Teaching Philosophy

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1 Teaching Perspective

Students attend universities to learn and become productive society members; therefore, I believe delivering quality lectures and facilitating students' learning are two essential duties of professors. Towards this end, teaching allows me to fulfill one aspect of my mission, that is:

To help students achieve their potential in academia and in the I.T. industry.

I believe it is my responsibility as a professor to help my students gain an in-depth understanding of the core principles of Computer Science and how to correctly apply them in both industrial development projects and academic research. I also incorporate activities that develop technical problem-solving skills and use state-of-the-art industrial tools and technologies. I believe professors share the responsibility of producing practitioners who are capable of developing I.T. systems of different complexity to the satisfaction of their beneficiaries. I also believe in improving my teaching style as I gain more knowledge, skills, and expertise.

2 Teaching Methodology

I have developed my pedagogical style through reflecting upon my experience as a professor and a student. Additionally, I have enhanced the style by implementing many of the best practices of teaching and learning that I have acquired through many teaching training and certificate programs. My style centers around capitalizing on the ways students learn best and minimizing the difficulties they face by incorporating research-proven practices from educational research. I elaborate on the practices I use in the following points.

1. **Teach with passion and enthusiasm:** As a student, I became interested in my research areas because of the enthusiasm of my supervisors. If students feel the passion of their teacher, they will echo it. I have also experienced this phenomenon as a professor many times. My passion and care have encouraged several students to excel in the courses and subsequently encouraged them to collaborate with me on undergraduate research projects in cybersecurity, machine learning, and software engineering.

2. **Encourage collaborative learning and teamwork:** For a few years, I have adopted CAHSI tenets and signature practices: active learning, problem-solving, and peer-led team learning (PLTL). In many of the courses that I teach, students are required to work together to complete active-learning tasks and team projects. The collaborative nature of these activities enhanced the students' insight as it encouraged dialogue that contribute to the intellectual growth of students. The in-class programming and problem-solving activities are carried out by a peer-led team of students. This practice aims to improve

student retention and develop leadership opportunities for undergraduates. Another proven technique I use is pair programming. Within the mini-projects, I require students to work in pairs to develop solutions. The outcomes of the above methods for students include better learning, improved problem-solving skills, and enhanced teamwork and communication skills. These skills are essential in developing complex I.T. systems and succeeding in the workplace.

3. **Incorporate technological, educational and industrial tools:** When I was a student, I studied many technical subjects on my own through reading and using educational and industrial software development tools. In my opinion, tools provide a mechanism for educators to initiate experiential learning. The proper use of tools enhances students' understanding and prepares them for the real-world marketplace. I incorporate technology and tools as much as I can in the classes I teach and the research I supervise. For example, I have supervised a team of senior students in a capstone project. The project targeted the development of a new software system that streamlines the processes of handling Bill of Material (BOM) change requests for two subsidiary companies of PACCAR Inc. I asked the students to use state-of-the-art techniques and industrial tools and follow Scrum agile software development methodology. By the end of the project, the team delivered a high-quality product that exceeded the initial requirements of the sponsoring company.

4. **Foster critical thinking and problem solving:** A primary goal of programs in Computer Science and related fields is to prepare students for the marketplace by developing their critical thinking abilities. Another goal of these programs is to develop their abilities to specify requirements and apply the appropriate problem-solving skills. To help students become critical thinkers, I participated in a series of faculty development workshops for developing critical thinking skills in students. The methods I use in my classrooms include: emphasizing a thorough understanding and de-emphasizing memorization, engaging students in conceptual discussions, and working on practical problems both in the classrooms and as homework.

5. **Provide conceptual frameworks:** I realized the benefits of instructors using a conceptual framework to organize the learning material early on when I was a student. Therefore, as a professor, I have adopted this method in the courses I teach. In most courses I teach, I develop a course framework that includes not only the required material but also includes supporting material such as recommended videos and reading, non-graded homework, and related tools. The framework's materials are organized in a course schedule. The benefit of developing such frameworks and making them accessible to students is twofold. First, the frameworks can help students become more organized and productive to manage their time and learning activities efficiently. Second, the supporting material helps interested students expand their knowledge and enhance their insight into the subject at their own pace.

6. **Promote a civil, comfortable, and motivating atmosphere:** A good learning environment can significantly enhance students' learning. I promote such settings by creating a welcoming, caring, and engaging atmosphere in which students are trusted and encouraged to do their best. Further, I set and ensure that the students understand and act upon the courses' expectations, goals, and policies. At the beginning of the semester, I also work with students to create classroom norms that we all should follow. In such settings, students become more engaged and feel comfortable asking questions and

starting conversations.

7. **Incorporate students in research:** Studies have shown that students learn best when they are engaged in active inquiry. To facilitate active inquiry, I develop research projects and supervise interested students. Involving students in research has many benefits for the students such as gaining in-depth functional knowledge, enhancing independent problem-solving skills, and introducing them to interesting topics that might inspire them to pursue an academic career. My research involves developing techniques and software tools in software engineering, cybersecurity, and machine learning. I collaborate with interested students to either build the tools or improve the applicability of the techniques. My collaborations with my students have resulted in many conference presentations, some of which have yielded journal articles.

8. **Combine a variety of teaching techniques:** During my teaching certification and training programs, I learned the different ways students absorb the material. To accommodate a broad range of learners in my classrooms, I explain concepts using various methods such as lectures, video recordings, discussions, collaborative activities, and demonstrations. For example, in teaching a graduate course called Software Architecture, I explained concepts through mini-lectures and examples. Then, I provided class activities in which the students work in groups to apply the concepts to real-world problems. The groups then shared and discussed their solutions with the whole class.