Developing a Dynamic Classroom with "ExCEEd" Teaching Workshops: Separate but Equal in New York and Arkansas

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I. Introduction

For the second year, the American Society of Civil Engineers (ASCE) has sponsored workshops to answer a call for formal educational training for engineering faculty members. Conducted both at the United States Military Academy at West Point and at the University of Arkansas, these "Excellence in Civil Engineering Education" (ExCEEd) workshops provided an effective venue to foster and improve teaching skills for a total of 48 junior faculty participants last summer with future plans to expand to three sites next summer. Specifically, the ExCEEd workshops attempt to present the works of Joseph Lowman’s Mastering the Techniques of Teaching and Teaching Engineering by Phillip C. Wankat and Frant S. Oreovicz; these primary references provided the scholarly, literary backbone for the workshop and established the credibility of the many techniques for stimulating intellectual excitement and interpersonal rapport in the classroom embraced by the ExCEEd model of teaching. The workshop is designed to allow participants to accomplish the following objectives:

- Learn and apply theories of teaching and learning
- Improve classroom teaching skills;
- Learn teaching assessment skills;
- Develop a passion for teaching.

Both the program at West Point and the one at Fayetteville ultimately accomplished the ExCEEd objectives with a clear commitment to providing user-friendly, hands-on training. Participants discovered an environment highly conducive to creative applications of innovative classroom techniques. Theories were not just discussed or presented but were demonstrated in classrooms by senior, experienced faculty. Further, putting theory into practice on a personal level, workshop participants were challenged to demonstrate their own abilities to emulate, apply, and execute the dynamic, enthusiastic methods encompassed by the ExCEEd model by teaching classes not once but three times. Despite a high degree of commonality in content, however, each program nevertheless found some room for individuality as they tempered the final array of subjects to better capitalize on the unique talents of the two separate workshop teams and cadre.

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This article examines both the similarities and the variations in the workshop content and structure between these two, geographically separated programs. In particular, the paper addresses the common theories of teaching and learning, the innovative methodology of demonstrating techniques and leading by example by showing proper classroom skills to workshop participants. Finally, it compares the two programs and their unique development of workshop content, selection and presentation of learning theories and practices, and demonstration classes with associated assessment practices and procedures. This paper further discusses employment of the workshop senior mentors/cadre to facilitate the accomplishment of the program objectives.

Table 1. Two-Dimensional Model of Teaching (Wankat, page 4)

<table>
<thead>
<tr>
<th>Intellectual Excitement</th>
<th>Intellectual Authority</th>
<th>Competent</th>
<th>Masterful Lecturer</th>
<th>Complete Master</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Intellectual Attacker</td>
<td>Adequate</td>
<td>Adequate</td>
<td>Intellectual Authority</td>
</tr>
<tr>
<td>Moderate</td>
<td>Adequate Attacker</td>
<td>Competent</td>
<td>Masterful Facilitator</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Inadequate Attacker</td>
<td>Marginal</td>
<td>“Warm Fuzzy”</td>
<td></td>
</tr>
</tbody>
</table>

II. Theories of Teaching and Learning – Making Teaching Compatible with Learning Styles

The basic ExCEEd teaching model addresses two recognized dimensions of effective college teaching described in both Lowman and Wankat (See Table 1). As can be inferred from the descriptive terms in the matrix, an instructor should theoretically strive to continuously improve toward the top right category where he has mastered both dimensions of intellectual excitement and interpersonal rapport. The first dimension addresses the skill of creating intellectual excitement as a function of the clarity of an instructor’s presentations and the corresponding stimulating emotional impact on students. Clarity deals with the conveyance of subject matter and naturally rests on a corresponding accuracy of content as well as the instructor’s personal mastery of the course materials and subject. The ExCEEd teaching model, however, emphasizes that clarity by itself is not sufficient to define excellence as a college professor; it must be accompanied by dynamic, engaging speaking and presentations. ExCEEd operates on a basic premise that the classroom is fundamentally a dramatic arena with the students subject to many of the same influences as audiences in front of actors during stage performances. Table 1 describes three ranges of the first dimension with “high” being consistent with what would be labeled as a skilled orator and instructor who is extremely
clear and exciting; conversely, low corresponds to the other end of the spectrum and indicates a tendency to be vague and dull.

The second dimension concerns interpersonal rapport. Engineers tend to be very adept at analysis and comfortable in situations that lend themselves to providing concrete solutions to identified problems. Professors likewise may tend to assume that the college classroom is strictly a setting for intellectual exchange of knowledge and facts. However, ExCEEd again proposes that just as the classroom resembles a stage, the students exhibit a number of similarities with audiences and are subject to a wide range of emotional and psychological phenomena that may support or detract from their learning experience. Interpersonal rapport refers to the instructor’s awareness of these emotional conditions and to his classroom skills that might engage the students and consequently increase motivation, enjoyment, and independent learning. Interpersonal rapport emphasizes a humanistic, two-way interaction between students and teachers. Table 1 also provides several levels of this dimension with “high” signifying an extremely warm and open, highly student centered instructor who appears to have strong interest in the students as individuals. The opposite end of the scale correlates to a classroom style that may tend toward a cold, autocratic, and highly controlling persona. The teaching and learning theories presented during the ExCEEd workshops collectively provide a credible foundation for increasing the participants’ awareness of how students receive, accept, and process information and some pragmatic techniques that might enhance instructor performance.

III. Show and Tell – Leading by Example to Improve Teaching Skills

The skills and techniques demonstrated and rehearsed during the ExCEEd program represent time-tested successful applications of the principles developed and discussed by Lowman and Wankat and Oreovicz and implemented at numerous universities including specifically the two hosts: the United States Military Academy and the University of Arkansas. The ExCEEd model (See Figure 1) for classroom instruction describes basic fundamentals that if implemented effectively can create an environment that exhibits practical classroom skills consistent with sound planning and quality, organized classroom instruction.

Putting theory into practice, senior ExCEEd staff actually demonstrate their

- 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 the 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 1. The ExCEEd Model for Classroom Instruction

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interpretation of an “ideal” classroom instruction in a manner consistent with the ExCEEEd model. The demonstration classes are full length lectures taken from courses typically common to many engineering disciplines – Statics and Strengths of Materials. Like the seminars, the demonstration classes were also presented to a collective audience with all 24 participants role-playing as students. Participants are encouraged to view the classes from the perspective of an undergraduate engineering student, answering and even asking questions accordingly. The rationale follows from a desire to make the classes as authentic as possible and to provide a realistic environment for exhibiting practical techniques and procedures. The classes embrace the tenets of the ExCEEEd model; demonstrators present a variety of practical instructional techniques involving development of learning objectives, formal and informal classroom assessments, questioning techniques, lecture organization with transitions, interaction with students, technology in the classroom, numerous but appropriate physical models and demonstrations, and even proper chalkboard procedures. Teaching through example, the demonstration classes allowed the participants to observe first hand the inherent flexibility of the ExCEEEd teaching model. Rather than trying to emphasize conformance to a rigid vision of the “perfect professor,” the variety shown by the demonstrators emphasizes that the participants must allow their own personality and inherent strengths to come through as a vital step toward excellence in the classroom. The demonstration classes visibly charge the workshop atmosphere as participants see theory put into practice in a manner that can be emulated. Rather than intimidated as some might assume, they seem to be convinced that the techniques are doable and definitely represent a path toward better, more effective teaching.

In conjunction with the demonstration classes, the participants are expected to put their learning into practice in short order. During the workshop, they develop and present at least three classes in a manner consistent with how they would back at their home university, but modified to incorporate the principles of the ExCEEEd model. In preparation for the workshop, participants bring course material from their home institution representing courses they have previously taught or are scheduled to teach in the future. Advertised as a high challenge but low threat atmosphere, small groups of four participants are aligned with three mentors from the ExCEEEd staff. Working sessions allow the participants to be coached through a deliberate review and

- Provide an Orientation:
  - “Why is this important?”
  - “How does it relate to prior knowledge?”
- Provide Learning Objectives
- Provide Information
- Stimulate Critical Thinking
- Provide Models
- Provide Opportunities to Apply the Knowledge:
  - In a Familiar Context.
  - In new and Unfamiliar Contexts.
- Assess the Learners’ Performance & Provide Feedback.
- Provide Opportunities for Self-Assessment

Figure 2. A Model Instructional Strategy
refinement of their course syllabus and associated teaching materials. Employing practical guidelines provided by the instructional strategy shown in Figure 2, the participants formulate learning objectives, develop in-class learning activities including lesson outlines and “board notes,” and work diligently to transform perhaps what could be viewed as dry, uninspiring old lectures into colorful, enthusiastic adventures in learning. The final test, of course, takes the form of a full “dress rehearsals” – teaching their class in front of their peers. As each participant completes a practice class, formal critiques are completed by at least two of the faculty mentors assigned to the group. These assessments identify strengths as well as areas for improvement and provide feedback on a variety of areas including perceived levels of subject matter expertise exhibited by the instructor, lesson organization, and conduct of the class. This “hands-on” atmosphere is normally heralded by the participants as one of the most beneficial aspects of the week long experience. The emphasis is clearly not to impart temporary knowledge but to plant and nurture long term seeds that would not only make the model a reality during the workshop but also provide for its export back to the participants’ home ground.

IV: The Two Programs: Different but Equally Effective

As discussed above, the basic concept for both the program at the United States Military Academy and at the University of Arkansas employed a three-prong course of action: address basic theories and fundamentals during seminars, employ senior faculty to demonstrate in “real” classroom settings, and challenge participants to develop, refine, and practice the skills they have discussed and observed. Figures 3 and 4 on the next page provide a graphic overview of the two workshop schedules along with the wide range of topics covered during seminars. Although the precise sequence and timing varied somewhat between the two sites due to personal preferences by site coordinators, both templates incorporated essentially equivalent mediums for structuring the workshop materials: seminars, demonstration classes, and laboratories. The seminars are collective events for all participants and include interactive presentations, discussions, and small group work. The seminar topics varied between the two programs to a small degree, but basically covered the same material involving teaching and learning principles and styles, communication skills, and assessment techniques for evaluating faculty and student alike. The seminars selectively highlighted critical topics from the Lowman and Wankat and Oreovics texts including those presented by this article as well as numerous personal success stories from senior professors and ExCEEd staff.

Almost without exception, participants acclaim the laboratories with their practice classes as an extremely beneficial aspect of the workshops. The two workshops scheduled the practice sessions either consistently in the morning or in the afternoon. Nevertheless, both venues proved highly effective and the time of day became an insignificant issue. As noted previously, to encourage better interaction and create more of a team setting for honing classroom skills, both workshops divided the participants into six groups of 4 participants each, augmented for the duration of the workshop with three permanent cadre – a senior mentor and 2 assistant mentors. During these sessions, participants practiced what they had seen, heard, and read. For both sites, according to feedback from
Figure 3. The ExCEEd Workshop as Executed at the US Military Academy at West Point

Figure 4. The ExCEEd Workshop as Executed at the University of Arkansas

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participants, the practice classes essentially defined the workshop utility and ensured its worth.

III. Conclusion

This article compares the common threads dealing with planning and execution of two separate and yet fully equal workshops, both dedicated to providing training for creating excellence in engineering education and for ensuring competence in the classroom. ExCEEd emphasizes personal performance, and allows participants to essentially learn by doing, guiding participants through some recognized fundamental tenets for teaching engineering in college. ExCEEd explores the theoretic background for effective classroom dynamics as well as the psychological aspects of how students learn. But perhaps most importantly, it also creates a safe environment for practical experimentation by junior faculty. It provides a documented and effective model for teaching with practical guidelines for implementation, but the workshops and ExCEEd staffs nevertheless emphasize individuality as a linchpin for future development of effective teaching styles and for continued faculty growth and improvement long after the graduation ceremony on the last day. The ExCEEd workshops have proven effective in the past and will hopefully continue to provide if not a spark at least a glimpse of one version of excellence in an engineering classroom.

Bibliography:


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