

## TEACHING STATEMENT FOR TINA M. MORRISON, PHD

Teaching and learning are active and engaging processes. Thus, an effective classroom environment should foster such an exchange. When I recall the days of being an engineering student I'm reminded of the hours I spent in the lab or the library with my peers, crunching through homework problems, trying to decipher what the professor was covering in class. Looking back, I realized a majority of my learning occurred in the presence of my peers, outside of the classroom. It was typical for many of my classmates to skip class and read the text on their own time. Some teachers were uninspiring, covering material rather than teaching. In my classroom, I create an active learning environment, one that fosters peer-to-peer interaction, encourages discussion, and stimulates interest.

In May of 2006, I was invited to teach Differential Equations at Cornell University for the Mathematics Department. Immediately after I accepted the position, I solicited the Dean of Undergraduate Engineering for grant money which would allow me to implement three teaching modalities: (i) pre-class assignments using Blackboard, (ii) the Hyper-Interactive Teaching Tool (the clicker), and (iii) quiz corrections. The first modality required students to complete pre-class assignments which I designed to prepare them for class. If the students reviewed the section assigned and worked through the examples they were able to answer the pre-class questions with ease. This allowed me to expand on difficult theory rather than introduce basic terminology. The second modality granted me with real-time knowledge of the student's comprehension on the subject matter. I also implemented a unique use for the clicker. Typically a professor uses the clicker to decide whether to proceed forward. In my class, I used it not only to gauge the class's comprehension but to engage the class in discussion. To begin, I would post a question on the board using the projector. The following is a sample question:

Which of the following equations is linear?

$$(A) \left(\frac{dw}{dx}\right)^2 - x = 0 \quad (B) t^3 \frac{d^2x}{dt^2} + t^2 \frac{dx}{dt} - t = 0 \quad (C) \frac{dy}{dx} + xy + y^3 = 0 \quad (D) \frac{dx}{dw} - \sqrt{x} = 0$$

The students were given two minutes to poll in their answer. The software immediately generated a histogram, which was only visible to me. Instead of immediately sharing with the class the correct answer, I asked the students to share with the class which questions they chose and why. Then, I had them talk amongst themselves to figure out the correct answer. Following the discussion, they polled in for a second time. This time, a majority of the class selected the correct answer. They learned from each other, only guided by the instructor. In addition to understanding a new concept, they learned interpersonal skills from one another.

The final modality I implemented was quiz corrections. After handing back their quiz, the students were allowed three days to turn in corrections, thoughtful corrections. The corrections had to explain what concepts they misunderstood and what they now understand. Below are two sample comments from students.

*"The clicker questions allowed me to gauge my own mastery of the material and helped the professor more readily assess what the class did and did not understand."*

*“Quiz corrections were a great idea. They provided me the necessary incentive to revisit and reconsider my answers, as well as an opportunity to demonstrate and be rewarded for effort and desire to do well.”*

My efforts for creating an active learning environment were rewarded with the H. D. Block Teaching Award for Excellence and a group of thankful students who gave me positive teaching evaluations. The evaluations emphasized how much they learned from their in-class experience and my enthusiasm for teaching.

More recently, I have been assigned an advising position for a master’s student in the Mechanical Engineering at Stanford University. Since May 2007, I have guided her through her first research project, prepared her for two conference presentations, and I am currently preparing her for the qualification exam. I meet with her weekly, which keeps her on track, engaged, and making continuous progress. I look forward to advising students on research projects that bring together the classroom knowledge with real-world scientific problems. I plan to involve my students, in and outside of the classroom, with the local industry of biomedical and engineering firms. This interaction will stimulate interest and engage them with the industry process of engineering. In addition to teaching courses in my area of interest, I am eager to teach courses that complement the department’s current offerings and extend the departmental courses into interdisciplinary fields.