

Does Conceptual Learning Improve a Student's Level of Confidence in Math?

Karla Skibba*

Department of Curriculum and Instruction, College of Education

Abstract. There is a need for students to increase their understanding and application of mathematical skills to compete in today's international economy. Encouraging students to think aloud and share the way they approach mathematical problems with each other may be especially important in helping students feel confident and have a positive attitude within the classroom. I conducted a confidence survey with fourth-grade math students to identify individuals who felt they struggled with understanding math. I focused on those students within my instruction over a two-week period and then had those specific students re-evaluate their confidence levels with the same confidence survey. My results were inconclusive showing that students who felt frustrated with math were just as successful in applying their understanding of math skills as their confident peers. The results of my study support the research today detailing concern that students do not have a deep understanding of how mathematical concepts are interconnected. Therefore, they feel answers are always right or wrong, but cannot support why that answer is correct.

Introduction.

The definition of confidence is being certain of oneself. I have found as a fourth grade math teacher that many of my students do not feel confident working in math when problem solving to find a correct answer. Numerous students are often too quick to ask, "Is this right?" Often, my response to them is, "I don't know. Show me how you found your answer." Mathematics has taken an increasingly, important role in our society with today's more technologically advanced economy and dependent role on that technology in our day to day functioning. "Mathematical classrooms in the United States today too often resemble their counterparts of a century ago" (NCTM, 2002).

Promoting confidence and a positive attitude in math class is an important responsibility for teachers. For the most part, students who experience difficulty in math develop negative attitudes toward the subject (Shellard, 2004). Many teachers assume that if students know basic mathematical facts and can perform basic calculations, they understand mathematics. Students must have an understanding of not needing to know the correct answer to be successful, but more importantly understand the concept and how to find the solution to the answer. Every mathematical problem may have only one right answer, but there are numerous mathematical strategies you can use to solve for that one, true answer. "Encouraging students to think aloud and share the way they approach problems with each other may be especially important in helping students feel confident and have a positive attitude" (Bafumo, 2004). A variety of effective methods include presenting a problem to the class and having them brainstorm different mathematical techniques to solve it, asking students to share, verbally explain their thinking processes to the teacher and class, and rephrase another student's explanation for understanding (Chapko, 2004). Far too many students struggle with mathematics because they don't see its connection to their lives (Bafumo, 2004). One of the best ways to accomplish an application to real life at any grade level is to use familiar and recognizable materials in their problem solving. The discussion among students and teacher provides the foundation for true understanding of mathematical concepts and positive attitudes in the classroom. Proficiency is much more likely to develop when a mathematics classroom is a community of learners rather than a collection of isolated individuals (NCTM, 2002).

Experiment, Results, Discussion, and Significance

Twenty fourth-grade students participated in my data collection. The dynamics of my classroom encompassed nine girls and eleven boys. I constructed a math confidence survey for students to individually complete. I used the data results to identify students who felt they were not performing well in mathematics or

simply felt frustrated with the concepts we were learning in class. I then designed a variety of division lessons based on research I found to improve understanding of those division math concepts. My goal was to see improvement in the confidence level of those particular students who felt frustrated in math through improving their conceptual understanding of division in math class. My second source of data was math artifacts students completed during the 2 week period. I also created a grading scale to assess students' understanding of the division concepts in long division. I used this third data piece as a tool to assess whether my low-confidence students improved their conceptual understanding of long division.

Through this two week process, I observed my low-confidence students' attitudes while working with partners and on their own. Their demeanors did not seem to alter. I found no changes in attitude or frustration. They all seemed to do well and could successfully complete the long division problems independently. I mingled around during the assigned activities and questioned my low-confidence students about how they thought they were doing. I received all positive feedback and attitudes were elevated during work, especially during the game time students shared with partners. As a final assessment, I asked students to solve a long division problem and then explain in journaling what the quotient represented. In doing this, students could show me that they could transfer their understanding of the meaning of division of simple facts to long division problems. I created a 3 point assessment scale to evaluate student understanding of the division concept through long division.

The following data figure (Fig. 1) reflects the data results I recorded from the post-confidence survey I administered. The data shows the answers to question number 5, "How do you feel about your math performance?"

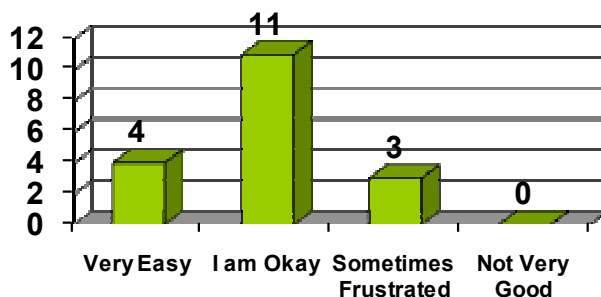


Fig. 1 Confidence Survey Results

I feel the results of my study were inconclusive. I found that the class as a whole understood how to solve division problems and could do so successfully, but failed to be able to define what the meaning behind the division was when applied to larger problems. Students who felt frustrated with math appeared to be as successful and confident as those who self-assessed themselves at a higher level of confidence.

Conclusions

The data results of my study support today's research detailing the concern that students do not have a deep understanding of math concepts. What understanding they have is very superficial. For example, my math students strive with intensity to compute for the correct answer instead of taking the time to understand the concept of what is being learned with that skill. My data shows that my students are successful at completing long division problems correctly, but no conceptual understanding exists when applied to long division. My students could not clearly explain why or what the division problem means.

My data also leads me to question whether students truly know how to assess their confidence. Are students truly aware of their confidence level? What can I do, as their teacher, to encourage them to be mathematical thinkers and problem solvers with self-assured confidence? This will be my future action that I will take as a reflective educator in my classroom.

- [1] NCTM. (2000). *Principles and standards for school mathematics: An overview*. Reston, VA: National Council of Teachers of Mathematics.
- [2] Shellard, E. (2004). Helping students struggling with math. *Principal* 84(2), 41-43.
- [3] Bafumo, M. E. (2004). Everyday math [Electronic Version]. *Teaching K-8*, 34, 8. Retrieved February 15, 2007.
- [4] Chapko, M. A. a. B., Marian. (2004). Math instruction for inquiring minds [Electronic Version]. *Principal*, 84, 30-33. Retrieved February 2, 2007.