
MAKING MATH HAPPEN:

ELEMENTARY NUMERACY PROJECT

Visible Teaching-Visible Learning leads to a dramatic shift or transformation in the learner's way of viewing the world.

John Hattie cited in <http://www.watanabe.blogspot.ca/2012/02/formative-assessment>.

Making Math Happen: The Elementary Numeracy Project has created mathematically rich school environments inviting and challenging students and teachers to experience the world of mathematics. At the end of the fourth year, focus group and survey participants respond to essential questions about the current status of the project, its impact on student learning and its connection to school district priorities. Where are we now? How are we doing? What inquiry questions guide future direction?

The project, through deliberate collaborative action design has capitalized on the expertise of Helping Teacher colleagues, built capacity through provision of visible, concrete experiences and nurtured significant teacher collaboration. The project has had a measured and growing impact on both teacher and student learning. The vision: visible teaching-visible learning. The targeted focus: teachers of elementary students. The learning intention: to build, overtime, success in numeracy for all learners.

Three Times Smarter: The Way of the Lattice

"In mathematics, a lattice allows for movement in all directions and each point can connect to all others, much like a high speed network."

Cathleen Benko and Molly Anderson

The model for the elementary numeracy project involves three layers of interaction and support. The collective efforts are built around the notion that participation in solving problems and generating ideas intertwine and flow in multiple directions. Each layer blends and builds capacity. Ongoing embedded teaching practice provides the most meaningful learning experience and involves: (1) skillful on-site coaching modeling best practice; (2) a collaborative mentorship team at site level bridging resources and learning in professional development both within the school house and between other schools and districts; and (3) all colleagues at each site working together with facilitated dialogue, professional focus, interest and desire to explore the teaching of mathematics. *"The three-tiered model really works!"* (Survey participant)

On-site Coaching: Examining the Role of the Helping Teacher

“The district recognizes the important and different perspective of the Helping Teacher and even though they have little formal authority they can dramatically influence the teaching and learning process. ”

T. Jones. 2004. The Examination of the Role of the Helping Teacher

The project design drew upon the strength of the Helping Teachers who are not only subject specialists but also who, as an integral part of district personnel, hold trusting and supportive relationships with teachers and administrators. The Helping Teachers were well positioned to provide “state of the art” resources, linkages to technology and support to encourage more personalized learning practices. Survey participants reported that the opportunities for in-service and demonstration lessons followed with critical debriefing has had a significant impact. Also participants valued the Helping Teachers’ direct connection to the district and ministry networks and appreciated “knowing” that support was present.

“Helping teachers, amazing. My entire staff has observed the” demoing” and the use of manipulatives. The staff would go over one tool and they would all take it and use it. It has changed how they teach (and think) about math. ” (Focus group participant)

Participants reported that the Helping Teachers offered embedded student centered lessons that focused on concrete experiences skillfully demonstrating teaching and learning through problem solving. These lessons and the side by side planning provided stimulus for further discussion and helped build not only skill but also confidence.

“When she offered to do demonstration lessons the project just took off.”

(Focus group participant)

The Numeracy Team: Collaborative Advantage

“When minds meet, they don’t just exchange facts they transform, reshape them, draw different implications from them, and engage in new trains of thought.”

Theodore Zeldin

Building capacity among teachers and focusing that capacity on students and their learning is the critical factor. The school numeracy team membership consists of a math mentor, a primary and intermediate representative and an administrator. This team attends 3 days of professional development a year for three years and is committed to bringing what they have learned back to all the teachers in their school. The team mentorship approach contributes to moving the leadership role from one individual to a community of professionals committed to improving student learning.

“I was asked what makes the biggest impact? That is actually what I have seen with the numeracy team. The school has a model of collaboration that works well. The teachers observe helping teachers and then the team analyzes and plans what we want to do. The collaboration is targeted on specific improvement. ” (Focus group participant)

Community of Practice

“Collaboration allows teachers to capture each other’s fund of collective intelligence.”

Mike Schmoker, Results

Helping teachers, numeracy team members and other colleagues create conditions for educative dialogue during and after demonstration lessons and professional development activities. These facilitated conversations encourage inquiry, dialogue, and reflection on teaching and learning practices. As a result of these conversations classroom teachers are able to change, lead and support others in the change process.

“The thing about this project is that the change is coming from the teachers themselves.”

(Focus group participant)

Key Priorities: Ahead of the Curve

“Helping Teachers establish long-term professional development goals in order to provide time for people to learn, discuss and act on implementing new knowledge, and evaluating the success of this learning on improving student learning.”

T. Jones. 2004 The Examination of the Role of the Helping Teacher

The goals of the Elementary Numeracy Project utilize an experiential perspective with a focus on systemic design to bring the concrete and visible math experience closer to the learner. The purposes are to promote a community of practice that encourages teacher collaborative inquiry, to enhance meaningful differentiation and to build connections and supportive linkages to 21st century learning practices.

Improved Collaborative Inquiry

“The most powerful form of learning, the most sophisticated form of staff development, comes not from listening to the good words of others but from sharing what we know with others. Learning comes more from giving than from receiving. By reflecting on what we do, by giving it coherence, and by sharing and articulating our craft, knowledge, we make meaning, we learn.”

Roland Barth

Teachers now reflect on results to guide further action. They collaborate systematically sharing the changing ways that they teach and work together to define goals and coordinate both teacher and student learning activities. Together teachers identify inquiry questions, develop strategies that work and utilize formative assessment to identify gaps in learning. According to the focus group and survey participants there is evidence of increased enthusiasm and definitely more lively conversations about the teaching of mathematics!

“The Numeracy project has been the best professional development my team has had...it really changed how we do math in our school. We understand it differently.”

“We have never been involved in something that brought together staff as this project did. We now have a collaborative staff.” (Focus group participants)

Improved Student Learning

“Teacher knowledge about the teaching and learning process (content knowledge and process knowledge) is the most powerful predictor of student success”

Marzano et al cited in Bennett and Rolheiser, 2001

Students are now able to verbalize their thinking strategies and are starting to explain ways that they problem solve. They articulate their thinking using the common language of mathematics. Students are more engaged particularly when participating in numeracy station centers, using ipads, apps and white boards. Students take pictures of their work, thought processes and upload them to their blogs, which makes student learning visible. Attitudes toward math are more positive and FSA results are improving at most project sites with a marked improvement in Grade 7 math knowledge and skills.

Ongoing Assessment

“The elementary numeracy project has provided a natural segue to an enhanced practice of formative assessment.” (Survey participant)

Professional development that is job embedded provides relevant opportunity to try new strategies and to gather, interpret and respond to evidence of learning with expressed purposes of identifying learning gaps.

“We have hard data as we use the district numeracy assessment. We are showing improvement especially in how students explain their thinking. Students are showing more understanding and a lot more number sense.” (Focus group participant.)

Meaningful Differentiation

“Differentiation is an organized yet flexible way to proactively adjust teaching and learning to meet kids where they are and help them achieve maximum growth as learners.”

Tomlinson, 1999

When teachers are aware of their student’s prior knowledge and experiences they can consider different ways that students learn without pre-defining their capacity for learning. Demonstration lessons focusing on essential understandings, setting up open questions and parallel tasks helped differentiate instruction for both teachers and students.

Addressing a variety of student/teacher needs, teacher inquiry questions, as well as utilizing a variation of formative and summative assessment tools identify gaps and realistic places to differentiate instruction.

Making Math Stick: The Long-term Relationship

“The essence of sustainability is long-term relationships.... Knowing we are in a long-term relationship gives us a measure of security. It frees us to practicein sustainable ways: no need to grab and run!”

Ben Ziegler

By adopting the long view the Elementary Numeracy project personnel have been able to consistently build knowledge, skill and confidence in the teaching of mathematics. The projects teams know that they can count on the constancy of the Helping Teacher and district support. Strengths of the Elementary Numeracy Project highlight: (1) skillful math coaching of Helping Teacher colleagues, and (2) the power of an organizational design that as its essence encourages the growth of teacher leadership. Growing teacher leaders, through mentorship, is an essential element when it comes to implementing change, building trust, sustaining growth and providing ongoing support for the projects. Building capacity among teachers and focusing that capacity on students and their learning is a critical success factor.

The survey and focus group participants expressed some urgency to continue to look critically and objectively at student math skills. Participants encourage one another to consciously search for a variety of useful formative assessment tools like *Leaps and Bounds* and to continue to look for ways to find strategic places for intervention.

Key inquiry questions come to mind as the Elementary Numeracy Project anticipates future direction. How to differentiate instruction so that math is accessible to all students and all elementary teachers? How to encourage students to struggle with challenges that require time and patience? How to provide clear and succinct exploration of the most critical concepts in mathematics? How to change teachers' roles to one of partner, mentor allowing for peer-to-peer learning? How to lead in such a way that student becomes the teacher? What makes math coaching effective? What is important for coaches to think about in the role of supporting other teachers? How to continue to share pitfalls and successes? How to provide teachers with ongoing chances to meet with other teachers to be learners of Mathematics? How to continue to create Mathematically rich school environments?

Now in its fourth year the project represents a sustained initiative which overtime has demonstrated impact. Mathematics, as its own language is now commonly spoken and understood in project schools. Through math open houses, math playground nights, school math contests, math word wells, world cafes and carousels the larger community has been invited into the intriguing and visible world of mathematics. Engagement is both school and community-wide. Transformative, innovative and engaging, we are Making Math Happen.