Teaching Statement
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My teaching has been informed by both theoretical and practical experience. Theoretical experience includes courses on teaching in science and engineering at the University of Wisconsin–Madison and the University of Michigan. These courses emphasized teaching in practice—that is, learning to teach by teaching. I acquired such skills as active learning techniques and backward lesson design as well as knowledge of multiple intelligences and theories of student assessment. These skills were applied during my graduate studies as a teaching assistant for an advanced-level course in electric power systems. I have further expanded these skills in my current professional capacity by serving as a guest lecturer, a leader of research group meetings, and a co-advisor of three graduate students. Drawing on these experiences, my teaching philosophy is best summarized by three main objectives: (1) impart a sound foundation of basic knowledge for all students using an active lecture style, (2) provide broad context in order to make connections among course materials, and (3) encourage student engagement through authentic and meaningful teaching.

Foundation of Basic Knowledge

In order to climb the ladder of Bloom's learning objectives taxonomy, students must obtain a solid foundation of course knowledge. As I experienced during my teaching assistantship, imparting basic knowledge is especially challenging for a diverse class with significant disparities between experienced students and those seeing the material for the first time. This is particularly evident among non-traditional learners who sometimes lack the requisite background knowledge.

To create a foundation of basic knowledge for all students, I am able to draw upon experience from the teaching courses to use an active lecture style. Active lectures encourage student engagement and understanding using brief exercises and assessments. For instance, after introducing a concept, I often provide a short related problem that students solve in a "think-pair-share" exercise. This gives the opportunity for all students to assess their mastery of the material, allows me to clarify any misunderstandings, and strengthens students' interpersonal networks. Active lectures have helped me reach multiple levels of student knowledge and anticipate the needs of non-traditional learners. After improvement through trial and error, this style has been well received among students and helps to bridge knowledge disparities.

Broad Context

Concurrent to imparting a solid foundation of basic knowledge, providing a broad context for course material allows students to construct an understanding of how knowledge fits together within and among disciplines. Putting knowledge in context enables students to build on their knowledge rather than simply memorizing material to pass the course assessments. To provide a contextual framework, I start classes by overviewing the purpose of the material and identifying connections to previous knowledge. Providing context is also accomplished by drawing on outside experts, such as guest lecturers from industry and government, who can demonstrate how the course material aligns with practical objectives. I also provide context through resources for deeper and broader student learning (e.g., related courses, seminars, and extracurricular groups).

Authenticity in Teaching

With a contextually grounded foundation of basic knowledge, I use authentic teaching and assessment to motivate students to achieve a deep understanding of course material. Authentic teaching engages students with practical and meaningful learning opportunities. As one mechanism for authentic teaching, projects which require creativity generate student interest and cement existing knowledge. For instance, I saw much stronger student engagement in a realistic transmission expansion design project than the routine solution of circuit equations.

My interdisciplinary experiences enable authenticity in teaching. A technical background alone is not sufficient for tomorrow's engineers to meet many societal challenges; authentic, interdisciplinary instruction is necessary to prepare students for workplaces that need increasingly diverse skills. For instance, sustainably meeting the world's energy challenges requires the interaction of experts from such fields as engineering, environmental science, social science, and policy analysis. The Master of Public Affairs, Energy Analysis and Policy Certificate, and Dow Sustainability Fellowship programs have afforded me with a strong background for teaching to these interdisciplinary challenges.

Integrating teaching and research is another important way for ensuring authenticity and student engagement. For example, one of my most gratifying teaching experiences occurred when a student spontaneously asked an open question in my research field. After a brief summary on the limitations of the current literature and a description of how I was approaching the problem, the student's engagement with the course material greatly expanded as evidenced by a follow-up discussion on research opportunities in power systems. Excitement about research is contagious.

Conclusion

My theoretical background and practical experiences have cultivated the objectives of imparting a sound foundation of basic knowledge to all students, providing context for course material, and emphasizing authentic teaching. While my experience affords a strong base, I look forward to further developing my teaching skills. As an aspiring professor, I intend to teach courses in electric power engineering, applied optimization, automatic control, and sustainable energy. In order to leverage my expertise in power system optimization to teach students who are concentrating on other topics, a course on applications of optimization to more general control and signal processing problems is of particular interest.

I am also interested in courses with interdisciplinary components. For instance, one proposal for interdisciplinary education is a project-based course on the power system expansion process. Several experts from a variety of disciplines would teach students how their area of expertise is applied in the development of future power systems. Forming teams consisting of students from various disciplines, students would take the viewpoint of a stakeholder in a hypothetical future scenario. The scenario could build upon my ongoing research efforts to develop realistic power system test cases for algorithmic benchmarking. Considering the scenario from several perspectives, each team would create and defend a proposal at a mock public utility commission hearing at the end of the semester.