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?”

In answering this question, my initial thoughts were that school should prepare students for life beyond school. This answer lends itself to another question, what does life outside of school look like? The answer to this question will have a different answer for every student. This brings me to the question, how can we prepare students for life after school? There is no way to prepare students for everything that they will encounter in life. Therefore 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.

To focus this perspective I will look at it through the context of mathematics. 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 in US schools we 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. This stunts their intellectual growth, keeping them from the opportunity to think independently.

This brings me to my research topic, how can individuals build a conceptual understanding of mathematics. It is important to move away from rote memorization and toward a conceptual understanding 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 my perspective 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 Gadanidis (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). It is the quality that matters. One may assume that constructions will be made.

In considering this with my own 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 mastered on 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) perspective 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.

Once I understood the core of the issue, I was then able to broaden my perspective, and consequently moved from a constructivist perspective to more of an interpretivist perspective. According to Bochner (2005), “Interpretive perspectives take for granted that all attempts to represent reality are mediated by language. What we say about the world involves the indistinguishable provocations of the world and the mediations of language by which we make claims about the world” (p. 65) The interpretivist perspective goes a step further than constructivism because in addition and relation to the conceptual constructions within the learner, it acknowledges the social aspect of learning and how the ability to communicate one’s knowledge represents those conceptual understandings.

This communication is an important aspect of the understanding of mathematical concepts. 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 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.

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.

Another interest of mine would be to continue with research 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.

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 extends aspects discussed at the beginning. One concern with mathematics is whether it is taught conceptually or procedurally. 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 teachers perceive that they are teaching mathematics conceptually, but the students are understanding it procedurally, it illustrates a disconnect that could try to be resolved. 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. “Interpretivists posit the practices of communication, that is, how meaning is performed and negotiated in the everyday world” (Bochner, 2005, p. 66). 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. This idea is supported by Bochner (2005) in his comment, “We need to be able to penetrate deeply into the minds and under the skin of our students, and we need to see the patterns that connect them to each other as well as to us, intellectually, emotionally, and aesthetically” (p. 299). By doing so successfully, we will move forward in recognizing one answer to the question, “What is the purpose of school?”
References


