Philosophy of Teaching and Learning

Victoria Brown

The questions of which specific philosophies and epistemologies for mathematics and mathematics education work the best and are correct have been widely discussed and debated for centuries with changes and modifications to the different theories being made along the way. The ways in which a child learns and interacts with the material is extremely important to their perceptions and feelings towards the content and material that they looking to gain knowledge about throughout the specific course. These attitudes and opinions can take years to change in the minds of the students and can possibly affect other courses throughout their educational career. It can be very difficult to narrow down one set philosophy or epistemological style being that each student brings into its classroom their own culture, perceptions, and personalities into the classroom. Each educator and mathematician answers these questions in their own manner depending on their personal beliefs, upbringing, and knowledge of research.

I personally believe that a mix of radical constructivism and social constructivism is the best learning theory to use in the classroom for students in our current generation and for generations to come. Radical constructivism follows from the assertion that the “deeper purpose of school is to foster independent thinking” (Glasersfeld, 2001, p.2). This concept of radical constructivism builds itself on an understanding that “human beings can only know what they themselves have made” (Glasersfeld, 2001, p.4). Each student will create something unique because of the differences in culture, understanding, and experience that they bring to the table. Huge strides have been made previously in the concept of differentiation in the classroom and this relates directly back to the point that students learn differently and so the material must be presented in different manners to meet their needs and help them foster a deeper understanding of the same material. If the students were able to develop their own understanding of the material based on their own construction of ideas, I believe there would be less pressure on both the students and teachers because the learning would take care of itself.

The mix of social constructivism also brings into play the impact that society makes on the understanding and learning of students. Because “education depends on the assumption as to what is valuable to our culture to pass on” (Ernest, 2011, p.1), educators must take into account throughout their teaching the fact that students are influenced by the things that are around them on a daily basis and more importantly social factors. Mathematics has its own goals, aims, and purposes, and it is important for the educators to realize that “the teaching of mathematics is a widespread and highly organized social activity” (Ernest, 2012, p.1) and that these goals, aims, and purposes are impacted by these social activities. Students develop a personal meaning for all of the different concepts and it is the job of the educator to make sure that each individual meaning meets the standards that have been put forth by the state.

I also agree with the Vygotskian aspects of the theory of mind that play into this mix of radical and social constructivism. This theory states that “human subjects are formed through their interactions with each other in social contexts” (Ernest, 1994, p.1) and that conversation is at the root of these interactions. Conversations, both internally and between students, allow the students to develop and solidify their understanding of a concept with the ease of a social situation that can take place in the classroom. These conversations also enable the students to see the perspectives of other students and how their ideas relate to each other and their personal cultures.

This independent thinking develops from letting the students work on their own in developing their learning and not have the educator constantly feeding them the information for them to replicate. This involves the teacher not being the main method for delivery of information. The teacher must use child-centered aims in the classroom and throughout the lessons in order to make sure that the children are developing their own thoughts on the mathematics that relate specifically to their own culture and background. In a classroom where the teacher supports children learning independently the “crucial role of the teacher is correcting learner knowledge productions and warranting learner knowledge” (Ernest, 1994, p.1). I found the key word in this statement to be production. The students are creating their own knowledge and the teacher is just coming through and modifying and tweaking the thoughts of the students. Using the constructivist approach to learning and teaching, “teaching does not begin with the presentation of sacred truths, but with creating opportunities to trigger students own thinking” (Glasersfeld, 2001, p.10). Lessons presented in a constructivist classroom should help foster the students thinking and give them the right to make conclusions and inferences from the material presented.

In order for students to be able to make the conclusions and inferences necessary to have a solid conceptual understanding of the material, they have to feel comfortable in the classroom environment. They cannot feel afraid to be wrong and feel like they will be judged by those in their class if they make the wrong decision. This is the easiest way to “demolish whatever spark of motivation they had and then it is not surprising that their willingness to tackle new tasks disappears” (Glasersfeld, 2010, p. 11). The educator must set this tone at the beginning of the school year to make sure that all expectations for both the students and their interactions with each other are understood by all to ensure the most success for all students. The students must take responsibility for their role in the classroom and in their own learning. This is a transition that can be difficult for many students because they are accustomed to having the teachers handle most if not all of the responsibility for their learning. The learning environment must also be very welcoming for the students. They must feel like they have a say in the environment and that it is comfortable for them to work together and communicate. This normally takes place by having group seating and very open lines of communication. I currently have an entire section of my classroom that is a student center and has nothing but supplies for them to use while in my classroom. I think many students appreciate this and tend to feel more at home.

I think that the learning tasks for the new Common Core Standards are very nice lessons that allow the students to investigate the material on their own and come to conclusions at the end in a closing activity. The students need a guide as they work through the material on their own and these learning tasks ask great questions throughout to keep the students thinking about different ways to think about the problem or concept as well as connections that can be made between concepts and disciplines. I also enjoy using cumulative projects instead of tests at the end of a unit because of it lets the students show both their individuality and their content knowledge. Journals are a great way to have students show their thinking and knowledge in the mathematics classroom. Through writing about the concepts, the students are able to internally put together all of their thoughts and write them in a way where they have to be clear to others, even though they are impacted by their own ideas and backgrounds.

These types of activities show a conceptual understanding for the students instead of a procedural understanding. The conceptual understanding is important for students to be able to branch into new topics, disciplines, and “adapt to new tasks” (Skemp, 1976, p.8). Having a conceptual understanding of mathematical material allows the students to “build up a conceptual structure from which its possessor can produce an unlimited number of plans” (Skemp, 1976, p. 15). This is the first step in getting students to think on their own and construct their own learning for many years to come. Cognitive learning that stresses the importance of conceptual thinking and helps the students “translate experience into a model for the real world” (Tall, 2004, p.2). Students relate to situations and have past experiences that require them to “take earlier ideas and reconsider and reconstruct them” to fit the specific situation, so the “journey is not the same for each traveler” (Tall, 2004, p.3). Using conceptual thinking and learning in the classroom can help students develop the attitude that “learning mathematics is empowering” (Schoenfeld, 1992, p.4). Empowering through mathematics will help students in every subject areas and course by helping them think logically through problem solving. These students are then better able to conquer the problems and tasks that will come before them on a regular basis in the real world.

References

Ernest, P. (2011). Social constructivism as a philosophy of mathematics: Radical constructivism rehabilitated? Retrieved August 6, 2012 from http://people.exeter.ac.uk/PErnest/soccon.htm

Ernest, P. (2012). *What is the philosophy of mathematics education*? Retrieved August 6, 2012 from http://people.exeter.ac.uk/PErnest/pome18/PhoM\_%20for\_ICME\_04.htm

Ernest, P. (1994) What is Social Constructivism in the Psychology of Mathematics Education. In Ponte, J. P. da, and Matos, J. F. *Eds Proceedings of the 18th Annual Conference of the International Group for the Psychology of Mathematics Education*, Lisbon, Portugal: University of Lisbon, 1994, Vol. 2, 304-311.

Glasersfeld, E. von (2001). Radical constructivism and teaching, *Perspectives*, *31* (2), 191–204.

Schoenfeld, A. H. (1992). Learning to think mathematically: Problem solving,

metacognition, and sense-making in mathematics. In D. Grouws (Ed.), Handbook for

Research on Mathematics Teaching and Learning (pp. 334-370). New York: MacMillan.

Skemp, R. R. ( 1976), Relational understanding and instrumental understanding. *Mathematics Teaching*, *77*, 20-26.

Tall, D. (2004). Thinking Through the Three Worlds of Mathematics. In *Proceedings of the 24th Annual Conference of the International Group for the Psychology of Mathematics Education*, Lisbon, Portugal: University of Lisbon, 2004, Vol. 4, 281-288. Retrieved on August 16, 2012 from

http://homepages.warwick.ac.uk/staff/David.Tall/pdfs/dot2004d-3worlds-pme.pdf