Instructor Reflections

We entered the QFT approach with an open mind. As curious people ourselves, we wanted to see what this could do for our students. Having never tried this before, we really did not know what to expect. After four Q-Focused projects in the course, what we found was that when the quest to find answers to the initial questions lead to more questions, first and second year students far exceeded our expectations. We were pleasantly surprised to see our students dig up and read journal articles. We were happy to hear about their trips to library research stacks and meetings with the research librarians. We were excited to see the students dig into Maxwell’s equations in their quest to prove or disprove Ohm’s law; to see the students go through the different stages of enlightenment as they tackled the notion that y=mx+b was not linear; to see them research linear and nonlinear devices and come up with their own answers to why real components vary from the linear models they had seen in their books; to see them draw a connection between their love for music to the operational amplifiers and their first aha moment about how they themselves were already capable of building circuits to remove pesky noise that creeped into good music. We were particularly excited as students started reflecting about how they were going to remember this beyond the exams. One student wrote in his reflection: *“I retained the most by researching the questions my mind was most curious about because that is the information that my mind really wanted”.*

We started this QFT exercise in our class to use questioning as a way to promote student curiosity. We found it did more than that. We have found the QFT technique to be excellent in promoting student curiosity, creativity, critical thinking, and teamwork. This technique allows young engineers to practice both divergent and convergent thinking that is so critical to their future successes. The act of freely producing questions encourages divergent thinking. Classifying and prioritizing questions promotes convergent thinking.

At the end of the project, students reflect on the questions and the QFT process itself. During this reflection, students are engaged in metacognition. *In How People Learn*, published by the National Academies Press, the authors say metacognition helps students connect their past experiences to new settings.

At St. Thomas, we have found QFT to be a very successful tool in engaging students and sparking their curiosities. Although we do not have formal assessment of our students, we have found by adopting this in our first Electrical engineering course, in subsequent courses, these students are more self-directed and engaged learners. Within our School of Engineering other faculty members have tried it in their courses and have found great value. In the KEEN network, Dr. Heath LeBlanc has tried this in his Circuits course at Ohio Northern University and has reported success.