Learning, Understanding, and Targeting Misconceptions

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To anyone, the words learning and understanding might seem synonymous. To a teacher, even, they might seem very similar. To an expert in the field of education, they are wildly different. After reading the article *How People Learn: Brain, Mind, Experience and School* by Bransford, Brown & Cocking (2000), it has become clear to me that educators not only need to focus on their students' understanding rather than learning, but also that there is an urgency for educators to share these ideas with the students' parents, students themselves, and society as a whole. It is up to us, educators, to start to shift the focus from learning to understanding. In order to do that, we must target our students' misconceptions.

To take this big idea and make it more manageable, I think of my niece. Lyla is now six years old going into first grade. She has learned and understood many new concepts in her life. One of these concepts being as simple as what to address me as when she wants my attention. When she was a baby, she would cry to signify she needed something. When she was around one and a half, she started calling me TT, short for auntie. At the time, I was taking a child development class where I learned the easiest sounds for children to make, "t" being one of them. I strategized for Lyla to be able to say my name by deciding my name would be TT. After getting everyone in the family to call me TT around Lyla, referring to myself by saying "smile for TT" or "give it to TT" and having my sister point to pictures of me calling me TT, we were successful. My one and a half year old niece called me TT. Although nothing made me prouder than for Lyla to learn to call me TT, she did not yet understand it.

Lyla understood why she called me TT when she was around three. She had another aunt whom she called auntie. Exploring her curiosity, Lyla asked me why Tiffany was auntie and I

was TT, even though she knew we were both her aunts. I explained to her that TT was short for auntie and that it would be easier to tell the difference if we had different names. Now, Lyla understood the relationship between TT and auntie. She then used her understanding, or usable knowledge to figure out why she was taught to call her grandma, Gam Gam. These names she had always used were shortened nicknames for longer, more generic titles. Lyla finally understood the relationship between the structure of my names, which made her able to use what she knew to solve a novel problem with her grandma's name – "to show evidence of transfer" (Bransford et al., 2000, p. 9).

Lyla did not experience conceptual change in this idea until she was 4. I came to her pre-school to meet her teacher where Lyla introduced me as TT. I, then, shook her teacher's hand and introduced myself as Hayley, Lyla's aunt. Later, when Lyla asked me why I used a different name, I explained to her that TT was not my real name just like Mom was not her mom's real name. I used her prior knowledge about her mother being named Katie and her father being named Adam to explain that TT was named Hayley. This was largely successful since "learning is enhanced when teachers pay attention to the knowledge and beliefs that learners bring to a learning task" (Bransford et al., 2000, p. 11). Finally, Lyla had come full circle in learning to call me TT as a nickname, understanding I was her auntie, and correcting her misconception that my real name was not actually TT, but Hayley.

There is no telling how many people, be it adults or children Lyla's age, she has told my name is TT. If I could have noticed her misconception earlier, that number of people would be smaller. The same idea can be applied in a school setting. There is no telling how many times a student has tried to add using a number line on their own by counting the number they start on.

For example, in the problem 12 plus three, they would start on 12 and hop up "three" to 14. The misconception here being that they need to count the number they start on (12) as opposed to starting to count up to three once they hop up one to 13, ultimately resulting in their answer being 15.

In schools, we have traditionally spent so much time focusing on the new content as opposed to finding the students' misconceptions. In recent years, different programs and approaches have emerged such as Phenomenal Science starting their units by drawing out as much student thinking as possible using KLEWS charts (Know, Learn, Evidence, Wonderings, Scientific Words) so that they can spot the misconceptions before they even introduce a new idea. Another approach is creating a culture of thinking in classrooms by making thinking visible. Teachers introduce students to thinking routines that guide them in making their thinking visible so that, if necessary, misconceptions can be found and conceptual changes can take place. However valuable, these charts and routines are time consuming.

Imagine how technology could speed up this process of addressing misconceptions. Imagine an online assessment that not only tracks your score but how long you hovered over the wrong answer, or if you clicked the right answer and then changed it to a different one. According to Culcatta (2013), these assessments are already being used at Arizona State University to collect learning analytics, or big data, to inform instruction in college math courses. Reimagining this concept at an elementary level, students could be assessed on reading basics or addition using math tools as I mentioned above. Collecting hundreds of thousands of data points per student could provide us with information not only about which questions students got right or wrong, but which ideas students are confident in their answers and which ideas students are

struggling with. Ultimately, this technology could lead us to finding these misconceptions, targeting them, and teaching for understanding.

References

Bransford, J., Brown, A.L. & Cocking, R. R. (2000), How people learn: Brain, mind, experience and school. Washington, D.C.: National Academy Press. Retrieved from http://www.nap.edu/openbook.php?isbn=0309070368.

Culcatta, R. (2013, January 10). Reimagining Learning: Richard Culcatta at TEDxBeaconStreet [Video file]. Retrieved from https://www.youtube.com/watch?v=Z0uAuonMXrg&feature=youtu.be.