

Clinical Faculty Development Program

Norman D. Dennis, Jr. and Edgar C. Clausen

*College of Engineering
University of Arkansas*

Abstract

With the significant increase in engineering student enrollment over the last ten years and the relatively flat number of tenure/tenure track faculty positions in engineering, a significant portion of the undergraduate teaching load has shifted to non-tenure track faculty. As a result of increased involvement of non-tenured faculty in teaching in the college, a developmental workshop was created for the clinical faculty within the college of engineering with a vision of making clinical faculty more engaging and organized instructors. The workshop was modeled after the very successful week long ASCE ExCEED Teaching Workshop. Participants were not only exposed to various teaching pedagogies, but were actually required to incorporate the pedagogies into a practice class, presented to their peers and to master teachers.

Introduction

According to the ASEE Engineering Data System,¹ engineering enrollment at U.S. universities has increased 56% since 2005 (421,072 to 655,160). At the same time, the number of tenure track faculty has remained level at approximately 26,000, while the use of non-tenure track teaching faculty has increased by 44% (6,752 to 9,709). Bringing this closer to home, engineering student enrollment at the University of Arkansas has increased from 2,864 students (2,043 UG, 654 MS, 167 PhD) in 2010 to 3,947 students (3,012 UG, 700 MS, 235 PhD) in 2014, an increase of 38%. While the number of tenure track faculty has remained constant at 104 and the number of non-tenure track research faculty has actually decreased from 11 to 6 over this time period, the number of non-tenure track teaching faculty has increased from 11 to 24.²

Non-tenure track teaching faculty can take many forms³ and have many different names:

- Full-time instructors, adjunct faculty, professors of practice or clinical faculty, who teach but have no research obligations
- Part-time positions with the same titles, who teach one or more courses on an as-needed basis

Some schools advocate multi-year contracts for full-time non-tenure track faculty, and some schools have criteria in place to allow these faculty to advance through the ranks (from assistant professor to associate professor to professor) with satisfactory service. Full-time teaching faculty may teach as many as eight classes per year, many more than their tenure track colleagues.

It is clear that full-time teaching faculty (hereafter called clinical faculty) need to be quality teachers because they will be major contributors to the teaching mission of a university, now and in the future. But, as Ambrose and Norman⁴ note, “when most faculty members enter the

academy, they are . . . ‘well intentioned gifted amateurs’ when it comes to teaching.” So, how can we assure that these clinical faculty will be motivated to do a good job, and how can we help to prepare them for the classroom? Felder *et al.*⁵ reviewed the design, implementation and evaluation of a host of available programs for making faculty better teachers, and noted that effective teaching should address how people learn which, in turn, requires the teacher to be more learner-centered.

In 2014, clinical faculty in the College of Engineering at the University of Arkansas were encouraged to participate in our first Clinical Faculty Development Program. The Development Program was a scaled down version of the American Society of Civil Engineers ExCEED Teaching Workshop (ETW).⁶ The ETW is a one week long workshop where participants are exposed to 13 seminars related to teaching and learning, three demonstration classes presented by master teachers and are required to teach three classes in front of peers and mentors and receive immediate assessment about the effectiveness of their classes. The ETW was hosted by the University of Arkansas for nine years and the lead author is still actively involved in leading the program at other host institutions. The purpose of this paper is to describe the development program, its participants, and some of the comments about the quality of the program.

The Program

With only two days available to conduct the Clinical Faculty Development Program the entire ETW was scaled down to what the authors felt was the irreducible minimum content. Rather than 13 seminars, the development program contained only seven. Only one demonstration class was presented, and the participants taught only one class for which they received immediate feedback from the mentors and other participants. The underlying theme of the workshop was to get participants to take a risk and try new techniques that might seem difficult to master at first, but would eventually make them more efficient teachers and allow more time to address the other pillars of the academy. The most important seminars were deemed to be:

1. **Teaching and Learning.** As a motivational and introductory seminar, the explicit need for good teaching was established using data from Seymour and Hewett⁷ and others^{8,9} to show the issues with attracting and retaining students in the sciences and engineering. The concept of a “Model Instructional Strategy,” as illustrated in Figure 1, is introduced as a model that contains the essential elements needed for effective student learning. Each element of the model is described in more detail in subsequent seminars.

A Model Instructional Strategy

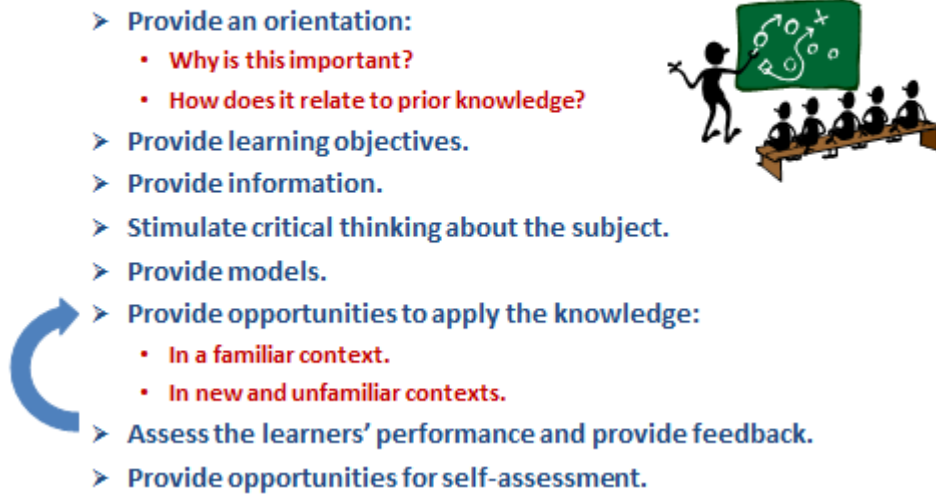


Figure 1. Elements of the Model Instructional Strategy (ETW, 2014)

2. **Principles of Effective Teaching.** Lowman's Two Dimensional Model of Teaching,¹⁰ illustrated in Figure 2, was introduced as a framework for evaluating effective teaching. The importance of intellectual excitement and interpersonal rapport both in and out of the classroom was stressed with the provision that initial improvements in intellectual excitement produce the largest gains in teaching effectiveness. Movies and clips of teachers who have been categorized into one of the nine positions in Lowman's model were used to allow participants to visualize the attributes associated with each position. Participants were asked to self-assess their relative location in the Loman Model.

Lowman's Two-Dimensional Model of Teaching

		INTERPERSONAL RAPPOR T		
		Low	Moderate	High
INTELLECTUAL EXCITEMENT	High	6. Intellectual Authority	8. Exemplary Lecturer	9. Complete Exemplar
	Moderate	3. Adequate	5. Competent	7. Exemplary Facilitator
	Low	1. Inadequate	2. Marginal	4. Socratic

Figure 2. Lowman's Two Dimensional Model of Effective Teaching (ETW, 2014)

The “ASCE ExCEED Teaching Model”, as presented in Figure 3, was purported to be the underpinnings of the teaching strategies needed to be an effective teacher. While the Model Instructional Strategies is “what the students need,” the ExCEED Teaching Model is “what the teacher needs to do to effectively execute the strategy.” The remainder of the seminars were all linked to elements of the Instructional Strategy and the Teaching Model.

3. **Speaking.** Relating to the element of engagement in the ExCEED Teaching Model, the minimum essential qualities of verbal communication (projection, articulation and variation in volume, speed, and pitch) were demonstrated and practiced by the participants through several exercises. Several mechanisms for stimulating positive student emotion through the use of drama, humor, physical movement and music were also demonstrated in this seminar
4. **Planning a Class I: Learning Objectives.** Both the Instructional Strategy and the Teaching Model emphasize the use of well-crafted learning objectives to establish what the student will be able to do when completing a lesson, a block of instruction and the course. This seminar introduced the participant to the use of Bloom’s Taxonomy¹¹ and Bloom’s action verbs that establish quantifiable learning objectives for all levels of cognitive learning. Participants were asked to create a set of learning objectives for their practice class, share them with a colleague to improve their clarity, and to modify them to increase their level of required learning in accordance with Bloom’s Taxonomy.

The ASCE “ExCEED Model”

- **Structured organization**
 - **Based on learning objectives**
 - **Appropriate to the subject matter**
 - **Varied, to appeal to different learning styles**
- **Engaging presentation**
 - **Clear written and verbal communication**
 - **High degree of contact with students**
 - **Physical models & demonstrations**
- **Enthusiasm**
- **Positive rapport with students**
- **Frequent assessment of student learning**
 - **Classroom assessment techniques**
 - **Out-of-class homework and projects**
- **Appropriate use of technology**

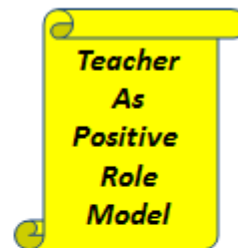


Figure 3. The ASCE “ExCEED Teaching Model (ETW, 2104)

5. **Planning a Class II: Board Notes.** This seminar provided tips for applying the Model Instructional Strategy to the organization of classroom instruction. Perhaps the most useful tool that participants of ETWs and this development workshop come away with is the concept of “board notes.” Basically, the entire classroom presentation as it will

appear on the blackboard, whiteboard or document camera, is first recorded accurately on paper. Figure 4 illustrates a page of “board notes” for a first class on truss analysis. Material in the upper panels is placed on the board, and include the colors that would be used. The material in the lower panels serves as reminders to include certain demonstrations or visuals from PowerPoint or some other medium. Participants were required to create a set of “board notes” for their practice class, and they found that they can reliably get content on the blackboard without maintaining a death grip on their notes. The creation of board notes serves as a good review mechanism and as a visual cue when referred to casually while they are laying on a desk or table. The absence of notes in the instructor’s hands allows for meaningful movement in the classroom and genuine gestures during class, which contributes to an engaging presentation.

6. **Learning Styles.** Participants were introduced to the Silverman-Felder¹² index of leaning styles (ILS) by completing the 44 question instrument to determine their own learning preferences. Their understanding of the ILS is enhanced via a skit in which mock students demonstrate extreme preferences in every dimension of the ILS. Strategies were discussed that will allow participants to develop learning activities that will appeal to a wide variety of learning styles.

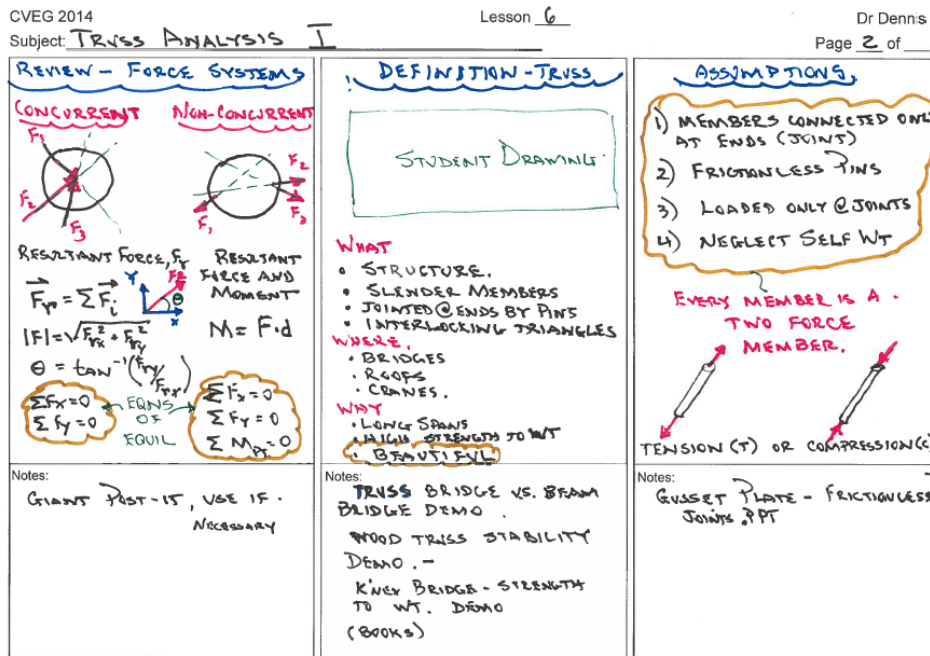


Figure 4. Example Page of “Board Notes,” Showing Three Board Panels

7. **Questioning.** Well-framed questions are a way of stimulating critical thinking among students and, if asked correctly, can serve to promote positive rapport in the classroom. Both are key elements in the Instructional Strategy and the Teaching Model. This seminar addressed ways to formulate and deliver questions, and stressed the need for pre-planned questions. The seminar provided tips for asking questions when engaging a specific

student, when a volunteer is needed or when the entire class should respond. The seminar also addressed how to address student responses to questions and how to respond to student questions. Participants were required to develop two questions that they could ask while placing a panel of board notes on the blackboard.

The demonstration class was used to illustrate how all of the elements of both the Model Instructional Strategy and the Teaching Model could be integrated into a classroom presentation to generate interest and stimulate critical thinking among students. The master teacher demonstrated good verbal and written communication skills, asked well framed questions, displayed enthusiasm for the topic, provided a good orientation and established the importance of the subject matter, and displayed control of the classroom. At the end of the demonstration class, the participants were introduced to a two-page teaching assessment worksheet that aids the process of providing meaningful feedback to an instructor that would allow improvement of a subsequent class. They were advised on how to use the worksheet to assess teaching based on elements of the Model Instructional Strategy and the ExCEED Teaching Model. Participants used the worksheet to provide structure to the assessment of the demonstration class, as well as practice classes presented by their peers.

Participants were asked to take a risk and move away from PowerPoint® and use the written and oral communication techniques presented in the seminars as a way of developing an engaging presentation. The participant practice classes were 25 minute sessions that were intended to cover a relatively compact topic with the hope that the entire topic could be presented in the allotted time. Participants were required to create learning objectives, create an organized presentation through use of board notes, formulate pre-planned questions, and present the material clearly and concisely with a great deal of enthusiasm for the topic. A common theme among all participants was that they prepared far too much content for a 25 minute class. Participants were able to determine the average time it took to present a panel of board notes, and were subsequently able to use board notes as a timing mechanism for determining how much content to prepare.

The Participants

Table 1 summarizes the participants in the workshop. Seven faculty participated in the workshop, representing five engineering departments. All of the participants worked full-time at the university. Three of the participants were full-time teaching faculty (clinical faculty), two were post-doctoral research associates who also had teaching responsibilities, and two of the faculty were tenure-track assistant professors. One of the assistant professors had been struggling with teaching, as was noted in his third year review.

Table 1. Workshop Participants

Workshop participants: 7
Number of departments represented: 5
Full-time faculty: 7
Full-time teaching faculty: 3

Tenure-track faculty: 2 (one was new, and the other had been at the university for three years)

Participant Comments

At the end of the workshop, the participants were asked to comment on the workshop content and its delivery, and to suggest improvements or changes for future workshops. Selected comments are shown in Table 2. The participants were very complimentary of the workshop and the master teachers. Instruction in the use of board notes and the requirement for each participant to make a brief classroom presentation were cited as particularly valuable aspects of the workshop. The participants had many suggestions for future workshops, including the desire to have more than one workshop per year and the need for instruction in specific classroom topics such as preparing exams/syllabi and flipping the classroom. It should be noted that two of the participants were named outstanding teachers in their respective departments for 2014-2015.

Table 2. Selected Workshop Comments

<p>General Comments:</p> <ul style="list-style-type: none">• “The organization and specificity of the material were wonderful.”• “I wouldn’t throw out anything, but I particularly liked the learning objectives and practice classes the most (also board notes).• “The board notes and practice class will immediately make me a more effective instructor. The other seminars will all help, but the amount of info will take time to consolidate into my teaching.”• “This should be required for anyone teaching a class in college (tenure track or clinical).”• “Attending today’s workshop is one of the best decisions I have made. I like the workshop so much! Both of you were so helpful. I learned a lot. I firmly believe that the knowledge learned in this workshop will help me improve my teaching. Thank you for organizing such a great workshop and teaching us how to teach.”• “I really appreciate Dr. Dennis and Dr. Clausen for putting together this workshop. I wish I could take this workshop on the first day when I joined the U of A.”• “All parts of the workshop are well designed and delivered. Particularly, the practice classes give the participants an opportunity to apply the techniques just learned and to get the feedback for improvements.”
<p>Comments for future workshops:</p> <ul style="list-style-type: none">• “I would have interest in class development: writing tests (especially), writing a syllabus, etc.”• “I would definitely want to revisit this again and do more practice classes, have a discussion of many of the techniques we have incorporated and our experiences with them.”• “Professional development topics would be very helpful.”• “Repeating a similar series maybe twice a year would be good.”• “Future Directions:<ul style="list-style-type: none">○ Seminars on more current topics in education (e.g. technology, online classes, designing a lab, design-based learning, ‘flipped’ classrooms . . .)

- Discussion/tips on student advising
- Meetings to follow up on previous seminars—more demo/practice seminars
- Other topics such as writing a good exam, assignments, etc.”
- “Since Powerpoint presentations are becoming popular, a seminar on designing and presenting slides may be a good addition.”

Next Steps

Based on anecdotal evidence provided by the participants, the Clinical Faculty Development Workshop was a success. The next development workshop will follow the same format as the first and will be open to all faculty, with a focus on those faculty who have been teaching from zero to three years. Ultimately our goal will be to create a variant of the development workshop for our teaching assistants, with a focus on skills used in the laboratory and drill sessions. The workshop organizers will create formal pre- and post-assessment vehicles to better quantify the degree to which participants were able to master the content of the workshop and actually implement some of the techniques presented in their courses during the ensuing year. We will likely invite former participants back to give a short presentation on how they implemented the techniques presented in the workshop in their own courses. Specialized topics like syllabus preparation and testing, distance delivery techniques and managing teams will be addressed at monthly brown bag luncheons during the academic year, which will be open to the entire faculty of the college.

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Biographical Information

Norman D. Dennis

Dr. Dennis serves as a University Professor in Civil Engineering and as the Senior Associate Dean of the College of Engineering at the University of Arkansas. His research interests include remote sensing techniques for site characterization, autonomous monitoring of transportation systems and nondestructive methods of soil characterization. He has been actively engaged with the ExCEED Teaching Workshop for over 15 years, and currently chairs the ASCE Committee on Education.

Edgar C. Clausen

Dr. Clausen currently serves as Professor, Interim Department Head and the Ralph E. Martin Endowed Leadership Chair in Chemical Engineering at the University of Arkansas. His research interests include bioprocess engineering, the production of energy and chemicals from biomass and waste, and enhancement of the K-12 educational experience. Professor Clausen is a registered professional engineer in the state of Arkansas.