

« All Aboard, continued

Final Destination: Student Success...Right On Time!

It is often said that the journey is not about the destination alone, but is more about the learning that occurs along the way. We would have to agree. However, in this case, the perspective of one of our Grade 6 students involved in the project on how the Kurzweil technology helped improve his learning proves that the destination does indeed matter as it defines the path ahead:

"I can read Grade 6 books now and I am happy about that. When I am listening to my work being read back to me, I can use the word prediction to correct any errors. I am working on an assignment right now to create a fantasy land. The program has improved my confidence level. Now, I can read at a higher level on my own. Before, I had a hard time reading at the level others could and sometimes they made fun of me, I did not like that so much. Now I feel smart like I know I am." ●

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Education for All Mathematics Project

St. Clair Catholic District School Board



Background

This article is a reflection on the Education for All mathematics project at the St. Clair Catholic District School Board. We focused our CODE money on sustainable professional development in mathematics for our board. Deborah Loewenberg Ball tells us her story of how an increase in her own content knowledge helped her to recognize and exploit situations when key mathematical ideas came up

in class. She also points out that her own "capacity plummeted when I myself was unclear about the mathematics, or when I had mistaken ideas" (Ball, 2002). We wanted our teachers to have the same kind of "profound understanding of fundamental mathematics" that Liping Ma writes about (Ma, 1999). She argues for connected, curricularly structured and longitudinally coherent knowledge of core mathematics. Dr. Ball also points out that it is critically important for teachers to "know mathematics for teaching," which is distinct from knowing mathematics for yourself (Ball & Hill, 2004). We used the research of Dr. Ball et al. to determine that we would focus our mathematics project on two things: content knowledge and pedagogical content knowledge. We wanted to give our teachers the opportunity to uncover and debunk any of their own misconceptions as well as to learn more about the kinds of mathematics they would need for teaching.

Keys to the success of our Education for All mathematics project were the principal's role as the instructional leader with in the school, as well as ongoing support for job-embedded professional learning. We wanted to go beyond typical professional development sessions that leave teachers with no one to help them implement new learning in their classroom and no school-based professional support system. With that end in mind, each of our schools had teams of five people who attended mathematics sessions. These teams included the principal, the program resource teacher (school-based special education teacher), and one teacher from each division. This gave teachers the support they needed back in the classroom to implement new strategies and techniques. Another spin-off advantage to having teams of five from each school was the ability of that critical mass to influence other teachers in their school.

The Professional Learning Community (PLC)

A key component of the success of this project has been the professional learning communities established in each of our schools. Every principal has PLC time for their schools—PLCs take place in every school every two weeks, with teachers having 50 minutes of release time to work with the principal and their colleagues. Often, PLCs take place with the principal along with each of the divisions. However, the principal can set the structure of each of the PLC sessions according to where the needs are. Most schools have cycles of topics for the PLCs, including literacy and numeracy.

The PLC played a large role in sustaining professional learning as well as in spreading the learning to other teachers in the school. Principals and teachers were able to collaborate on how best to integrate these strategies into their classrooms, and to reflect on many of the practices. This also had the benefit of enabling the members of the school community to support each other in the improvement of mathematics teaching.

Principal as Instructional Leader

Concurrently with this project, principals and vice-principals had received significant professional learning to develop themselves as instructional leaders within their schools.

Much has been written about the role of the principal—it is a diverse role requiring an eclectic skill set, including interpersonal and political skills as well as managerial and organizational skills. However, even these necessary skills are not sufficient for today's schools. Principals need to be lead learners and leaders who help teachers reflect on their instructional practices and support them as they change them to better meet the learning needs of all students.

For the last two years, principals have attended monthly full-day sessions that have been 75% devoted to their role as instructional leaders. At the same time, we have eschewed traditional one-shot professional development sessions in favour of a series (3 or 4 days) of sessions with school teams in which the principal participates as a learner alongside the teachers. Our goal has been to develop the principal as a knowledgeable leader who can support and direct the instructional program within the school.

Teacher Researchers

Throughout our project, teachers have been committed to doing their own research by trying new strategies with their students and analyzing the effectiveness of these strategies through student achievement. Through student work samples and assessments (assessments given to some full classes and some classes with identified students), we have noticed an improvement in student achievement in mathematics. Teachers have reported that more students are understanding concepts that have been previously difficult for students to understand (e.g., fractions, decimals, operational sense, counting/quantity, etc.). Throughout the project, teachers have been exposed to many different strategies that allow students to learn concepts beyond what has been done in the past. Most program resource teachers, in particular, have been given some tools to help understand where common student misconceptions are and how to help students get past these misconceptions. For example, in one school, using strategies learned in the project (First Steps in Mathematics, 35 Dinosaur task), we were able to find 11 of 23 students in a Grade 5 class who did not have a sense of quantity—that is, they did not trust that there were always 35 dinosaurs when using different strategies (such as counting by 1's, 2's, 5's, and 10's, along with addition and multiplication). Previously, we would have suggested that the students work harder and try more of the problems they struggle with. Often, this approach only reinforces misconceptions. Using some of the strategies learned, we were able to focus our efforts and determine that these students had some serious issues relating to quantity. We were then able to focus on specific learning activities for these students and to help them gain a sense of quantity. Once students were able to get past this very limiting misconception, they were able to begin to understand operations and not just memorize them. This led to higher student achievement on operational/computational assessments.

Another example was in a Grade 5/6 class with 26 students. Students were given a place value assessment (i.e., the 52 Candies and 43 Candies tasks from the First Steps in Mathematics tool). The entire class got the 52 Candies task correct (traditional place value partition of 5 'tens' and 2 'ones'). When the same students were given the 43 candies task (non-traditional place value partition with 3 'tens' and 13 'ones'), only 8 of 26 students completed the assessment correctly. This gave incredible insight into the misconceptions that these students had. As learned in our project, these students had a 'face' value interpretation of place value. Knowing what the students' misconceptions were, we then helped clear up their misconceptions with place value by giving them problems involving non-traditional place value partitions. Prior to the project, we would have assumed that students understood place value and had generalized the patterns, when in fact they had not.

As we learned when working with students throughout our schools, such misconceptions were a common theme. Students were struggling with the idea of quantity long after we assumed that they had mastered counting. This is just one example of how student understanding, and subsequently achievement, has improved throughout our project. Other curricular areas in which we have noted an improvement are fractions, decimals, operational sense, and place value.

Knowledge of Students as Learners

"I taught it, why didn't they learn it?" is a question many educators ask themselves. The shift from teaching to learning in education is not new. With the focus on teachers as researchers in their own classroom, teachers quickly learned that having new strategies to teach mathematics only goes so far. The notion of how students learn mathematics becomes paramount. By using tools, such as First Steps in Mathematics and ideas found in Teaching Student Centered Math (Van de Walle et al.), teachers began to learn how students learn mathematics. Participants learned where common misconceptions occur and how to help students get past their misconceptions.



In our project, we used the research tool Content Knowledge for Teaching Mathematics, developed by Dr. Ball et al. at the University of Michigan. The instrument was administered prior to the project and after a series of sessions. Over the course of one year, we did see an increase in teachers' mathematical content knowledge and their knowledge of how students learn mathematics.

Lessons Learned

Throughout this ongoing project, we have learned a few things. We have learned that we need to continue to provide support to teachers as they implement new strategies in their classroom. We have taken our motto of "pressure and support" from Dr. Michael Fullan et al. We continue to expect teachers involved in the project to implement new strategies in their classrooms. But while we have this expectation, we continue to offer support. The support could take the form of classroom visits from District Numeracy/Literacy teachers (coaches) or from system-level consultants, or the support provided from the school's professional learning community. The inclusion of the program resource

« Mathematics Project, continued

teacher and principal has definitely offered another level of support for teachers to count on in their schools. However we can and we need to continue to offer support. We also learned, and our teachers began to internalize, the shift from teaching to learning in their mathematics classroom.

We believe this has been a significant project for our school board. All teachers involved in this project have given positive feedback and have shifted their practice, although in varying degrees. We began our project with the number sense and numeration strand, but we plan to extend it to include all five strands. We also recognize that teaching is cultural and that cultural practices are hard to change. Positive change takes time and commitment and we are steadfast in our resolve to improve the learning of mathematics for all students. ●

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9001:2000 since May 2000, focusing on policies and practices of daily operations, which in turn reinforce quality assurance and consistent standards for clients.

As a standards agency, CSC ensures that resources developed for use in Canadian schools are of the highest quality to support instruction and learning. CSC has broad experience in curriculum correlation, identification of needs, and resource development. ●

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Watch for the next issue of CODE Chronicles, coming January 2009!

Knowledge Translation in Action: A CSC/CODE Collaboration

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Curriculum Services Canada



Curriculum Services Canada (CSC) is collaborating with the Council of Ontario Directors of Education (CODE) in the development of resources and learning opportunities for educators in school boards across Ontario. These resources and opportunities focus on supporting school boards as they build capacity, develop learning networks, and sustain initiatives emerging from the CODE Special Education Projects. Our goal is to support a variety of education stake-

holders (e.g., teachers, administrators, parents, etc.) with diverse needs to provide a comprehensive range of learning opportunities. Resources are developed through an emergent design process based on ongoing dialogue with and feedback from stakeholders. We encourage you to share feedback on this resource, CODE Chronicles, or any other related resource.

What's Available

We are currently created the following resources and learning opportunities as a part of this project:

- **A knowledge mobilization webinar series for educators**
These one-hour sessions allow educators to connect with an expert facilitator and develop strategies to build capacity and learn lessons that have emerged from the CODE projects.
- **A summit for educators**
CODE is hosting a summit on November 17 and 18, 2008 to help facilitate dialogue, thinking, and reflection in an effort to deepen our understanding and impact practice.
- **The Parent Partnership Matrix**
Parents are critical success partners in a child's education. The Partnership Matrix outlines strategies for engaging parents on a variety of levels.
 - A print-based version of the Matrix will be available at the November 2008 summit.
 - A web-based version will be launched shortly after the summit and will provide access to additional resources and strategies.

About CSC

Curriculum Services Canada (CSC) is the Pan-Canadian standards agency for quality assurance in learning products and programs. A not-for-profit organization, CSC provides standards-based services including development, implementation, evaluation, and accreditation of teaching and learning resources; production and delivery of multimedia and web-based professional learning programs; and support for education stakeholders on initiatives related to curriculum implementation.

CSC is the parent organization for a family of quality services trusted by Canadian teachers. We have one affiliate, The Curriculum Foundation (TCF), which is CSC's charitable arm and supports a Grants for Teachers program for the development of new teaching/learning resources. CSC's management system has been registered as being in conformity with ISO