

## Math Solutions and Strategies for All

### **Project Description:**

Teachers met by cycle with our math consultant, Cheryl Cantin, for 90 minute blocks over six days. Supply teachers were organized in advance and one supply teacher would cover three teachers per day (one per cycle). This structure worked well and gave the teachers enough time to meet with Cheryl, bring forth their concerns, discuss strategies, analyze student work, receive feedback and recommendations, and to develop tools. Teachers did their best to get the same supply teachers for all six days to provide consistency for the children.

During the first meeting, each cycle was asked to identify an area that they felt they needed support with. Cycle one indicated that they wanted to focus on Number Sense. They brainstormed various concepts needed for success in the cycle one math program and Cheryl agreed to prepare materials that the teachers could explore for their next session. Cycle two indicated that they, personally, experienced difficulties with interpretation of word problems and they wanted to explore different strategies to support students in analyzing and interpreting word problems. They decided that they would administer a grade appropriate word problem with their goal being to analyze as a cycle and with the help of the math consultant, the students' interpretations of the problem. Each teacher was to bring these samples back to the team at the next meeting, along with the rubric currently being used in class. Cycle three chose to focus on problem solving and situational problems. They discussed student-needs in relation to these learning objectives. They also talked about the importance of setting teaching routines which would be consistent from one grade to the next and consistency in evaluation of these problems, specifically when the students have to show their understanding of a problem. They decided together that they would work on creating an evaluation rubric with the goal of ensuring consistent evaluation across grades. Similar to cycle two, they decided to focus on student understanding of the problem. Hence, not about the task, but about how the students are interpreting the task.

### **Goals:**

The first goal of the project was to develop and build upon strategies that provide equitable access to mastery for our students by using student results to help them to target the specific areas where we need to improve as a school. Our second goal was to develop tools and strategies together that would assist in moving our students forward and in ensuring more consistency with respect to teaching of math concepts and language, as well as evaluation. We feel that we were successful in reaching our goals. Not only will the rich discussion that took place during our meetings enhance our teaching, but the materials created will be beneficial to both students and teachers in ensuring consistency for years to come. Having our math consultant present for these sessions was extremely beneficial in helping us to understand the "big picture". With her guidance, we were able to identify the most important concepts that should be taught for our students to be successful now and in future years i.e. high school. By having release time to focus only on math as opposed to meeting after school or during planning days when teachers have many different items to attend to, the motivation to participate in the project was higher and the gains were substantial for each teacher. The only

change we would make stems from the fact that our sessions were often spread out and the time span between meetings was such that it sometimes made it difficult to pick up where we left off and to remember what had been discussed previously. If we were to do such a project again, we would prefer to complete the project during a shorter time span, but still meet for the same number of sessions i.e. September to December rather than spreading it over the entire school year. This would help us to have a stronger focus.

### **Outcomes:**

#### **Cycle One:**

During the remaining five meetings, the cycle one team met with Cheryl and examined a document from parts of the book, "How Children Learn Number Concepts: A Guide to the Critical Learning Phases". Largely this document dealt with the critical learning phases of counting. The teachers provided examples of what they see regularly in their classrooms regarding early number sense. They decided to continue working with and discussing the document in relation to their practices and observations in their classrooms. They discussed the critical learning phases related to the parts of numbers, decomposing numbers, and using symbols. They also discussed the use of math language and the importance of being consistent with the language throughout the Cycle. Cheryl shared a word problem chart based on cognitively guided instruction problem types. She described how the chart worked and gave them problems to look at. This chart was helpful in making them more aware of how they choose and present math problems to their students. In their final meetings, they had round-table discussions sharing their impressions of how the strategies they had started this year had improved the quality of their instruction. They expressed that as a result of previous work done with our consultant in past years, the students were coming into their classes in September with a stronger foundation than was previously noted. They attributed this to a better understanding of concepts, using the same math language from Kindergarten to Grade 2, and the students' overall readiness in Math. Lastly, they discussed the pertinent points that should be covered in K and cycle one at the beginning of a new school year and concluded that understanding of numbers and place value seem to be the most important points to cover in K and cycle one.

#### **Cycle Two:**

For the cycle 2 team, the remaining 5 meetings consisted of sharing and analyzing data brought by each teacher. From their discussions, they began to create the criteria that their cycle would use to evaluate student interpretation of a problem in order to ensure vertical alignment in regard to math assessment in problem solving. Since the rubric was a work in progress, they realized that further data would be needed to continue developing the rubric. They collected this data between meetings. The main focus was around application problems and how to accurately assess the understanding portion of the evaluation. There was a discussion about providing equitable evaluation as opposed to equal evaluation when it comes to our students with specific needs. As our special needs students are integrated, assessment of these students' abilities is often a challenge for generalists. During the last meeting with the math consultant, the cycle 2 teachers finalized the rubric that they had been working on.

Cycle 3: The cycle three team brought samples of student-work to their meetings and looked at the analysis part of situational problems. The discussion was focused around the question: How do we evaluate student understanding of a situational problem and how should students show it on their paper? The math consultant shared a rubric that she had been working on with the cycle two team. The teachers agreed that this was also appropriate for cycle three. They added to the rubric already started, and tested the rubric with the student-samples that they had brought with them. They decided that they would continue working on the evaluation rubric at their next meeting and in the meantime, they would encourage the students to read the problem carefully and determine what the questions are. At the next meeting, they continued to work with the evaluation rubric more specifically, looking at the “understanding of what they are being asked to do” part. Once again, teachers brought student samples and corrected several samples with the consultant based on the rubric they had developed so far. They noticed that the rubric gave surprising results which led to a discussion of the importance of teachers stating the expectations clearly with their students to give them a fair chance to be successful. The next meeting was focused on the section “oral response” of the rubric. They debated back and forth about the language and specific terminology used in the rubric. They decided that they would continue to develop the oral response part of the rubric as it would be used for formative assessment in the classroom, a checklist of sorts. During the 5<sup>th</sup> and final meetings, the team examined effective strategies for teaching measurement. They used the book “Teaching Student-Centered Mathematics” by Van de Wall, Karp, Lovin, & Bay-Williams. They discussed the idea of introducing nonstandard units for measurement activities. They also met with the math consultant Cheryl Cantin once again and discussed the issue of IEPs in relation to math and how they should be used as a partnership between parents, students, and teachers. They are continuing to develop the rubric and are hoping for a final draft very soon.

### **Reinvestment:**

The team of teachers and administration involved in this project feel that the resources created and the learning achieved by the participants can benefit the educational community at large. The rubrics that were developed as well and the strategies that were discussed can be used by other mathematics teachers in other schools. While the rubrics are designed to be used at the elementary level, they could easily be adapted for high school. Likewise, strategies could easily be shared as best practices at future conferences and workshops. It is important to note that in our school, it allowed an important opportunity for our teachers who attended the LCEEQ Summer Institute to share their learning with their colleagues and in the presence of our math consultant thus creating a win-win situation for all, but most importantly, our students. We would definitely encourage any team to carry out this same project. The presence and support of the math consultant would be essential to provide expertise and move the teams forward. This project could be improved if more time could be devoted to it to delve deeper into other math concepts that are related to the topics examined during this project.

We would like to thank LCEEQ for their support and for allowing us to embark on this important journey of mathematics learning.