As a researcher it is necessary to develop a theoretical perspective that is grounded in educational theory. It is important to “embed one’s ideas within a community of scholars,” because failure to do so results in a study that is open to a variety of interpretations and often has little real value (Romberg, 1992, p. 56). In developing my theoretical perspective, I started with the question from the beginning of the quarter, “What is the purpose of school?”

I believe that the purpose of school is to help students to become independent thinkers so that they may know how to answer their own questions outside the structure of school. In helping students to become independent thinkers, as a math educator, I am focused on their development of mathematical concepts. It is necessary for students to be independent mathematical thinkers because mathematics allows us to use our minds in a way that greatly increases the power of our thinking, which in today’s world of rapidly advancing science, high technology, and commerce, is becoming increasingly important (Skemp, 1987). Unfortunately, too often US schools fail to teach children mathematics and it becomes a source of anxiety (Skemp, 1987). This is because many students are taught mathematics as a manipulation of symbols, according to a set of rote memorized rules (Skemp, 1987). When students fail to understand these rules and/or are unable to remember them, they believe that math is difficult and that they are not good at it, which leads to feelings of anxiety.
In trying to help students to feel less anxious about mathematics, it is important to move away from rote memorization and toward a conceptual understanding of mathematics because, as Skemp (1987) indicates, students are less likely to recall rules that seem unconnected, than ideas that can be integrated into their own knowledge base. “Once people are able to analyze new material for themselves they can fit it into their own schemas in the ways most meaningful to themselves,” (Skemp, 1987, p. 45). This belief is also supported by Gadanidis (1994). He acknowledges, as students acquire new knowledge, this knowledge along with prior knowledge “is transformed as students construct more inclusive schemas of understanding” (p. 93). I believe that as students make more connections with mathematical concepts, those connections may help them to build a more conceptual understanding, and as a result, the students will begin to feel less anxious about mathematics because it is able to follow a logical path leading from previous lessons. To them it will simply “make sense.”

When initially aligning these beliefs with an educational theory, I considered myself to be a constructivist. Upon examining the characteristics of constructivism, most constructivists agree on two principles: the learner actively constructs their own knowledge, and coming to know is a process of organizing and adapting to the world as experienced by the learner (Gadanidis, 1994; Kilpatrick, 1987). Lincoln (2005) emphasizes this point by stating, “Constructivists are first and foremost concerned with the meaning-making activities of research participants” (p. 119). Upon applying this point to mathematics, we must ask the question, how do we know if the learner has constructed an accurate understanding of mathematical
concepts? This is why Gadannidis (1994) states, “In a constructivist view of mathematics learning, the question is not whether students construct understandings of mathematical concepts, but rather how good are their constructions” (p. 93). In other words, every experience is going to have some form of influence on the individual. The question is whether this influence leads to sound mathematical thinking or misconceptions.

In considering this perspective, my experience has led me to believe that students’ constructions are not always very “good.” When I started teaching at a high school, after six years of teaching elementary mathematics, I often had to explain concepts to the high school students that should have been understood when they were at the elementary level. When speaking with the high school students about their understanding of these fundamental concepts, they often expressed difficulty in fitting all the rules together and remembering them. Their difficulties speak directly to Skemp’s (1987) assertion of the need for a learning context. This experience reinforced my belief for the need for mathematics to be taught more conceptually. In Lincoln’s (2005) view of constructivism she states, “It is only when we understand the underlying values of respondents and research participants that we can begin to understand where conflict exists and where negotiation around larger issues might be engaged” (p. 63). If we can understand the value that teachers place on a conceptual understanding of mathematics then we may be able to understand how to move toward a teaching method that promotes this type of mathematical understanding. My experience leads me to believe that far too little value has been placed on a conceptual understanding of mathematics.
In placing more value on conceptual mathematics and helping my students to build their understandings and attempt to fill in any “gaps,” we would work in small groups with manipulatives to understand why a certain procedure “worked” to solve a problem. Following an activity, we would discuss connections that we were able to make. The students were skeptical at first of working with manipulatives and drawing pictures because they felt that they should be “beyond” these “elementary” strategies. However, after discussing their connections and many “aha” moments, the students came to enjoy our sessions and became more confident in their mathematical understandings. In making connections between concepts the students felt that math was “easier” because it did not involve the memorization that they once believed was the core of mathematics.

Through these experiences and continuing to build my own understanding of educational theory, I have consequently moved from a constructivist perspective to more of an interpretivist view. This is because the interpretivist perspective goes a step further than constructivism. In addition and relation to the conceptual constructions within the learner that are recognized by constructivists, it acknowledges the social aspect of learning and how the ability to communicate one’s knowledge represents those conceptual understandings. “Interpretivists posit the practices of communication, that is, how meaning is performed and negotiated in the everyday world” (Bochner, 2005, p. 66). This communication is an important aspect of the understanding of mathematical concepts.

Through reviewing the literature, a great deal of mathematics research focuses on communication. In a research study conducted by Langham, Sundberg, &
Goodman, (2006) they describe how teachers who engaged in mathematics discourse as they were involved in an exploration of mathematical concepts were able to recognize the importance of the concepts, and how the discourse helped to build those concepts. Koellner et al. (2007) also looked at the ability of communication to build mathematical understanding. In their study they found that as teachers collaboratively discussed a math problem, their understanding of the mathematics content evolved. The teachers were able to compare, reason, and make connections between the various solution strategies that they did not previously recognize. The ability to recognize multiple solutions to a problem is an important departure from traditional mathematics instruction. Rather than support the traditional teaching method of following a set process to solve a particular problem, these studies demonstrate the large role communication plays in building mathematical understandings, which follows the interpretivist emphasis on “how we talk about the world and try to deal with it” (Bochner, 2005).

My belief in the importance of the role of communication in developing understanding has also been strengthened by my experiences here at Drexel University. I have had the opportunity to “observe” Dr. Ellen Clay’s online probability and algebraic reasoning class for the winter 2009 quarter. In this class the students make video podcasts that show how they solve a problem while explaining their thinking. When I started listening to the podcasts I was amazed at the transparency of their work in comparison to only being able to look at their written work. This method allows much greater access to a student’s understanding or misunderstanding, as the case may be. It also allows for any learning gaps, both
large and small, to be recognized with greater facility. An interpretivist could use this approach to learning to “probe how meaning is performed and negotiated in the everyday world” (Paul et al., 2005, p. 47).

In moving forward and thinking about the research that I want to pursue, one idea that I have is to look at the impact podcasts have on elementary students’ abilities to communicate their mathematical ideas. In my experience I have found that elementary students do not like to have to provide a written explanation of their thinking after solving a problem. This could be related to the fact that students begin to learn vocabulary by first hearing words and speaking them before they are able to incorporate them into their writing (Fisher, 2008). If students are able to use a podcast to demonstrate and better communicate their mathematical understandings, they may build their confidence and feel more comfortable, thereby lessening the anxiety that Skemp (1987) described. Further, if properly utilized, it may also allow teachers to be able to more easily identify gaps in student understanding and recognize if students are building a solid conceptual understanding of mathematics or simply using rote memorization of a set of procedures.

I am also interested in continuing the research that I completed for my masters thesis. This research looked at students’ ability to communicate mathematical understandings that they acquired while engaged in a strategy game. A constructivist perception guided this research because I was looking at individual students’ ability to build a strategy for the game. The research could be extended to look at communication and interactions between the students as they are engaged
in a strategy game, measuring the impact of these interactions on their mathematical understandings. By looking at the interactions and communication between the students I would be changing the theoretical lens of the research from constructivist to interpretivist.

Related to this view of learning mathematics in the classroom, Cobb, Gresalfi, and Hodge (2009) have developed an interpretive scheme to attend to “how students come to understand what it means to do mathematics as it is realized in their classroom and with whether and to what extent they come to identify with that activity” (p. 41). This scheme could be used to extend the research on conceptual understandings of mathematics and anxiety about mathematics. In helping students to understand mathematics conceptually, we need to know what their perspective of mathematics is. Cobb et al.’s scheme looks at the nature of mathematics from the student’s perspective. I believe this to be very important because if students do not perceive mathematics to be conceptual, they may not look for connections between concepts that may help them build a deeper understanding of the mathematics. This research could also identify areas of student anxiety, as acknowledged by Skemp (1987), regarding mathematics. By looking at how students identify with mathematics in their classroom, we may address these concerns about mathematics.

Through this process of looking at my perspective on education and identifying with an educational theory, I find that the interpretivist perspective resonates with me the most. This perspective is conducive to research that will look at how students understand mathematics through interactions with others. In looking at these interactions we may be able to identify successful methods of
coming to understand mathematics conceptually. It is this conceptual understanding that will ultimately help students become the independent thinkers that we hope they will be. To do this, we must look at mathematics from the student perspective. By doing so successfully, we will move forward in recognizing one answer to the question, “What is the purpose of school?”

References


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