

## **AC 2009-648: PREPARING GRADUATE STUDENTS TO TEACH: A SEMINAR ON TEACHING FOR GRADUATE ASSISTANTS IN ENGINEERING**

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# **Preparing Graduate Students to Teach: A Seminar on Teaching for Graduate Assistants in Engineering**

## **Abstract**

Graduate student teaching assistants constitute an important part of the university and serve a critical role in the education of undergraduate students. The purpose of this paper is to describe efforts to redesign a course entitled, "Teaching Seminar for Graduate Assistants" offered to graduate students in the College of Engineering at the Pennsylvania State University. Students enrolled in the course serve critical roles in the College of Engineering, including holding positions such as lab instructor, recitation leader, independent instructor, or grader. Although the course has been offered for many years within the college, efforts to revise the course were made in order to better meet the needs of the college and the diverse graduate student population within the course and to clarify the instructional objectives of the course.

Individuals who are involved in faculty development or who are concerned with enhancing the educational experiences of teaching assistants may be interested in this paper, which includes a description of the specific course activities and assessment techniques. In addition, assessment data from the students on the effectiveness of the course are described. Challenges and concerns with teaching the course given the characteristics of the students are also discussed.

## **Introduction**

Graduate Teaching Assistants (TAs) wear many hats with a variety of duties and responsibilities from grading, correcting homework, tutoring students, holding office hours, teaching a lab or recitation or being the primary instructor of a course. Many fill an important role within the university structure teaching undergraduates in resident courses. However, most TAs go into this duty with little or no teaching experience. Training programs abound in universities which focus on the general preparedness for teaching assistants. Most are in the format of short sessions that focus on just-in-time information regarding general tips on grading, student etiquette and understanding university policies and procedures. "TA training is an essential and powerful tool that improves TAs' performance" (p. 4).<sup>1,5</sup> While this information may be sufficient for those students who hold limited duties such as grading and office hours, TAs who have teaching duties often have little or no information and mentorship on how to be an effective teacher, or an understanding of how students learn. More complete programs are necessary in order to give the TA the appropriate tools and pedagogical strategies that foster an understanding of the teaching and learning process.

Most tenured college professors will tell you, that as graduate assistants, they went into their teaching duties cold with little or no instruction on the art and craft of teaching. Similarly, TAs often assume their first teaching experience with no instruction on how to teach. TAs must be effective in communication to be able to present information clearly and concisely in the classroom and lab formats. In addition, they must be able to effectively manage the classroom environment (p. xxxv).<sup>2</sup>

This paper describes in detail a Graduate Assistant Seminar that prepares graduate students to teach. The course is offered through the College of Engineering at the Pennsylvania State University. The course design incorporates lecture, discussion, active learning, and peer learning activities that allow the students to experience the teaching process first hand. The course incorporates two teaching observations, one by the course instructor and the other in the form of a peer observation. The purpose of this paper is to share the experience, lessons learned and the benefits of the course as it prepares a diverse population of graduate assistants to be teachers in undergraduate engineering courses. Publications that support teaching and learning strategies, model programs and framework for TA seminars are represented in the research.<sup>2</sup> However, the research is lacking in the area of “how to implement” a program for TAs in the practice of teaching.<sup>2</sup> In this paper we will describe the design and delivery of the Graduate Assistant Seminar.

## Course Context

ENGR 888, the Graduate Assistant Teaching Seminar, is a one-credit graduate level course required by all graduate assistants who have a teaching responsibility within the College of Engineering at the university. Any student who has a responsibility for leading a lab, recitation, or course is required to enroll in the course by the College. Students who are not currently teaching and have other responsibilities as a TA are not required to enroll in the seminar. Rather, these students are asked to attend a brief non-credit orientation for TAs, which cover topics such as working with students, grading techniques, and academic integrity issues. Although these students are not required to enroll in the credit-bearing seminar, some students still elect to take the course due to interest.

The Graduate Assistant Teaching Seminar had been in existence for at least ten years when the current instructor began to teach it. However, substantial changes were made to the course in order to better fit the needs of the students.

The course proposes to meet multiple objectives. First, students should learn to engage in strategic course planning, by aligning various course components, including objectives, instruction, and assessment. Second, students should be able to write clear and concise objectives for a course they are teaching or assisting. Finally, students should be able to identify advantages and disadvantages of various instructional and assessment methods as they relate to teaching within the engineering domain. Specifically, by the end of the course, students should be able to:

- Practice strategic course planning by aligning various components (i.e. objectives, instruction, and assessment) for a specific course,
- Write clear and concise objectives for a course they are teaching,
- Identify advantages and disadvantages of various instructional methods (i.e. active learning, problem-based learning, discussion, collaborative learning),
- List methods of classroom assessment including the advantages and disadvantages of each (multiple-choice tests, constructed-response tests, and projects),
- Understand the university services and policies for Academic Integrity, Affirmative Action and Counseling and Psychological Services, and

- Critique and give constructive feedback to a peer.

The course consists of seven face-to-face meetings, each of which is scheduled for two-hours. The first six sessions take place during the first six weeks of the semester. The second half of the semester is comprised of the peer and instructor teaching observations. The seventh class meeting takes place during the final week of the semester. Each class session focuses on teaching and learning concepts. The course content includes instruction on preparing for the first day of class, knowing your students' learning styles, writing course objectives, design of teaching methods and assessment tools that support the objectives and methods. Research on learning theories and cognitive psychology are presented in the context of teaching and how individuals best learn (p.16).<sup>2</sup>

Each session models the teaching and learning process, using lecture and student participation in active learning exercises. The format for each session contains a short lecture/presentation with integrated questions and a related learning activity. Given the focus of the course on teaching, the instructional strategies used within the course vary from week to week, in order to model for students a variety of instructional methods that can be utilized. Each week the instructor featured a different instructional technique, including discussion, interactive lecture, debates, small-group activities, and student presentations. This enables the students to practice or discuss the concepts in order to reinforce their learning.

A critical component of the course included two observations of the students who were teaching. A peer observation component required student pairs to observe each other teaching and provide feedback. All students were required to observe a peer including those who were not currently teaching. In addition, the instructor observed each student and provided feedback.

### **Course Sessions and Activities**

Appendix A features a matrix describing each course session and the accompanying assignments. In addition, each course session is described below:

*Session 1, Getting Started: The Basics* – The purpose of this session is to encourage the students to reflect on their prior experience as learners and consider how this will impact them in their own teaching. The course opens with a discussion on how to prepare for the first day of class, a brainstorming activity on “what is an effective teacher,” and a discussion on “my biggest fears in teaching.” At the end of class students are asked to complete a questionnaire on the TAs’ teaching responsibility, prior knowledge on teaching and background information. Students are given a reflection assignment that requires them to recall the most effective and least effective teacher they may have experienced and how they will use this experience in the formulation of their own teaching style.

*Session 2, Strategic Course Planning (course goals, objectives, outcomes)* - The purpose of this session is to discuss how to plan a course, focusing on understanding course goals and writing course objectives. After a short lecture, the students practice writing objectives which they share with the class for critique and discussion. Bloom’s taxonomies for the cognitive and affective domains are described in lecture. Academic Freedom is also addressed in this class meeting

including questions such as what does it mean to have academic freedom and how much freedom do instructors have in the classroom. The university policies on Academic Freedom are discussed as well. The discussion and brainstorming activity for this session addresses “how to answer student’s questions,” an area that students often express concern about in the initial background questionnaire. The discussion focuses on what to do when a student asks a question, how to best address students’ questions in class, and what to do if the TA does not know the answer. Assignment 1 is proposed, which asks students to identify or write three learning objectives from a course they are teaching or attending, classify each to a level of Bloom’s Taxonomy, and describe the teaching method they would use for each objective.

*Session 3, Instructional techniques (lecture and discussion)* – The purpose of the third session is to discuss the effective use of lecture and discussion as instructional techniques, with consideration of learning theories and cognitive psychology principles. The session focuses on “how students learn” and how to make lectures more effective and engaging by integrating active teaching strategies in to the lecture. The class discusses students’ attention spans and examples of various active learning techniques. Tips are provided for locating activities on the Internet which can be a good source for finding problem solving activities. One example shown in class comes from physics, consisting of a video of a two balls on a ramp.<sup>3</sup> Students are asked to predict which ball reaches the end of the ramp first. The video demonstrates a common misconception on physics concepts. Many of the students incorrectly predict what will happen and are often surprised by the outcome. The example is shown as a way to engage students and to address student misconceptions in an interesting manner. The example generates a great deal of discussion because the TAs want to solve the problem and recognize that similar problems may be a good way to engage their own students. In addition to this example, the students participate in a small group activity regarding “my biggest teaching challenge.” The small groups share their biggest teaching challenge, discuss how these challenges can be met, and share with the class how they would address the challenge. This actively and collectively allows the students to get suggestions from their peers in a safe and non-threatening way. The teaching and peer observation projects are introduced and arranged during this class meeting. The observation rubrics and assignments are in Appendix C.

*Session 4, Instructional Techniques (active learning, collaborative learning, problem-based learning, case-based learning)* – This session expands on instructional techniques, with a short presentation on the benefits and challenges of using alternative teaching methods such as active learning, group work, and problem solving, and how to incorporate them into our teaching style. The activity for this session, which requires 60 minutes, is an exercise on leading class discussions. In groups, the students participate in a formal discussion. The guidelines for the discussion along with discussion questions are given out. Each group is given a short article along with related resource material on a pedagogical issue to read and discuss. Each group facilitates a discussion on the article by summarizing the article, posing questions to the class, and sharing their findings from their initial small group discussion. Assignment 2 on identifying and creating teaching methods is proposed and described. There are two options for this writing assignment. One is to observe an instructor for a course they are assisting or one in which they are attending. During a class meeting, the TAs are asked to monitor the techniques the instructor uses in the class. The paper assignment asks students to describe and critique the instructional methods used by the instructor. The second option is for the TA to try an active learning

technique in the course they are teaching. The paper should describe the strategy used, the students' reaction, reflection on the success of the activity and how it might be revised for the next time it is taught. The purpose of this assignment is to encourage students to identify teaching methods and gain confidence by trying one method. Mid-semester feedback is collected at the end of class in the form of a minute paper.

*Session 5, Assessment strategies and the purpose of assessment (rubrics, grading evaluations, testing)* – We open this class with a brief discussion on the results from the mid-semester feedback minute paper conducted during the previous class including the importance of collecting feedback at mid-semester. We begin this session's lecture with questioning the class on the purpose of assessment. The lecture includes questions such as how do we define assessment, what have the TAs learned from their own experience, and why and what do we assess. The lecture focuses on the reasons for assessment and assessment techniques such as rubrics, tests, quizzes, group quizzes, projects, readiness assessments and papers. The activity for the session is a debate on the pros and cons of multiple-choice testing in engineering courses. The class is divided into two sections for the debate. The debate material, which is given as a handout, from the text book, *Teaching Engineering* (pp. 219-220),<sup>4</sup> consists of a description of the advantages and disadvantages of multiple choice testing and writing test questions. The debates often turn into heated discussions with students passionately choosing one side over the other. The session ends with thought questions such as what takes place after the test, providing feedback to the students, reviewing material, whether or not the test be returned to the student and the responsibility of the grader. Assignment 3 on the learning styles inventory is proposed, which requires the students to complete the Felder Learning Styles Inventory<sup>5</sup> and describe their reaction to the results.

*Session 6, Knowing your students (motivation, learning styles, individual students, problems and challenges)* – The students bring to class their results from the Felder Learning Styles inventory. The session begins with the students sharing their inventory results and their opinions on whether they agree or disagree with the instrument results. This leads to a lecture on knowing your student audience, comparing traits in different types of learning styles and motivating students. Case studies on student behavior are used in the group discussion activity. The session ends with a short video on the "A Vision of Students Today."<sup>6</sup> The intention of showing the video is to ask TAs to think about and understand the needs and styles of the students who will be in their classrooms. This is the last formal class meeting until the final week of the semester. Peer and teaching observations take place independently throughout the upcoming weeks.

*Session 7, Wrap up, Student Services, Academic Integrity (Affirmative Action, Judicial Affairs, Counseling and Psychological Services)* – The final session ties together all the concepts covered in the course. Feedback on the observations is given to each student. Our final discussion is on cheating and plagiarism using an actual case from the university. End of semester evaluations are conducted and students complete a detailed questionnaire on their experience in this course. Reflection #2 is assigned which asks students to reflect on their own teaching this semester relative to what was learned in the course.

## **Course Observations**

*Peer Observation Project* - The initial course structure had required the instructor to independently observe each student two times. The purpose of the multiple observations was to allow students to make changes to their teaching and receive feedback at multiple points of time. However, given the number of students enrolled each semester made even a single observation for each student very time consuming. In order to maintain the ability for students to receive sufficient feedback on their teaching, a peer observation project was added during the course revision, which requires pairs of students to observe each other teaching.

Peer learning involves listening and responding on the part of each peer and being able to give feedback in a non-threatening way. McKeachie states “students often learn more from interacting with other students...one of the best methods of gaining clearer, long-lasting understanding is explaining something to someone else”(p. 219).<sup>7</sup> The students have a pre and post observation session. The pre-session sets up expectations for both peers and gives information on what to expect during the teaching session. The post observation session is where the observer gives feedback to the instructor in the form of a letter of critique. The assignment is a paper with five parts each describing the components, the pre-session meeting, the observation, the post-session meeting, and feedback narrative and includes the questionnaires and checklists used by the observer.

This added assignment has proved to be perhaps the most beneficial part of the course. Assessment data is discussed below that suggests that the peer observation project helps students better understand their own teaching.

*Teaching Observation Project* - For the teaching observation project, the instructor of the course, in the role of teaching consultant, observes the student teaching his or her own course, lab, or recitation, and captures this on video. The TA selects and decides in which class the observation will take place. After the observation the instructor and TA meet for a feedback interview. The video is used to emphasize good points and make recommendations about the teaching practices observed. In addition to the observation, students are asked to complete a Reactionary Paper where the student describes his/her reaction to being observed. The student also describes any changes made in their teaching style based on the feedback and if these were successful.

*Alternate Assignment* - TAs who are not teaching in the current semester complete an alternate assignment that replaces the Teaching Observation Reactionary Paper. It is important to note that all the students, including those who are not teaching, must observe a peer teaching and complete the Peer Observation Project assignment. This Alternate Assignment requires the student to attend a teaching and learning workshop or write a paper based on a pedagogical article that they found in an engineering journal such as the Journal for Engineering Education. Because it is important for the student to practice giving a presentation to a group, the student presents to the class on the topic they selected for this assignment. This ensures that the non-teaching student has an opportunity to be observed and receive feedback from their peers in the class. The instructor gives feedback as well in summary statements after the students are finished.

The three assignments, Peer Observation Project, Teaching Observation Project, and the Alternate Assignment are Appendix C, D, E.

## Assessment of Course Effectiveness

During the fall, 2008 semester, data was collected from the students enrolled in order to determine the effectiveness of the course and select activities. The three sections of the course totaled 37 students with 31 participating in the assessment. This diverse group included 5 female students and 26 male students. Of the students, 15 were international students (4 female, 11 male). The international students came from countries such as India, Venezuela, Iran, China and Turkey. The students represented a variety of majors across the College of Engineering including electrical engineering, nuclear engineering, mechanical engineering, computer science engineering, engineering science and mechanics, industrial engineering, and civil engineering. Of the total students' teaching responsibilities, 8 were teaching a course, 17 were teaching a lab or recitation section, and 6, who did not have any teaching responsibilities, were grading, holding office hours, or holding homework/tutoring sessions.

The students completed a course perception questionnaire during the final session of the course. The questionnaire focused on students' perceptions of the course, their perceived understanding of teaching practices, the perceptions of their personal teaching, and their understanding of how people learn. A more complete description of the questionnaire is available in Zappe and Kapli (2008).<sup>8</sup> Appendix B displays the items, along with frequency data and descriptive statistics for each. In addition, student comments were available through their reflection assignments. Students gave permission through an informed consent document to allow their survey responses and assignments to be used for research purposes.

Overall, students had a very positive perception of the class. Approximately 90% of the students agreed or strongly agreed that they were comfortable with the instructional techniques used in the class. Approximately 75% of the students felt more comfortable planning their own course and felt they will be more confident the next time they teach.

Given the characteristics of the students in the course, it is not surprising that only about 60% of the students see a connection between the course and their future career. Similarly, only about half of the students felt they were more interested in teaching for their future career. Many students do not anticipate seeking an instructional or faculty position, as a career goal, and plan to go into industry.

Of the course activities in the seminar, students rated the peer observations to be the most helpful with over 70% describing them to be "helpful" or "very helpful." For example, one student stated, "Peer observations were excellent." Another student stated, "The peer review was the most important part of the course" but still desired wanting "more time to practice in front of peers [which] would have been valuable." Yet another student noted that the peer observations "were the most helpful" but added that the background course material was necessary in order for the observations to be worthwhile. As he or she stated, "I wouldn't have learned as much from the observation without some of the background information taught in class." Other quotes that supported the perceived value of the peer observations and follow:

- "I like the peer observations very much. I learned a lot from others' teaching."



- “Peer observation was the biggest take away from this course.
- “Observations were a great idea. Observations allowed me to make rapid improvements quickly.”
- “I feel more confident teaching now and I think that the observations contributed most to an improvement in my teaching.”

The least helpful course activity appeared to be writing course objectives. Perhaps students do not yet see the value of writing course objectives, given their lack of experience with planning a new course and their likelihood of following already established course plans from instructors in their departments. This may be an area to consider for improvement during the next course revision. Another area may be the opportunity to allow students to practice their own teaching. While the new course revisions allow for additional time to practice teaching in the course, some students (approximately 39%) still desired to have more opportunities to practice.

Most students who were teaching in the concurrent semester found the course to be helpful to their teaching experiences. A total of 85.6% of the students who were teaching agreed that they made changes to their teaching as a result of the course. Fewer students, approximately 43%, added more active learning techniques. This is not surprising as many first-time instructors are often intimidated to try techniques other than traditional lecture. Almost 90% of the students found that the observations helped to identify areas of improvement; 83% of the students found that the feedback sessions were helpful. As one student stated, “Feedback on teaching was informative and comforting to know things are working well.” The vast majority of the students felt that the seminar helped to improve their teaching. An example student comment suggested that the overall seminar was effective: “The information presented in this class has helped me understand that there are different types of students and that there are varied ways of helping those students achieve classroom goals.”

### **Discussion and Reflection**

In the Fall semester 2008 the course instructor was teaching this course for the first time. This instructor chose to follow the framework of the course as previously taught, using lecture coupled with student-centered activities as described in this paper. However, the instructor incorporated a major change: the Peer Observation Project. The instructor believed that teaching assistants observing each other and providing constructive feedback is a sound pedagogical strategy. Due to the characteristics of the students, the diversity of backgrounds and levels of TA responsibilities, this was challenging logistically. This project was an independent and student-centered activity. The students were responsible for the scheduling of the observations and the interviews. The instructor was concerned that the students would have difficulty scheduling meetings because of their various TA responsibilities. To the pleasure of the instructor, the project received very favorable comments from the students. The assessment data supports that the students felt they learned much about themselves in observing a peer teacher.

ENGR 888, in its current form, allows engineering graduate students to practice and apply pedagogical methodologies concurrently while learning teaching theory. The activities in the course are designed to scaffold the TAs learning by moving from understanding goals and writing objectives, classification of appropriate taxonomies, and selecting methods and assessments for the objectives. These concepts coupled with discussion on understanding the audience and the student learner's needs and styles prepares the Graduate Assistant to have a sound basis in teaching practice. The peer and teaching observations allow them to practice incorporating teaching methods concurrently with learning the concepts.

The students form a community of learners throughout the semester as a result of the peer observations. Concurrently, the observations by the teacher help the TA to visually study and revise their teaching and presentation skills. These projects aim to foster confidence in the Teaching Assistant. The challenge in this course is to convince the student that they can succeed in teaching.<sup>9</sup> ENGR 888 will be revised and improved in subsequent semesters using data from the students' exit survey. The focus will be on providing an interactive and productive experience for the students using a learner-centered approach that will empower them to be responsible and independent learners.<sup>10</sup> Assessment data and students' performance indicate that the learner-centered frame work as incorporated into the course contributed to the success of the course. Students' responses on the survey indicate that the majority of the students, as a result of the course, better understand the advantages and disadvantages of various instructional methods and appreciate that well-trained teaching assistants can be a benefit to the culture of the college.<sup>11</sup> As the course continues to evolve, the instructional methods will focus on giving the students more opportunities to present in front of the group. The instructor plans to design and pilot a microteaching assignment to allow students additional opportunities to practice teaching.

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## APPENDIX A: Course Activities and Assignments Matrix

	General Topics	Assignment
Session 1	Getting Started: The Basics; Group discussion on What is an Effective Teacher; Active Learning Introduction; discussion on Tips for the First Day of Class	Complete background questionnaire Reflection Paper #1
Session 2	Strategic Course Planning lecture (Course goals, objectives, outcomes); Discussion on answering students questions; Explain Peer Evaluation observation project;	Assignment 1: writing course objectives Schedule two observations first with peer and second with instructor. Post lesson plan in course management system before observation scheduled date
Session 3	Instructional Techniques (Using Lecture and discussion strategies); Lecture on How Students Learn and Cognitive Psychology; Discussion activity on “the biggest teaching challenge”.	Conduct mid-semester feedback in class
Session 4	Instructional Techniques (Active learning, collaborative learning, problem-based learning); Discussion on mid-course feedback; small group discussion activity using cases	Assignment 2: Writing teaching methods for objectives
Session 5	Classroom assessment  (Testing, rubrics, grading, evaluations); Small group discussion on what is the purpose of assessment; debate on the pros and cons of multiple choices tests.	

Session 6	Understanding your students (motivation, individual differences, problem students);	Assignment III: Classroom assessment exercise
	Learning styles inventory; discussion on inventory	
Independent Work	Peer observations; Instructor observations meetings and feedback sessions; Alternate Assignment	Peer Observation assignment due Friday of the 12 <sup>th</sup> week of the semester; Teaching Observation Reactionary Paper due Friday of the 13 <sup>th</sup> week of the semester
Session 7	Observation Feedback; Discussion on Affirmative Action, Judicial Affairs and Counseling and Advising Services using cases from actual university issues.	Reflection 2 ; Alternate Assignment

## APPENDIX B: Frequency data and descriptive statistics for course questionnaire

Each survey response was coded from 1 through 5, with “strongly disagree” being 1 and “strongly agree” being 5. Means and standard deviations are calculated using the coded responses. This coding system was used for all subscales except for the Understanding of Teaching Practices subscale. For the Teaching Practices subscale, each survey response was coded from 1 through 4, with “not at all helpful” being 1 and “very helpful” being 5. Means and standard deviations are calculated using the coded responses.

### Course Perception (CP) Subscale

Item N=31 (100%)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Standard Deviation
1. As a result of this course, I am more interested in teaching.	0	2 (6.5%)	14 (45.2%)	12 (38.7%)	3 (9.7%)	3.516	.769
2. I can see a connection between this course and my future career.	0	5 (16.1%)	7 (22.6 %)	13 (41.9%)	6 (19.4%)	3.645	.985
3. I felt comfortable with the instructional techniques used in this course.	0	0	3 (9.7%)	16 (51.6 %)	12 (38.7%)	4.290	.643
4. I wish I had more opportunities to practice my teaching in this course.	2 (96.5%)	7 (22.9%)	10 (32.3 %)	8 (25.8 %)	4 (12.9%)	3.161	1.128
5. As a result of this course, I feel more comfortable planning my own course.	1 (3.2%)	1 (3.2%)	4 (13.0%)	19 (61.3 %)	6 (12.9 %)	3.903	.870
6. As a result of this course, I better understand the advantages and	0	1 (3.2%)	2 (6.5%)	22 (71.0%)	6 (19.4%)	4.065	.629

	disadvantages of various instructional methods.						
7.	As a result of this course, I better understand the advantages and disadvantages of various assessment methods.	0	0	5 (16.1%)	18 (58.0%)	8 (25.8%)	4.097 .651
8.	As a result of this course, I will feel more confident the next time I teach a course.	0	3 (9.7%)	5 (16.1%)	18 (58.1%)	5 (16.1%)	3.806 .833
9.	I am interested in concepts related to teaching and learning.	1 (3.2%)	3 (9.7%)	9 (29.0%)	11 (35.5%)	7 (22.6%)	3.645 1.050

### Understanding of Teaching Practices (UTP) Subscale

Item N=31 (100%)	Not at all helpful	Somewhat helpful	Helpful	Very helpful	Mean <sup>1</sup>	Standard Deviation
1. Writing course objectives	1 (3.2%)	12 (38.7%)	13 (42.0%)	5 (16.0%)	2.710	.783
2. Classroom debate on assessment techniques	1 (3.2%)	7 (22.6%)	13 (42.0%)	10 (22.6%)	3.32	.836
3. Interactive lecture showing demonstration (i.e. the balls on the ramp)	2 (6.5%)	6 (19.4%)	16 (52.0%)	7 (22.6%)	2.903	.831
4. Small group activities in the classroom	1 (3.2%)	8 (25.8%)	16 (52.0%)	6 (19.4%)	2.871	.763
5. Peer observations	2 (6.5%)	7 (22.6)	8 (25.8%)	14 (45.0%)	3.97	.978
6. Large group discussions	0	14 (45.0%)	14 (45.0%)	3 (9.8%)	2.645	.661

### Teaching Practice (TP) Subscale

Item N=28 (100%) (only for those teaching)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Standard Deviation
1. As a result of this course, I have made changes to my teaching.	0	2 (6.5%)	2 (6.5%)	19 (67.8%)	5 (17.8%)	3.964	.744
2. As a result of this course, I have included more active learning techniques in my class.	1 (3.2%)	3 (9.7%)	10 (35.7%)	12 (42.9%)	2 (6.5%)	3.393	.916
3. The observation helped me to identify areas where I can improve my teaching.	0	2 (6.5%)	1 (3.2%)	16 (57.1%)	9 (32.1%)	4.143	.803
4. The feedback sessions following the observation were helpful to my teaching.	0	2 (6.5%)	3 (9.7%)	15 (54.0%)	8 (29.0%)	4.036	.838
5. I feel that my teaching has improved as a result of taking ENGR 888	0	1 (3.2%)	2 (6.5%)	15 (54.0%)	10 (36.0%)	4.214	.738



## **APPENDIX C: Peer Observation Project**

**Peer Evaluation Feedback Assignment Instructions and Rubric (20 points):** You will be put into teams for this project. Each person in the group will have an opportunity to observe the other. If you are not teaching this semester you will observe someone. Because you will not be observed you will do an alternate assignment. Schedule your peer evaluations on the public calendar in ANGEL. Then proceed with these steps.

### **Step 1: Pre-observation meeting to discuss expectations:**

- Give the observer some background on the lesson.
- What do you each expect to learn from the observation?
- Does the instructor want the observer to look for specific concerns during the observation?
- What can the observer expect? Environment? Course goals? Student types? Class size?
- Is this a lecture, lab or recitation?
- Should the observer be acknowledged or introduced to the students?

### **Step 2: Observation (You are only required to observe 50 minutes of the class session)**

- Use the Checklist for Observing Teaching Behaviors document as a guide
- Take notes
- Listen and watch
- Immediately following the observation complete the Observation Feedback Form below

### **Step 3: Post-observation meeting to give feedback to teacher:**

- Overall impression of the instructor
- Overall impression of the observer
- Give three positive comments to the instructor on what was good about his/her teaching
- Any surprises or did the session go as planned
- Comment on any issues or concerns that the instructor mentioned in the pre-session
- Use notes and check list as evidence to provide feedback
- List suggestions where his/her teaching can be improved upon. Please be specific make reference to the teaching by using specific examples and give a recommendation on how you would change this technique in the future.
- Thank the instructor for their time and commitment to better teaching and learning.

**Step 4:**

**Deliverables (submit to ANGEL drop box):**

Summary document, due one week after the post-observation meeting, should contain:

**Part 1:** Describe the pre-session meeting (5 pts.)

**Part 2:** Describe your experience in the class observation (5 pts.)

**Part 3:** Describe what took place in the feedback meeting (5 pts.)

**Part 4:** Conclusion (5 pts.) - The conclusion should contain a narrative statement addressed to the instructor on your recommendations for improvement and describing examples of good practice. It should also contain a statement that reflects on your experience being an observer. Answer the question, what advice would you give a peer who was going to do an observation of another peer?

**Part 5:** The completed Observation Questionnaire and Checklist For Observing Teaching Behaviors documents should be included.

## **APPENDIX D: Teaching Observation Project**

This project has three parts, the observation, by your instructor, and videotaping, feedback meeting with you, and a two page reactionary paper on your experience being observed and reaction to the feedback.

### **Criteria for Teaching Observation (20 pts.)**

#### **Pre-observation:**

- Select lecture/lab/recitation that you feel will be most beneficial to your for an observation.
- Complete the Lesson Plan using the appropriate Lesson Plan document in the Teaching Observations folder in ANGEL.
- Submit the Lesson Plan to the Lesson Plan Drop box one week before your scheduled observation.
- Schedule your observation time with your instructor by email
- 3 observations per week will be allowable
- Monday mornings before 11:00, Thursday evenings after 5:00 and all day Fridays are not available. (If you have a need to schedule during one of these times please discuss this with me by email.)

#### **Post Observation:**

When the observation is completed and after I have reviewed the video, I will send you an email to schedule a 15 minute feedback session with you.

#### **Deliverables:**

- Lesson Plan (10 pts.)
- Reactionary paper (10 pts): A two-page paper which should include your reaction to being observed and your reaction to the feedback; and what you may plan to do with one or two of the feedback suggestions.

## APPENDIX E: Alternate Assignment

### Options for Alternate Assignment for students who are not teaching

#### A. Mini-lecture opportunity

Students will lead the ENGR 888 class in teaching a concept using the principles discussed in class (i.e. incorporating lecture, active learning through using group activities, interactive lectures, demonstration, etc). Students who select this option will write a shortened version of the lesson plan assigned to students choosing to do observations. Feedback to the student presenter will be provided from other students in the class as well as the class instructor.

#### B. Attending a teaching and learning seminar on campus

Students will attend two teaching and learning seminars/workshops/events on campus sponsored by the teaching and learning center or other relevant groups on campus. Students choosing this option will write a short paper which describes the events, what was discussed, and the implications for teaching and learning. Students, along with other students who selected this option, will also be asked to provide some resources and participate in a brief 10 minute discussion panel of what is learned at these events during the last class meeting.

#### C. Investigation of discipline-specific issues in teaching

Students who select this option will investigate teaching issues in their own field. For example, students in computer science will investigate a teaching issue of interest in computer science. A good place to start for this investigation is the *Journal of Engineering Education* which often provides educational experiments that have been conducted in specific areas. If the student has difficulty finding articles from their exact discipline, students can also select an area to explore (i.e. gender issues in teaching, teaching writing, instructor evaluations, working with student teams, active learning, technology integration in teaching, etc). Students selecting this choice will write a paper summarizing at least 3 related articles. In addition to the summarization, the student will be asked to discuss in the paper any implications for teaching and learning and how the student may use this information in future opportunities to teach.

#### D. The First Day of Class

We've covered loads of material in six class sessions including theory, methods, strategies and tools for teaching. We discussed the fears and challenges that face first time teachers. Although you have not had the experience of actively teaching this semester, you have had the opportunity to observe teaching of your peers and your professors in your classes, including your instructor in ENGR 888. Your role, for this project, is that you are hired as a new teacher at a university. It's the week before your first class meeting. You have 50 undergraduate students in a first-year introductory engineering course. What would you envision for your first day of class? Describe how

you would prepare, plan and conduct your first day of class. Include your preparation strategy for the week before classes start and how you would organize your lecture for the first class. The content for this paper should plainly describe what will you do and how you will get ready for the class; and what you will do on the first day of class. Provide details please. ENGR 888 gave you all the tools you need to complete this assignment.