Teaching Statement

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My Teaching Philosophy

I believe in experiential learning: I grasp the true meaning more quickly by doing rather than by thinking. My goal as a teacher is to help students learn from experience. Particularly, I plan not only to impart technical knowledge to students, but also to provide hands-on practice in order for them to develop real expertise.

Teaching Experience at CMU

My teaching experience as a Teaching Assistance (TA) in three separate courses at CMU gave me important insights of being an effective teacher. Specifically, I learned that (1) knowledge without practice is insufficient to solve real-world problems, (2) hands-on exercise helps students apply their knowledge beyond the classroom, and (3) motivation increases the productivity of students.

First, practice is as important as knowledge for students. While I was working as a TA in two security courses with my advisor, I designed several assignments to practice skills needed for analyzing vulnerabilities. In one of the assignments, for instance, students were asked to exploit a vulnerability in a program to gain a root privilege to the system that the program was running on. I observed many students spending several hours or even days in order to successfully exploit the program. Surprisingly, though, some experienced students solved the problem in a few minutes: one student indeed solved it in 5 minutes. I noticed that this big gap between students originates from the different levels of experience and practice: some students were familiar with program debugging while others were not. Therefore, one of my goals as a teacher is to narrow the gap between students by providing them practical exercises to apply their technical knowledge.

Second, practical challenges stimulate students so that they can learn beyond what we teach in a classroom. For example, the concept of buffer overflow exploitation is simple, but in order to fully digest it, one needs to have extensive understanding of computer architecture as well as

compiler theory and computer network, which cannot be taught in one semester. I recall one of our students had a hard time doing hands-on exercises due to the lack of knowledge about low-level computer architecture. At the end of the semester, however, he acknowledged that the exercises let him on a steep learning curve.

Finally, another teaching experience at CMU during my master's degree helped me realize the importance of motivation in learning. I was working as a TA for a project-oriented course, where my job was to support students on all fronts from their design decision to the implementation. In the course, three to four students teamed up and worked together to design an embedded system from scratch. The freedom given to students in their projects indeed made them highly motivated and enthusiastic. Furthermore, I noticed that their self-motivation helped them face and solve practical problems. This is another reason why I espouse experiential learning.

Teaching Experience at Korea University

I was invited as a lecturer at Korea University for a short-term course regarding offensive computing, which made me appreciate the importance of healthy competition between students. During the course, I organized a problem-solving competition in substitution of a homework. I ran a web server for the competition that shows a list of problems to solve and displays the current ranking among students. For anonymity, I asked students to use their own pseudonym. Indeed, the competition was a driving force: some students worked days and nights to win the competition, and most of the students eagerly studied the problems. This experience taught me that competition is a great motivator for students.

Courses Offering

I look forward to teaching introductory computer security and cryptography as well as core courses in software security, software testing and engineering. Finally, I also look forward to developing a graduate-level course on vulnerability analysis and detection.