Teaching Statement for Neil Klingensmith

One of the main reasons that I'm interested in an academic career is that I enjoy teaching and working with undergrads and junior graduate students. It tends to be a diverse group of people who have different perspectives on how to approach problems, and I have learned a lot by working with people from different backgrounds. Also, because students are only in school for a short time, there is a consistent flow of new people and new ideas. It is very rewarding to see how much students can grow in the short time that they spend in school. As a grad student at UW-Madison, I've had experience teaching by supervising junior graduate students and as a TA for a class.

One who stands out in particular is an undergraduate mechanical engineering student named Zach LaVallee. Zach started out designing mechanical components for one of our building automation projects. His first project was to design a servo-actuated vent that could be controlled by an embedded computer. He used duct tape to fasten a bracket to the vent, which concerned me a great deal at the time. As far as I could tell, he had never drilled a hole or threaded a screw. By the time Zach graduated two years later, he was well-versed in mechanical design, fabrication techniques, and 3D printing. He even picked up some programming. He has gone on to lead Emonix, the startup that we co-founded together. Zach was successful because he was in a supportive environment that allowed him to take risks and explore his interests without worrying about failure.

I have found that particularly in computer science, the best way for students to learn is by working on projects. Many of us come to the field through an interest in video games and find out later that it has other more interesting aspects. Computer science students are often motivated by outcomes like writing a program that does something exciting, and courses should be congruent to the students' interests. For that reason, I think it's valuable for courses to have a project component to help students learn how to apply the ideas they learn about in class. As teachers, our goal should be to get students to struggle as much as possible to learn without discouraging them. I aim to cultivate problem solvers, not just students who perform well on exams.

When I started college, my dad told me a story about his first day at the Colorado School of Mines. His instructor's words of wisdom to the class were this: "Look to your left. Now look to your right. You will not be here when those two people graduate." His professor was trying to set up a spirit of competition in the Freshman physics class that may have been appropriate then, but it is wrong for today's students. Instead, it is important to teaching students how to collaborate. Students should work together on projects as much as possible, delegating work and trusting their team members to do their parts. Like in the real world, they may need to pick up slack for some team members.

Getting good grades is important, but it may not be the outcome that motivates all students. Instead, I will start by asking students to take pride in their work—a high level concept that can take many forms depending on the context. Students will likely be more successful in the long run if they think about the solution to a problem before jumping in to start programming. The courses I have taken that required me to submit plans before submitting solutions generally had better outcomes.

Working with a diverse group of people, I've learned that tailoring the work to the individual is also very important. In a university setting, it is important to create an environment where students can pursue their interests with some guidance and support from faculty. I will not try to engineer outcomes for individual students because I've found that it rarely turns out as expected. Instead, I will try to understand what motivates the student and create a supportive environment where they can be successful. Helping students to choose projects that fit their goals is important to get a positive outcome.

The grad students I've mentored have gone on to work in a variety of jobs: two at startups and several others at large companies, all doing different kinds of work. Ananth Sridhar, one of the junior graduate students I mentored wrote the following bit in the preface to his thesis:

> *I would like to thank my research mentor, Neil Klingensmith, without whose guidance I wouldn't have learnt half as much as I have.*

To get such positive feedback about my role in someone's education was very rewarding. It's my goal as faculty member to help other people learn about interesting and exciting things in computer science and to develop new and practical technologies.