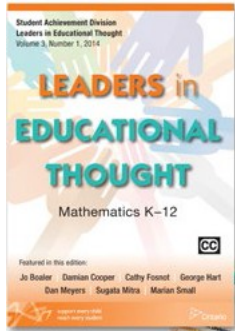
- Conduct a needs assessment using student achievement data and develop a cohort SMART goal
- Develop collaboratively with the learning team a strategic and targeted SMART goal based on identified knowledge and skill gaps of students
- Actively participate in collaborative inquiry to support the professional learning of teachers
- Monitor the effectiveness of the classroom teaching and learning strategies on student achievement through the stages of the professional learning cycle for collaborative inquiry

### **Seven key levers or drivers have emerged as being integral to the realization of SSI success:**

1. Leadership provided by a senior staff member (usually a superintendent) within the board who ensures that the SSI goals are known, understood and shared by the schools participating in the initiative.
2. Instructional leadership of the principal, actively engaged in the work of the professional learning team.
3. Ongoing monitoring of Student Success indicator data (both pass rates and achievement levels).
4. A focus on teaching and learning in the context of the secondary school.
5. A focus on student intellectual engagement through the strategic selection and effective implementation of evidence-based instructional strategies and the creation of conditions supportive to student learning.
6. Strategic, targeted and differentiated professional learning sessions for principals and professional learning teams.
7. Support documents and structures provided through professional learning sessions and through an E-community.

## 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.



### Leaders in Educational Thought – Mathematics K–12 (Vol. 3, No. 1, 2014)

Featured in this edition: Jo Boaler, Damian Cooper, Cathy Fosnot, George Hart, Dan Meyer, Sugata Mitra and Marian Small

This new video resource features seven math leaders and researchers, as they share their thinking about the effective teaching and learning of mathematics. Their reflections, observations and musings, recorded at the Ontario Association for Mathematics (OAME) 2014 Conference, explore such topics as the “art of mathematics,” how to engage students in building conceptual understandings and procedural fluency and the importance of developing a love of mathematics in all children. Speakers also explore professional learning for educators.

To watch the video click here <http://learnteachlead.ca/projects/leaders-in-educational-thought-mathematics-k-12/>

### Invitational Webconferences

The ministry has launched a series of invitational webconferences in the areas of literacy, numeracy, collaborative inquiry and the early years. All sessions are promoted on EduGAINS (look for Adobe Connect Series for Professional Learning) and on [LearnTeachLead.ca](http://learnteachlead.ca).

If you missed the November 12 Dr. Cathy Bruce webconference on [Teaching Fractions – What’s the Big Deal?](#) click [here](#).

On Friday, November 28, Dr. Chris Suurtamm facilitated a web conference for principal learning teams. Her presentation, [Confronting Myths and Challenges in Mathematics Education](#), explored misconceptions about mathematics education and some of the challenges that educators face in enhancing mathematics teaching and learning. Chris offered a forum for sharing some possible solutions. This session is being archived at LearnTeachLead and may be accessed after December 5, 2014. Click [here](#).



### K to 12 Capacity Building in Mathematics Regional Sessions

With a focus on *Paying Attention to Fractions*, the newest addition to this highly profiled ministry series, the fall face-to-face sessions explored the power of the unit fraction. Participants engaged in a fractions task in order to experience first-hand some of the research findings about fractional thinking highlighted in the document. They were also given opportunities to explore connections to spatial, algebraic and proportional reasoning.

The sessions also explored the need for “soft” skills; while the need to know “the math” is vital, facilitation skills are vital, too.

More information about the role of mathematics facilitators can be found in *Facilitating Mathematics Professional Learning*. Click [here](#).

Spring Capacity Building Sessions will build on the fall learning. For information, email [studentachievement@ontario.ca](mailto:studentachievement@ontario.ca).

For directions on how to order resources from Service Ontario click [here](#).