

Teaching Philosophy Heather Shipley Ph.D.

Teaching allows me the opportunity to disseminate information to the public so they can make informed decisions, which I believe is a fundamental responsibility as a scientist and engineer. There are basic concepts civil engineering students should comprehend. Among these are the ability to apply mathematics and science to engineering; the ability to design systems to meet needs; the ability to analyze and interpret data; and understand professional and ethical responsibility. I have several goals in addition to teaching these basic concepts: 1.) actively engage students in the learning process; 2.) help students develop critical thinking skills; 3.) help students develop written and oral communication skills; and 4.) provide a strong foundation for lifelong learning.

An educator may inspire but students need to be actively engaged in learning for it to be successful. In an effort to encourage students to take responsibility for their own learning, I use cooperative and active learning approaches along with lecture in the classroom to develop qualitative and quantitative skills. This is accomplished by using videos, conducting demonstrations, doing group exercises, taking field trips, and having discussions in and out of the classroom. For example, to demonstrate water filtration I show students how to make a filter out of a water bottle, coffee filter and sand, and then demonstrate cleaning dirty water. I take students on field trips to observe what they have been learning in class through lecture, homework, and tests. The group exercises give students the freedom of choice on how to complete an assignment. For example, on a project to convey environmental engineering concepts to the public, they choose their audience (e.g. grandparents, home owner associations), topic (e.g. water sustainability, pollutants in water), and method to teach the information (e.g. town hall meeting, produced a video; made a museum exhibit). Using these approaches creates an environment where it is acceptable for students to learn differently based on their learning style. I teach the students Felder's model the first day of class. Felder's model is based on five learning style dimensions: perception (sensory or intuitive), input (visual or verbal), organization (inductive or deductive), processing (active or reflective), and understanding (sequential or global). I ask them to complete a questionnaire on how they learn; in the next class period I show the results. I also refer them to an online site for a more in-depth questionnaire and analysis.

Educators should guide students to think critically by teaching them where to find information, how to evaluate information, and how to make an informed decision based on their understanding of the information. To teach students where to find information, I demonstrate how to use library resources and search engines to find information on a specific topic. The students then do a similar exercise for homework. One of the basic concepts we teach to civil engineering students is how to analyze and interpret data. For example, they are given an analysis of surface water and asked to identify if the water meets regulations based on the concentration of constituents in the water. This exercise is expanded and the students are asked to determine what treatment technologies need to be applied to the water to meet regulations. This exercise through homework and test questions teaches students to evaluate information and make an informed decision. Critical thinking is further developed by having the students write a research paper on new technology being developed for water and wastewater treatment.

Students are exposed to current research topics, but they also learn how to critically evaluate the literature and the proposed methods of treatment.

Engineers need good communication skills to be successful and students should engage in these skills in every engineering course they take to prepare them beyond the minimum acceptable standards. Engaging students in class discussion improves their oral communication skills while encouraging reasoning and understanding of the importance of diversity of thoughts and attitudes among individuals. I also have the students do oral presentations on topics in environmental engineering which teaches them to express their ideas clearly and defend their work through the question and answer portion of the presentation. Written communication skills are developed through quick written responses in class to a central question which often begins a discussion. I assign a research paper to improve writing skills while teaching students how to critical review literature. I require students to write lab reports for laboratory courses to improve their written skills but also learn how to evaluate, analyze, and interpret information.

Students should be encouraged to value learning as a lifelong process. Faculty are lifelong learners; they are constantly researching, interacting with colleagues, and seeking professional development to make them specialists in their fields. We serve as role models for our students for lifelong learning. I emulate lifelong learning to my students by attending professional conferences in my field and then telling the students what I have learned and observed. I read news and current events relating to engineering and use these topics (e.g. global climate change, water issues, environmental regulations, etc.) as discussions during class and when there are questions about the topic encourage students to find the answers themselves and report back to the class. I also use my research laboratory as a mechanism for lifelong learning by having undergraduates work on projects in the laboratory. This requires them to continually review the literature to see how their works fits into the literature and understand the big picture or application of their work. Using these different methods to demonstrate lifelong learning shows the students that learning can occur through formal and informal experiences.

In conclusion, I am very committed to creating a learning environment that is both rigorous and engaging and empowers students and educators to learn. All of these goals allow me to improve my teaching skills and enable me to improve the quality of engineering education I deliver. I pride myself in learning all the names of my students no matter the class size, valuing them as individuals and treating them with the utmost respect. Teaching with clarity, passion, insight, and patience impacts the learner and allows them to find their passion and become lifelong learners.