Math in *Motion*

a K–12 resource

Issue #1 • December 2013

A K–12 newsletter fostering mathematics awareness and successful practices across Ontario school boards

Math for Young Children

What does the research tell us?

Professional development and training for over 40 public school teachers in inquiry-based teaching

Children bring more mathematical knowledge and experience to school than previously believed.

Young children already do mathematics and think about mathematics in their day-to-day world. For Ginsburg, Lee & Boyd (2008) "[t]he question of whether young children are 'ready' to learn mathematics is beside the point... Learning mathematics is a 'natural' and developmentally appropriate activity for young children."

Ginsburg, Pappas & Seo (2001) observed that preschool children's self-selected free play involved mathematics content 50% of the time!

continued on page 2.

IN THIS ISSUE:

Math for Young Children – page 1
Middle Years Collaborative Inquiry – page 1
Gap closing resources – page 3
College Math Project – page 4
Spotlight on...Paying Attention to Mathematics – page 4

Math Middle Years Collaborative Inquiry Aims to Close the Gap for Struggling Students

For struggling students in Grades 6–10, the Math Middle Years Collaborative Inquiry aims to reduce achievement gaps in some high priority areas.

Using the Board Improvement Plan for guidance, the Middle Years Collaborative Inquiry, which began in 2011–2012, especially targets the learning needs of those students who are disengaged or struggling academically. There are eight boards involved in the Inquiry, seven English language and one French language.

continued on page 3.

Student Achievement Division

Math in Motion is published monthly except during the summer. For more information about this newsletter or to make a comment, email the editor.
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Math for Young Children
What does the research tell us?

continued from page 1.

A comprehensive literature review of over 500 articles reviewed by Dr. Catherine Bruce and Tara Flynn, Trent University, Dr. Joan Moss, OISE, University of Toronto, and the M4YC Research Team leads us to the research that allows educators to reflect on their practices around the mathematics that both the educators and children bring to the classroom.

This synthesis is divided into sections and gives us the overview and groundwork for continuing research in the field of mathematics for young children:

- Young children's informal mathematics
- The history of mathematics education for young children in Canada
- Development of children's mathematical understandings: Socioeconomic influences
- The state of mathematics education for young children today: Research on educator values, practices and challenges
- What mathematics education for young children could look like: Lessons from the research
- Specific mathematics programs that help young children
- Conclusions and recommendations (pages 30-32)

To access the Literature Review for Mathematics for Young Children, click **here**.

Consider!

Mathematics for young children must offer opportunities, structures and tools for children to connect their intuitive mathematical thinking to more formal mathematics. The following statements are from the Math For Young Children Literature Review:

- According to the position statement given by the National Association for the Education of Young Children (NAEYC) and National Council of Teachers of Mathematics (NCTM) 2002, educators need to consider at least two approaches towards the mathematics education of young children: 1) maximizing the opportunities provided by the "teachable moment" in children's play to build mathematical ideas; and, 2) enacting an intentional curriculum designed to sequence mathematical ideas in a developmentally appropriate manner... mathematics in the early years "needs to go beyond sporadic, hit-or-miss mathematics," but needs to provide "carefully planned experiences that focus children's attention on a particular mathematical idea or set of related ideas" (NAEYC and NCTM, 2002, principle 9, p.24)
- The consensus in the literature is that "play does not guarantee mathematical development, but it offers rich possibilities. Significant benefits are more likely when teachers follow up by engaging children in reflecting on and representing the mathematical ideas that have emerged in their play" (NAYCM/NCTM, 2002, 10; p.22)

Math Middle Years Collaborative Inquiry Aims to Close the Gap for Struggling Students

continued from page 1.

Melissa Weyland is an Education Officer with the Student Success/Learning to 18 Strategic Implementation, Innovation and Support Branch at the Ministry of Education. She says that a lot of schools involved in the math inquiry report experiencing positive spillover effects into other subjects. "It's encouraging greater conversations. Teachers are focusing on things they have in common and that's been tremendous," says Weyland.

Weyland says it's great that the strategies employed in the math inquiry are being taken up in other subject areas. "For teachers, it strengthens their understanding of the learning trajectory."

Applying a differentiated instruction approach, teachers' professional learning options include facilitated collaborative inquiry and teacher participation on cross-panel learning teams involved in collaborative planning, teaching and assessment. The initiative began with a focus on cross- panel teams of educators working with students in Grades 6 to 10. Each team carries out an inquiry project to generate knowledge about and evidence of effective practices in middle years classrooms. The Inquiry builds capacity in inquiry skills and build connections among middle years educators to improve mathematics learning for all students from Grades 6 to 10. For more information on this inquiry, contact Melissa Weyland at melissa.weyland@ontario.ca.

Resources to Close the Gap in Students' Learning of Mathematics

Gap Closing resources, available at **EduGains.ca**, are designed for students who need additional support in mathematics.

For each topic in the resource, there is a diagnostic and a set of intervention materials. Diagnostics are designed to uncover the typical problems students have with a specific topic. Evidence from the diagnostic can be used to inform the classroom educator's instructional decisions to support the struggling student.

- For Junior/Intermediate, the goal is to close gaps in Number Sense so that the student can be successful in learning grade-appropriate mathematics.
- For Intermediate/Senior, the goal is to close gaps in Number Sense, Measurement and Algebra so that the student can succeed in their mathematics program.

For various modules available for download, click **here**.

Homework Help for Students Grade 7 to 12

Homework Help is a free online math help resource for students in Grades 7-10.

Homework Help provides free, live one-on-one tutoring from Ontario teachers Sunday to Thursday from 5:30pm – 9:30pm ET.

The program is funded by the Ontario government and administered by TVO's Independent Learning Centre.

Check it out **here**.

College Student Achievement Project (2012-2015) continues the collaborative venture focused on first-year College students

The College Student Achievement Project (CSAP) supports increased levels of achievement in mathematics and language courses of first-year college students in Ontario. Educators at both secondary and postsecondary levels are eager to see students succeed in their chosen programs and to identify barriers to success and ways to support students more effectively. Funded by the Ministry of Education and the Ministry of Training, Colleges and Universities, the CSAP is led and operated by a research team at Seneca College and includes all 24 colleges and 72 district school boards.

The CSAP is intended to facilitate the achievement of these goals:

- To analyze student achievement in first-year college mathematics and language courses and to relate these to students' educational backgrounds in secondary school;
- To deliberate with members of both college and school communities about ways to increase student success in college.

Building on the College Math Project (CMP) of 2009, 2010, 2011, the CSAP, which began in Fall 2012, incorporates new research and development activities not previously undertaken by CMP, including: collecting and analyzing achievement data from college students' second semester (in addition to first semester data), extending the CMP to include college student achievement in language (English and/or French) courses and furthering the analysis of preparatory and foundational courses offered by colleges investigating the mathematics skills assessment tools. The final CSAP report for cycle one research is due to be released in February 2014.

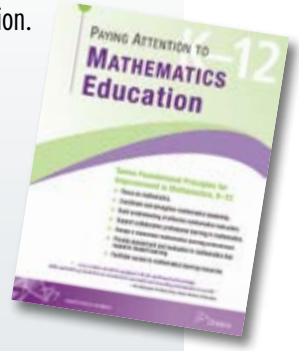
Spotlight on: Paying Attention to Mathematics Education (K–12)

'Directions Evidence and Policy Research Group' is conducting an evaluation of the dissemination, use and usefulness of K–12 English and French language mathematics resources created by the Ontario Ministry of Education. Once the review is complete, we will share the results of the evaluation in this newsletter. Each month we feature a different resource. This month we highlight 'Paying Attention to Mathematics Education – K–12.'

This resource is geared for educators. It describes the seven foundational principles that resulted from the work of the Ministry's Mathematics Teaching and Learning Working Group in its attempts to surface current, research-based knowledge in mathematics teaching and learning, and to bring a positive change in the field in order to ensure better results for all K–12 students.

The seven principles include:

1. Focus on mathematics.
2. Coordinate and strengthen mathematics leadership.
3. Build understanding of effective math instruction.
4. Support collaborative professional learning in mathematics.
5. Design a responsive mathematics learning environment.
6. Provide assessment and evaluation in mathematics that supports student learning.
7. Facilitate access to mathematics learning resources.



These principles serve educators as a guide for planning and implementing improvements in mathematics teaching and learning. For each principle, a detailed description of what is involved and required to implement the principle in the classroom, is provided.

To access this document click **here**.