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Teach your students to ask "Why?"

How many times have you observed your students rely on memorization without deep understanding? In this talk, I will present some results of an earlier study on students' understanding of related rates where I collected evidence that students approach both computations and problem solving in the same procedural way, displaying some sort of fixation on procedures and symbol manipulation without understanding under what conditions those procedures apply. I will then present a simple instructional approach for a first-year calculus class that aims at breaking this fixation by combining active learning with opportunities for self-generated explanations to help students monitor their understanding.