



Using Open-ended Questions in Primary Math

“The ultimate goal of differentiation is to meet the needs of the varied students in the classroom during instruction. This becomes manageable if the teacher can create a single question or task that is inclusive not only in allowing for different students to approach it by using different processes or strategies but also in allowing for students at different stages of mathematical development to benefit and grow from attention to the task...A question is open when it is framed in such a way that a variety of responses or approaches are possible” (Small, 2009, p.6).

“Big ideas represent fundamental principles; they are the ideas that link the specifics” (Small, 2009, p.4).

Introduction

This project began with a curiosity about using open-ended questions in math in the primary division as a strategy to assist students in developing number concepts. The teachers had observed that a ‘show and tell’ method of teaching math resulted in the students being able to perform a task in a familiar context but when presented with a problem in another context, the students struggled with applying what they had appeared to know. Although word problems have always been a part of math work, they are often used as a means for students to apply a learned skill directly after the skill has been practiced. In these situations, the students don’t need to sort out how to solve the problem; they just need to apply an operation to some numbers. In this project, we wanted word problems to be a chance for exploration and solidification of number concepts, as the students responded to the problem in different ways.

Beginning Observations

At the beginning of our journey, the teachers all posed the same problem (show as many things as you know about a number) in order to observe the initial reactions and responses of their students. We discovered that some students were not comfortable with tasks that were open-ended and did not have a single right answer; the more capable students preferred to work alone and did not want others copying their work; and some students had difficulty actively listening during sharing time. As we posed other questions, we also noticed that our responses were very important; we needed to accept all answers without judgement, and we had to be careful not to come with a preconceived idea of how the students should respond as we posed guiding questions. With these observations, we realised that a collaborative culture needed to be developed in which sharing and helping each other think through problems is the norm.

Samples and Reflections

For this report, the teachers have each provided details and samples or descriptions of student work for one question, along with their reflections on the task. They have also given examples of other tasks that were presented throughout the project. Some of the questions were borrowed from texts; others were created based on activities in the classroom. Please see attachments for the questions and samples, and the list of other tasks.

One of the greatest benefits of this project was the insight teachers gained about the students' understanding of numbers and their operations as they actively engaged in the tasks. Often this insight was gleaned during on-the-spot interviews, especially with the younger students who struggled to explain their thinking on paper. Another great benefit was the rich discussions that took place during our meetings as we examined the challenges of: changing our practice to one in which we allow students the time they need to explore and discover on their own; developing engaging, authentic, differentiated questions that are truly open-ended; and creating a collaborative, non-judgemental culture in the classroom that encourages critical and creative thinking.

With the End in Mind

We are at the beginning of our journey to make math a meaningful, engaging, successful activity for all students. As we feel pressure to cover the curriculum and prepare students for EQAO, we often push on and some students are not given the time or opportunity to develop a sound understanding of numbers and operations. It is our hope that as we learn to differentiate through the use of open-ended and parallel tasks, and as we use assessment to inform our practice, all students will continue along their developmental path with confidence and success.

Small, M. (2009). *Good questions: Great ways to differentiate mathematics instruction*. New York: Teachers College Press.