Mathematics, at least in my opinion, is much more a study of "why" rather than "how". That is not to say that being able to correctly solve math problems is not an important and useful skill, but it is secondary to enabling students to develop the ability to think critically and for themselves. If we really want to educate students, we need to get them to think holistically about a problem, beyond the surface of finding the "right answer", to the deeper waters of why this problem is worth solving and where it leads from here. Teaching math is not about creating students who are calculators, but instead is about inspiring students to use mathematical tools to solve the problems with which they are faced in life. It is when students reach the point of thinking for themselves and begin asking deeper questions that they gain critical thinking and problem solving skills, which will be the tools they can continue to use beyond the confines of math class. Ultimately, I try in my teaching to model these skills and to challenge my students to see the relevance of math, by consistently asking the question "why" as I also demonstrate the "how".

One of the most important strategies I use to engage my students with the subject matter is through having them work on problems, particularly problems that build upon one another and lead to the most general case. In my second year, I was a workshop leader for the MathExcel program, which consisted of a special recitation section of the calculus sequence directed towards minorities. This program met for one additional time each week and emphasized group work and collaborative learning. We met at the math house, which was divided into smaller rooms that had a few tables, instead of a typical classroom. This environment made it much easier for students to work with one another and the additional recitation time we had helped us to be able to tackle more problems, which had greater depth. My role was to encourage students to help each other and nudge them in the right direction if they were off course or stuck. My students did excel in this course; they learned the material in much greater depth from their time spent teaching one another. I am grateful that this experience happened so early in my time at UK, since it greatly influenced my teaching habits. Now I try to recreate these elements of collaborative learning in all my courses, by using worksheets as well as manipulatives in a group work setting. I often try to shorten lectures to give students time in each class to engage with the material and each other through a planned activity. This process not only encourages students to learn the "how", by working their own examples, but often one group member will ask another "why did you do that?", which slowly encourages them to ask "why".

In order to promote the asking of more critical questions by my students, I design activities and worksheets which encourage students to use inductive and deductive reasoning to find the next concept for themselves. When I was teaching Math Problem Solving for Elementary Teachers, I created an activity where students used polydrons (a math manipulative which allows the user to create 3 dimensional polyhedra) to create different polyhedra and to explore the ratio of the faces, edges and vertices. My students had so much fun creating unique polyhedra that they almost forgot they were doing math! As a class we compiled all the data and looked for the pattern. The students discovered Euler's formula with just a bit of prodding, and in the class period we continued to talk about it and its applications. The sense of accomplishment in having discovered such an important tool on their own, encouraged them to continue to ask questions and push the boundaries as the course progressed. Such inquiry based learning experiences stimulate learning in a new way. Thus my goal is always to encourage and empower students to question me and one another and to seek out the answers for themselves.

Since I believe in collaborative learning, I empower students through working with them one on one or in small groups. I focus not just explaining the next step but instead asking leading questions which help the student figure out the next step independently. Not only does this keep the student in the driver's seat, it also models the thinking behind the process and gets closer to the question of " why". Although a student may pursue the wrong path I will encourage them to

continue so that they my learn from where they went wrong. This can be more successful than seeing the "correct" solution. Other times a student will see a method I did not think of. I use these opportunities to explore how methods can be equivalent and can lead us to the same answer. I love when students come to office hours and encourage them to take advantage of this opportunity as much as possible. In this setting, not only am I able to help a student overcome his\her own barriers and misunderstandings, but I am also able to get a better sense of what the student understand and where he\she is struggling. This helps me in planning topics for the next class. Most often I find that if I am able to explain a problem in more than one way, my student will also see multiple aspects and will find an approach that works for him\her.

I also try to incorporate the techniques which I employ in small groups into my lecturing style by encouraging questions and asking for participation. When working examples I will ask students for the next step or will ask them to work the problem themselves before solving it together. I use my time at the board to model the types of critical mathematical thinking I want to inspire in my students. Whenever I introduce a new concept, I not only try to give an explanation for why something is true, but also try to move students to explore why it is the next step. I strongly encourage my students to challenge the importance of a topic. I want them to be able to use the tools I am teaching, but I also want them to see why they matter and why they are useful additions to our mathematical tool kit. In order to do this, I plan my lectures to include examples and ideas upon which I can build in the next class and which I can use to compare and contrast methods. I also make sure that I know what "big picture idea" I want my students to take away from the lesson and structure the entire class period to present, explain and practice this concept.

In order to be effective in motivating and teaching the use of new concepts, I look at the scope and direction of the whole course. In planning for instruction, it is critical to know the mathematical concepts that need to be taught and the best way to sequence them. This means planning lectures and activities as well as finding ways to effectively use homework, quizzes and exams to help emphasize the major concepts in the course. I assign homework problems that require written explanations in addition to procedural problems and ask for basic reasoning to be included in any problem I grade, which again emphasizes that math is more about the conceptual understanding than just the "how".

While most teaching is done in a classroom, much is done outside of it. I have mentioned already how I love to utilize office hours but I also enjoy participating in outreach programs. I have had the opportunity to work with both our high school and elementary math circles as well as our high school math day for girls. These teaching opportunities allow me to share my love of math with younger students who often shy away from the discipline. I feel a calling to encourage all students to pursue a mathematical education, but particularly underrepresented minorities. I hope that active participation in teaching outside of the classroom will help me accomplish this.

When I was still an undergraduate at the College of William and Mary, I was given the opportunity to participate in two different undergraduate research projects which inspired me to continue to graduate school. The dedication of my faculty advisers helped shape me into a much better mathematician and helped me develop so many life skills as well. I hope to work with my own students on such projects. I feel that undergraduate research helps build a stronger educational community and helps translate mathematical skills into life skills. When students are faced with a large problem to tackle, they rise to the challenge and often surprise themselves with their own abilities. Ultimately, whether I am helping a student tackle a research problem or just a problem in college algebra, I hope to inspire them to strengthen their critical thinking and problem solving skills. Often this process can begin with the simple question "Why?".