Statement of Teaching by Brandy S. Wiegers

All life experiences teach us something. Remembering this fact is essential to being an instructor; the experience our students have during class time, during office hours and during out of class mentoring affects our students' learning. My generalized teaching goals follow directly from this philosophy:

1. Ensure that the students learn the course material.
2. Integrate the three components of academia (research, education, and service) into teaching.
3. Utilize tools for success: variety of teaching methods, technology and real world applications.

I approach these goals by utilizing the departmental and campus resources, SMART learning objectives and by using teaching tools that reach out to today's student.

Ensuring that students learn course material through SMART Course Objectives

Every facet of our teaching is important to the learning process, and we can leverage this fact with SMART (specific, measurable, attainable, realistic, timely) course learning objectives. Before starting with a new course, I review the approved departmental syllabus to access what material knowledge and skills the students should gain from the course. Using this understanding, I create objectives for the quality and type of work to be achieved by the end of the course, ensuring that the students not only grasp the material, but come to appreciate and be able discuss the material at an appropriate level.

I then use these course learning objectives to create a course calendar that will, in turn, define the lesson and assignment learning objectives for the daily classroom lectures. In the past, I've taught in a numerical analysis course. For this course, I created the course learning objective that "by the end of the quarter [the] student should be able to list the components of a technical report and to create such a report." Using the course's numerical programming assignments, I was able to achieve this goal by ensuring that lectures, office hour sessions, assignments and grading addressed how to write a technical report. At the end of the quarter, students knew how to write a technical report and had gained a more thorough understanding of the course material because they had to move beyond implementing and testing a numerical method to comprehensively appreciate the numerical method in order to complete the assignments.

By defining the objectives before planning the course calendar, I ensure that the lectures are relevant and that they include all the key components that need to be covered in the course. In class, I start my lectures with an outline of the learning objectives to which I refer when presenting the lesson. Highlighting the objectives ensures that the students have an understanding of what they will get out of the lesson. At the end of the session, I review the objectives to allow the class, both myself and the students, to assess our progress. The lesson objectives provides context to the students, helping them understand the relevance of the lectures and the assignments in relation to the course. I've also found that defining SMART objectives provide everyone with a shared understanding of the rationale for assigned grades; students must achieve the learning objective in order to obtain the grade, providing an extra incentive and the defined emphasis of the material to be studied.

Integration of the three components of academia: research, education, and service

The experience of every individual in an academic setting should be infused with the three pillars of research, teaching and service. When creating learning objectives for a mathematics course these three components need to be included. To address research learning, students need to have case studies, real world problems and historical perspectives so that they can move beyond their book studies and develop independent thoughts about the course material. This will show the students that they do math everyday and that math is a necessary component of real world life, not just a class to pass while in college. To integrate teaching, students need to work with each other in a group setting to teach each other the concepts because teaching something requires a much different thought process than learning it. Doing so will ensure that the students have a high quality understanding of the material. To integrate service in my teaching, I use service related examples. When teaching about exponential growth, I discussed the Heifer International program where individuals can buy a family a pair of rabbits to raise, with the condition that the family must give the offspring to other individuals in their community. Through this lesson, a student can understand the impact on the community that a high school graduation gift of rabbits will have by the time they graduate from college.

Tools for Success

Teaching to Different Learning Styles

Beyond ensuring that these three pillars of the academic experience are included in classrooms, it is important to provide a variety of teaching techniques to reach out to the varied learning styles. Mathematics is a very traditional discipline which lends itself to a straightforward lecture presentation style. This method does not benefit all students, but radical deviation from this method is not overly successful either because of the expectations that students bring with them to the course. With these two thoughts in mind my class presentation focuses on lecture and also uses group work and technology to add variety. Again, group work allows students to either teach one another or work together in guided inquiry to discover the mathematical concepts together. This has worked particularly well in the CLIMB mathematical biology research course that I am helping to teach, where a group of 9 students (both biologists and mathematicians) are responsible for working together to complete a group report addressing a current mathematical biology research problem. Each member of the research cohort must lead the group report process once throughout the quarter. Also, group members are encouraged to take different roles throughout the quarter, either leading the mathematical derivation, summarizing the biological implications or completing the literature review. I have seen this method result in students gaining a more thorough understanding of the course material because they share their knowledge and questions in order to gain a common-level of understanding among group members.

Using Technology

Technology is useful at all levels of mathematics. While at University of Idaho, I worked as a teaching assistant in the UI POLYA Math Center, where all of the University's basic algebra courses are taught using a technology- centered method. One of the primary means of teaching they use at the POLYA center are recorded mini-lectures that are available to students via the internet. This allows students to refer back to material that they don't understand. Additionally, it allows them to rewind and hear something that they missed the first time. My experience with working with this innovative approach to math education has influenced the presentation that I give in my classes. I believe in providing online resources for students to help them outside of class and in showing them during class how to use these resources. When working with a numerical analysis course, I show them in class how to create a computer program and interpret the results so that they understand how the graphs in the book were made. Bringing the computing element of the course into the lecture rather than leaving it as homework, makes it a group effort rather than an individual effort. This is especially important with the numerical analysis course because the students come from across disciplines and have a wide variety of computing backgrounds so in-class work helps equalize the students' programming knowledge. This aspect of teaching also allows for me to incorporate my research into the lectures, something that I have done effectively in guest-lectures for other courses as well as in in the Math Modeling Experience and in CLIMB.

Real World Applications

My double undergraduate degrees in Mathematics and Biological Systems Engineering, my variety of research experiences and my experience with CLIMB, MME, Explore Math and Oakland/East Bay Math Circles have provided opportunities to gain exposure to a wide variety of real-world mathematical applications. In the CLIMB undergraduate course, students are amazed that a simple application of algebra can help them gain understanding of the spread of the *Wolbachia* microbe in the *Drosophila simulans* population of California. At the same time, the middle school students that I've worked with in Explore Math and the Oakland/East Bay Math Circle are able to grasp the concept of a logistic model through the use of deer population modeling and quick group games. My experience with teaching specialized topic courses has provided a familiarity with real-world applications that give me a wealth of examples and techniques to draw on when teaching all of my courses.

Learning for Tomorrow's Teaching

When preparing for teaching I also create objectives for myself which focus on professionalism and personal growth. My first objective is always to provide a professional presentation that will garner the respect of my students. Establishing mutual respect is the first step to becoming a mentor and I consider being a mentor the most important role that we serve for our students. My second objective is to learn from the course and apply that knowledge to my future courses utilizing personal assessment, student evaluations and campus resources to better my presentation style and student interactions. As I stated at the beginning, all of life's experiences teach us something and I always seek to learn from my current teaching to improve on future teaching. In addition, when preparing my course, I ensure that students learn the course material through SMART course objectives, I make the most of their learning experience by integrating all aspects of academia and I utilize tools for success to improve their learning experience.