
Summary

Prepared by

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There are many ways to successfully teach children so they possess a richer understanding of mathematics. Although there are many methodologies to accomplish such an understanding our article described not only children’s understanding but also how the teacher understands different mathematical methods and how those understandings affect her instruction.

To give a brief summary of the article, the work described was based around TBI (Teaching to the Big Ideas), a four-year enhancement project sponsored by the National Science Foundation, and jointly conducted by EDC, TERC, and Summer Math for Teachers. This article was written around class examples from Anne Marie O’Reilly, and Theresa Bujak, both 6th grade teachers; and Beth Keeney, a combination 3rd and 4th grade classroom teacher. In our research, the definition of A Big Idea is a statement of an idea that is central to the learning of mathematics, one that links numerous mathematical understandings into a coherent whole (Charles, 10).

This article examines two avenues for promoting teachers mathematical investigations. The first avenue is exploration of disciplinary content and the second is the examination of student thinking. In K-12 teaching situations these two kinds of investigations is where one is related to exploration of disciplinary content and the other to the examination of student thinking, and how they can be pursued in a professional development setting.

A major component of the TBI project involves teachers as mathematical learners in lessons designed by project staff. The project worked on activities in each of the following areas: number systems and whole number operations, data analysis, geometry, fractions and decimals, ratios, combinatorics, probability, variables and
functions. A mathematics lesson in TBI usually begins with the introduction of a task, often (and especially for explorations of arithmetic) understood as a word problem. Teachers have students work in small groups; staff listens in, sometimes asking probing questions. The group is then brought together to discuss the task and to use the various groups’ findings to carry the mathematical ideas further.

One example was “Nancy has 6 2/3 meters of material. It takes 5/6 of a meter to make her fabulous fancy hair ribbons. How many fabulous fancy hair ribbons can she make?” Students were asked to solve the problem by drawing a large, detailed, labeled picture. They had to write a number sentence (equation) and write the answer in a complete sentence. After working with a partner and being fully focused on the questions students were able to come up with an answer of 8. However students spent most of their work time refining their pictures and explanations. It is amazing the number of different ways the students came up with the answer. Every group seemed to have a great explanation of their work and the correct answer.

From the seminar, Keeney (the 3rd and 4th grade teacher in the article) learned that mathematics is not just a set a procedures to be memorized and mechanically applied. She learned that mathematics was more than solving novel problems and sharing solution strategies. The problems had become a means to exploration of mathematical concepts. Mathematics was no longer seen as a set of disconnected concepts, skills, and facts due to having an understanding of the Big Ideas. Effective teachers know how Big Ideas connect topics across grades; they know the concepts and skills developed at each grade and how those connect to previous and subsequent
grades. According to Charles, “The degree of understanding is determined by the number and strength of the connections” (Hiebert & Carpenter, 1992, p. 67).

An important part of the TBI seminar involved learning how to use children’s perplexities to make such deep conceptual issues visible. When teachers began their investigations they first started by analyzing other teachers’ students. They studied video tapes of clinical interviews and classroom discourse as well as written materials illustrating student work.

Teacher’s mathematical investigations are achieved through exploration of disciplinary content and examination of student thinking. Teaching to the big idea is also incorporated into workshops created for teachers on staff development days. Members of a group are not only encouraged to work together but groups themselves learn the most when collaboration occurs. When one has a clear understanding and appreciation for teaching to the Big Idea, topics within mathematics are no longer seen as meaningless.
Works Cited

