The ExCEEd Teaching Workshop: Hints to Successful Teaching

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Abstract

The purpose of this paper is to present successful teaching hints identified by one team as a result of their experience in the ExCEEd (**Ex**cellence in **C**ivil **E**ngineering **Ed**ucation) Teaching Workshop (ETW) and proven successful during the course of last year. ETW is an American Society of Civil Engineers (ASCE) sponsored one-week course offered at the United States Military Academy (USMA) and the University of Arkansas that provides the participants with the foundation necessary for continued growth and development towards teaching excellence. The team, comprised of six faculty members from various universities throughout the country, adapted what they learned during their ETW experience (i.e., kept journals) and through self-assessment and assessments by peers and students upon returning home to offer several successful teaching hints. The teaching hints, which are consistent with the literature on successful teaching, can be categorized into four areas: organization, preparation, practice, and rapport. This paper describes these teaching hints with everything from "full dress rehearsals" to memorizing your student's first names. The effectiveness of these hints with respect to teacher performance evaluations, student feedback, and self-assessments is also included.

I. Introduction

ETW is the direct descendent of the T^4E workshop, **T**eaching **T**eachers **T**o **T**each **E**ngineering[1]. T^4E was funded through the National Science Foundation (NSF) for three years and was provided at USMA for engineering professors with less than four years of teaching experience, i.e., civil, mechanical, aerospace, electrical, chemical, etc. T^4E was such a huge success[1] that ASCE decided to continue the program under the ExCEEd Teaching Workshop moniker with one caveat: the program is offered only to civil engineering professors with less than four years of teaching experience. To date, there have been three offerings of ETW: in 1999 and 2000 at USMA and in 2000 at the University of Arkansas with each session having 24 participants. There were nine observers from the ASCE Program Design Workshop[2] at USMA in 1999 and six observers (two each from ASME, IEEE, and AIChE) at USMA in 2000.

Modifications to the original one-week T^4E program have been relatively minor. Most changes have dealt with the addition or deletion of a few supplemental topics. ETW, and previously T^4E, uses the six-week instructor-training model from the Department of Civil and Mechanical Engineering (C&ME) at USMA as its foundation.

The ETW experience made such a dramatic impact on the team's teaching performance[3] that they felt motivated to pass along these hints for successful teaching. The teaching hints, which can be categorized into four areas: organization, preparation, practice, and rapport, were developed after review of the journals kept by each team member during the workshop and the discussions of common experiences at their respective universities during the year following ETW. The journals not only stimulated reflection by each member (material, methodology, perceptions, attitudes, etc.) as the week progressed, but also provided insight into possible hints for successful teaching. ETW is about learning and practicing new skills, internalizing methods for successful teaching, and developing as teachers during the week. The journals served as a vehicle for reflecting about this developmental process. The trends within journal entries[3] and the team's experiences at five different universities were highly consistent with the review of the literature. The hints listed in the journals and discussed via e-mail between team members were mentioned throughout most texts and articles on exceptional teaching techniques. Even some hints not formally presented during ETW, but discussed in depth within the literature, were mentioned by most of the team as being important to their success in the classroom upon return to their respective universities.

The ETW schedule is presented to set the stage for the list of hints. Hopefully, new faculty members looking for guidance about effective teaching can use the provided hints to assist them while learning to teach on the job.[4] However, these hints are not provided as a replacement for the exceptional ETW workshop, but as a reminder of some of the key points to being successful as a teacher and to serve as a starting point for those waiting to get into a teaching workshop. There is no replacement for actually teaching a class under a mentor's gaze and learning through a constructive assessment of the class. Peer, student and even self-assessments assist in fully understanding the realized benefits of ETW.

II. ETW Organization

How is ETW organized? ETW is a one-week short course (Figure 1) providing seminars on the basics of excellent teaching (using Lowman[5] and Wankat and Oreovicz[6]), demonstrations of effective teaching, laboratory exercises requiring the participants to teach lessons followed by group assessment, and discussions on how to apply the presented techniques in different university settings (laboratory, large classrooms, auditoriums, or seminar groups, etc.).

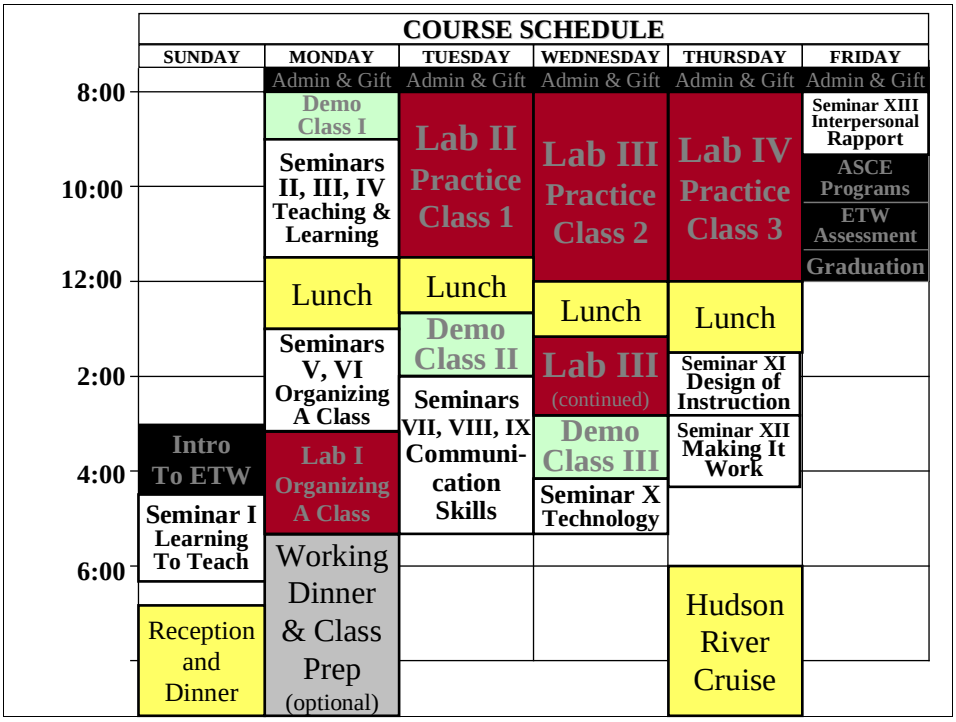
The most critical and transformational part of ETW is the opportunity to learn new techniques, then practice them in the three classes presented by each participant. Team members assume the role of students during the class and assessors at its conclusion. The senior mentor is the primary assessor for the first class, while follow-on classes are critiqued by all with the actual participant instructor leading the last critique with a self-assessment – essential for any improvement and/or maintenance of excellent teaching techniques.

The 24 workshop participants are divided into four-person teams along with a senior and junior mentor. The participants are professors from across the nation with one to four years of teaching experience. The team presenting this paper came from both research and teaching institutions representing the following civil engineering disciplines: geotechnical, structural, transportation, and environmental. The senior mentors are current or retired C&ME Faculty or graduates of T^4E

or ETW. The junior mentors at USMA are new C&ME faculty that just completed the full six-week version of C&ME instructor training. At the University of Arkansas, the junior mentors are recent graduates of T^4E or ETW.

The ETW schedule depicts the continual building process from the course and lesson objectives, to teaching principles, to lesson preparation, to rehearsals, to presentation of the lesson, to finally assessment of the lesson content and presentation. The tremendous success of this diverse group from such a short, very focused workshop is incredible.

Figure 1. Workshop Schedule



III. Hints

The team, comprised of six faculty members from various universities throughout the country, adapted what they learned during their ETW experience and through self-assessment and assessments by peers and students to offer several successful teaching hints. The presented teaching hints are highly consistent with the literature and can be categorized into four areas: organization, preparation, practice, and rapport. Following each hint is an assessment (when available) provided in a tabular format by students and peers, as well as, self-assessments.

Student assessments come directly from the course-end critiques. At many universities, there are standard questions asked of each student concerning the instructor's performance. The results provided to the instructor sometimes include comparisons of their performance to those in the department as a whole and the entire university. Whenever possible, these comparisons are provided below (note: scoring above the department average also placed the author above the university average).

Not every university has a formal peer assessment program. The United States Military Academy is fortunate enough to have such a program in many of its departments (e.g., each instructor must assess 3 peer classes of other instructors each semester). Some of the authors at other universities have been successful in establishing peer groups willing to assess each other's classes. There is no substitute for assessment. Whenever possible, peer comments are provided.

Self-assessments are the most subjective, but also extremely important, of the three types of assessment provided.[7] Most of the comments are the result of personal assessment of daily lessons, a block of lessons in a course, or an entire course.

IV. A. Hints – Organization

Success in any endeavor requires proper organization. This is especially true in higher education. Without an organized plan for teaching preparation, it can and will be placed secondary in relation to research. The preparation and presentation will not have the desired effect – properly educating and then motivating the students to continue in the discipline as a student, an educator, or a practitioner. "Most excellent instructors plan very seriously, fully aware that alternative ways of organizing class sessions are available, which go beyond the mere presentation of material to the promotion of active higher-order learning and motivation."[8]

Establish lesson-learning objectives. The real key to efficient lesson organization is to establish written learning objectives for each lesson prior to the start of the semester. The learning objectives not only guide lesson development, but also serve as a contract with the students as to what they should expect to be covered during the semester.[9] There must be at least one objective for each lesson. Generally, three to five lesson objectives are ideal with the verbs defining the level of desired performance based on Bloom's Taxonomy of Educational Objectives.[10] An example of lesson objectives for a lesson on truss analysis is:

- Define and Identify zero-force members in a truss.
- Solve for the internal forces of truss members using:
    - Concept of two-force members.
    - Through observation (by inspection).

Formal lesson objectives provide the proper focus for lesson preparation. Ideally lesson objectives should be provided to the students at the beginning of the semester. The first time through a course, individual lesson objectives may need to be developed as you prepare a block of lessons. If this is the case, provide them as a handout at the beginning of the block. As a minimum, place the lesson objectives on the board at the beginning of class or have the students physically refer to them in the syllabus (or recently distributed handout). The lesson objectives then serve as a road map to help the students understand the connectivity of what is being presented and discussed during the class. Of course, full student understanding of a lesson objective is accomplished through both in-class and out-of-class work (i.e., notes, discussions, reading assignments and homework). The listing of lesson objectives at the start of a semester never precludes a change in the course based on some type of assessment or determined need. Simply providing the rationale for the change and a listing of the new objectives for the changed

lessons will quell most student anxiety. No matter when the lesson objectives are provided to the students, the lesson objectives must be assessed at the conclusion of each lesson.

The table usually following each hint presents feedback or assessment from peers and students, as well as self-assessment at the conclusion of a lesson and a block of lessons. Review of the assessments for the team members over the past year provided valuable insight for each hint.

Establish Lesson-Learning Objectives		
Peer	Self	Student
• Always write them on the board. Physically check them off or mention them as you accomplish them.	• Important to give the students the big picture for each lesson. • Guides development of relevant topics/events to introduce each lesson.	• The lesson objectives help me focus on what to study – study aid. • I can see how certain topics fit into the class as they are presented. • Sense of purpose. • Instructor used lesson objectives. (Scored above Department Average).

Establish course objectives. In general, many professors establish course objectives before the start of the semester. Some may even provide a more detailed list of course objectives beyond what is mentioned in the course description. The course objectives establish the structure of the course that allows for connectivity between courses and provides insight into what the course is suppose to accomplish.[11] An example of a course objective in a Statics Course covering the analysis of trusses is:

- Apply equilibrium equations to calculate external reactions for member forces in trusses.

Any type of program assessment will assess each course's objectives to determine if the offered courses meet the stated program goals.

Establish Course Objectives		
Peer	Self	Student
	• I will limit change until I see student assessment. • Great - students know exactly what will be covered in the course.	

Schedule course in proper classroom. How a professor plans to conduct the class and engage the students dictates the proper type of classroom setting. "College classrooms are dramatic arenas first and intellectual arenas second."[12] Maybe this is why many classrooms have raised platforms near the board and overhead lighting to improve student observation of the professor during active learning. If a professor desires to conduct in-class small group exercises, an auditorium probably is not the best choice. Either individual student desks or large tables with multiple

chairs may be more suitable. The equipment in the room to include the amount of black board space, projection systems, etc. may limit how course material is presented. Is the classroom close to a laboratory or is their classroom space in the laboratory if experiments are part of the lesson objectives? Is there space in the classroom for large models or demonstrations? Is the course covering design or is it a seminar?[13] All of these (and many more) issues affect the learning environment for the course.

Even though there is an appearance at some universities that funding is only sought for research facilities rather than maintaining or upgrading existing classrooms, the professor must still seek out and demand classrooms that are conducive to learning if they are going to be able to establish the proper learning environment. Where is the future researcher nurtured initially? - In the classroom. The professor constantly must consider at the intellectual and emotional objectives that can be accomplished in class.[14]

Schedule Course In Proper Classroom		
Peer	Self	Student
• Big room (+) allows for demonstrations and lab exercises to be set up right in the back of the room. • This room has a lot of boards. Now you do not need to erase often during class.	• I like at least 10 black board sections (no erasing) to cover most material in a lesson. • I want a place in the room to place CE interest items in the room. • Room needs overhead screen (and phased lighting) not blocking a black board, if possible. • I like individual student desks so that I can modify the classroom setting from lesson to lesson.	• I like the when we work in small groups in class (by circling up desks).

Schedule realistic course preparation time. Each professor must organize their time (read schedule) to meet the requirements for research and teaching. Effective teaching requires time just like research to prepare, practice, grade, and just be available (i.e., office hours) to provide out-of-classroom assistance. Each professor has a threshold of required time to effectively teach a given lesson. A large amount of time is usually essential in preparing the lesson for the first time. Learning how to teach effectively before teaching that first class can significantly reduce the amount of time required to feel comfortable and prepared to teach any lesson.[15] Even less time may be required if little modification (based on assessment of lesson objectives, content, models, demonstrations, etc.) is required the second time a lesson is taught.

Schedule Realistic Course Preparation Time		
Peer	Self	Student
• Always prepared for class. Seldom carried around board notes.	• I need a minimum of half a day to prep for class. It used to be one full day of prep for one day of lessons. • I need 5 – 6 hours for a new lesson, 2 – 3 hours for a previously prepared lesson.	• Instructor was a master of the material. • Professor knew his stuff. • Instructor had a plan for every lesson. (Scored above Department Average). • Instructor demonstrated depth of knowledge. (Scored above Department average).

Schedule feedback. Students are a great source for determining how well you are presenting the course.[16] Some type of student feedback should be planned as a minimum at the end of each quarter of the course. The assessment can occur during class, on a course web page, or as a single page homework requirement. The key is to keep their input anonymous and to make changes or at least comment on their input. Remember, student evaluations are useful because they improve student morale.[17]

Schedule Feedback		
Peer	Self	Student
• Good timing for muddiest point paper at the end of class (first lesson in 5 lesson block). I know it was hard to adjust the next lesson, but I can see that the students benefited from it.	• Student feedback provides me insight to whether I have covered the material properly. • The students are very perceptive and catch idiosyncrasies that I do not know exist.	• Great teacher, you actually used what we provided during the one-minute paper and changed the next lesson.

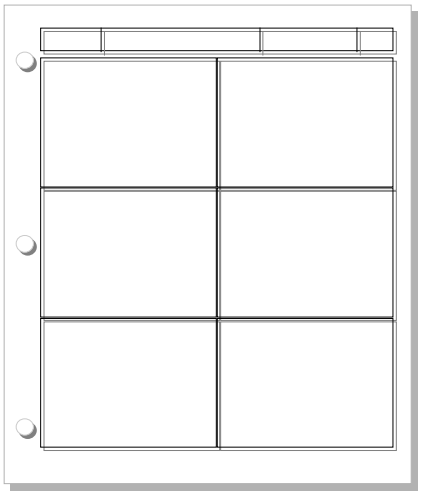
III. B. Hints – Preparation

There are only a set number of lessons during each semester for professors to properly cultivate learning within their students. When a professor walks into class, opens up the course folder to the sticky note marking the spot the previous lesson stopped, and begins at that point to try and determine what to discuss in class, precious student contact time is wasted.[18] The lesson can quickly turn into a presentation of conscious thought with an occasional concept being placed in any empty space available on the chalkboard. What is needed is a "grabber" – something at the beginning of class to stimulate the student's curiosity for the current lesson.[19] Maybe the "grabber" is a super demonstration or use of a great model (not sabotaged by missing equipment (i.e., the model) or inadequate preparation).

Board notes. A lesson is generally considered fully prepared once the professor has developed lesson objectives, studied the material, planned exactly what he or she intends to place where on the chalkboard, acquired the lesson materials (hand-outs, structural plans, models, etc.), built unavailable models, rehearsed the class, planned in-class group or individual exercises, planned possible in-class assessments, and prepared the associated homework. The key activity is planning what to actually present in class including the material to be placed on the board. "Teachers who carefully consider what content should be presented and how learning should be organized are more likely to orchestrate virtuoso performances than those who leave much to improvisation."[20]

During ETW, the development of board notes established what material was to be placed where on the chalkboard (Figure 2). Each rectangle represents a section of the chalkboard (reasonable

Figure 2. Blank Board Notes

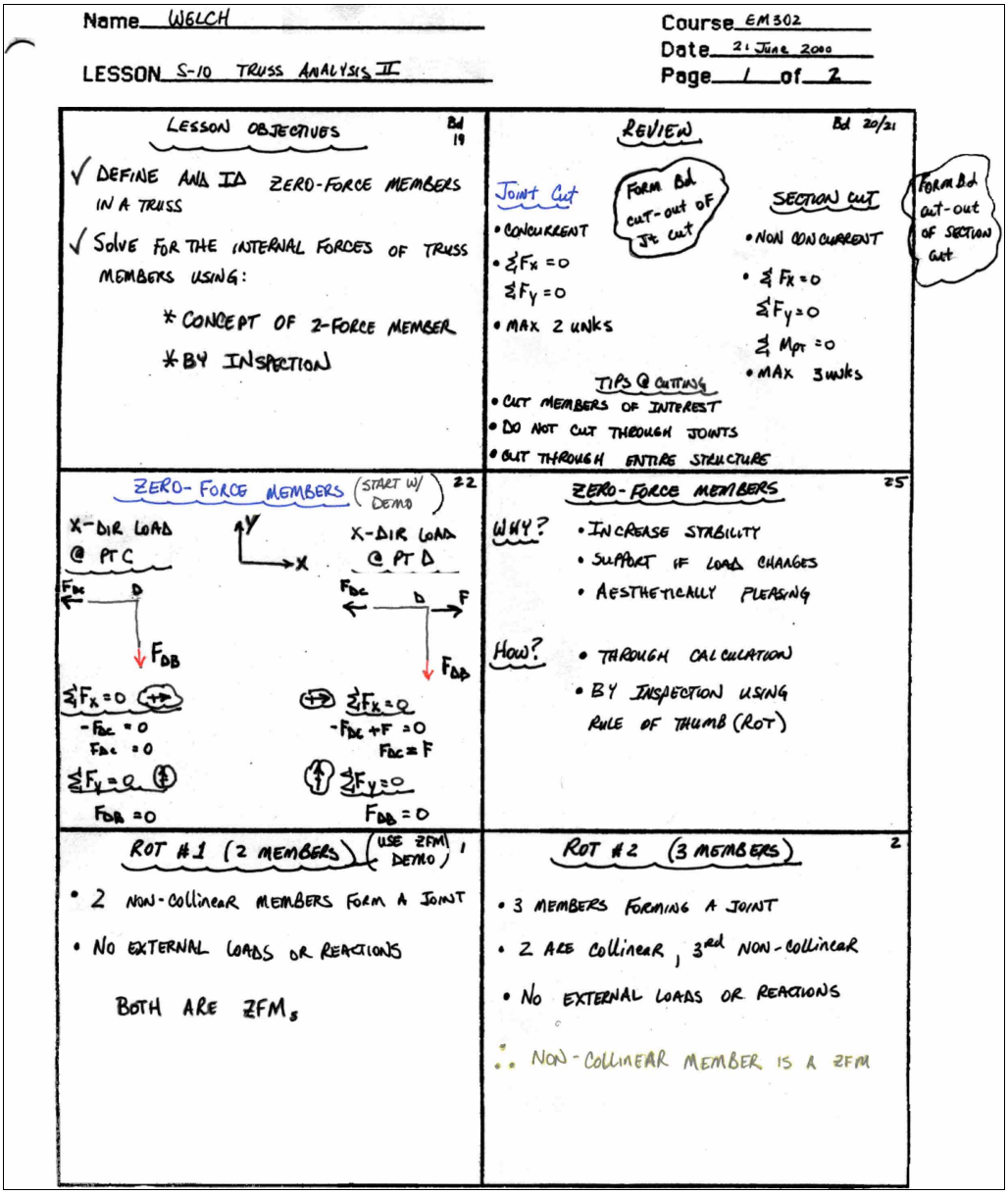


board space). Some board notes pages have 6 sections of material, while others may only have 4 sections. Board notes can be used to plan the entire lesson to include when to do a demonstration or use a model (Figure 3). The third board has a note (i.e., start w/ demo) as a reminder when the physical model needs to be used during the actual ETW demonstration class. Some teachers use the left-hand rectangles for the actual chalkboard material and the right-hand rectangles for notes or questions to ask in class associated with the material in the left-hand rectangle. Wankat relates this to the playwrights putting stage directions in their plays to indicate announcements, reminders, breaks for student activities, alternate solution paths, etc. Normally the posing of good, clear questions, rather than relying on spontaneity, requires thorough preparation.[21] Notice that only the minimum amount of material required to guide the student's learning should be placed on any one board (Figure 3).

Fully thought-out board notes usually accomplish all but the lesson rehearsal and the development of homework. Most homework usually causes in-depth use of the concepts presented in class (i.e., what is in the board notes). The process of reproducing/thinking through the board notes (i.e., tying together why we present the material in a certain order) will prepare

the professor to focus on engaging the students rather than thinking about what or how it should be placed on the board. If during board note development a group exercise is incorporated into the class, then the professor must decide if the student desks need to be arranged for the exercise

Figure 3. Board Notes For Workshop Demonstration Class



at the beginning or during class. If there is a desire to modify group dynamics for each group exercise, then the professor may want to place name cards (names on folded 5x8 cards) on desks prior to class. Board notes also provide a written record as to what was actually taught during that lesson which can be key during course assessment.

Board Notes		
Peer	Self	Student
• Great presentation and organization of board material! (30 out of 35 assessments). • Students can easily see points of emphasis based on chalk color. • No wasted effort in the class.	• Well thought out board notes free up personal memory during class, lessens my anxiety, and improves flow of the class. • Minimizes the amount of material placed on the board (efficient notes increase student learning). • I can view notes from a student's perspective. • Use to gage the timing of my class. I know how long it takes to put up one board worth of material.	• I liked how organized my notes appeared after your class. • My notes are now easier to use in studying the course material. • Instructor communicated effectively. (Scored above Department average). • Instructor demonstrated depth of knowledge. (Scored above Department average).

Physical models. Whenever possible, have a demonstration or physical model as part of a lesson. Just as with a play, except here the professor is the sole performer, the props greatly assist in developing the ambiance for the performance.[22] Simply put - a picture is worth a thousand words. During board note development, the suitability of models or demonstrations should become obvious. Some prep time is usually required to have a proper model prepared or a demonstration set-up in time for a given lesson.

Physical Models		
Peer	Self	Student
• Visual Learning is so important in your course. I could not fully understand concept until you pulled out the model. • Excellent training aids. (20 of 35 assessments).	• I need to try and have one for every lesson. • Need more demos even though I was not taught that way - I would have benefited greatly (especially us visual learners).	• I liked all the toys (models) in class – I could see (understand) many of the concepts much better. • Instructor used visual imagines. (Scored above Department average).

Use the textbook in class. During class, use the pictures and charts (tremendous aid and saves a great deal of time[23]) in the textbook when explaining equations or concepts. The chart or figure should be displayed on an over-head, but the student should be using their text to look closely at the figure. The professor should ensure that as much of the board note material as possible is referenced back to the text through written page or equation numbers on the chalkboard. This

technique generally meets the often expressed desire of students for additional structure that a textbook can provide.[24] If the student has to use the textbook in class to follow presented material, then they will more likely use the text during homework and begin the process of understanding how to self-learn through other available references.

Use The Textbook In Class		
Peer	Self	Student
• Good use of textbook in class. (Assessment by boss.)	• I use material in the textbook every lesson. I cite and write on the chalkboard equation numbers and figures.	• I actually used the textbook more in your course than in others.

Read the assignment before each lesson. Complete review of the material the students will use to learn with during the course ensures that the professor will make timely references in class to text material. This is especially true when teaching a course that you have not taught for awhile or if it is not in the professor's specific research area.[25] Life long learning is not limited to the areas that faculty are performing research in. For example, teaching a Mechanics of Materials course after not formally covering the material since second or third year of their undergraduate program will cause most professors to relearn many seldom used basic principles or maybe truly learn them for the first time. A professor must fully understand all material (notes, textbook, etc.) that is provided to the student to assist them in their learning process.

Read The Assignment Before Each Lesson		
Peer	Self	Student
	• I did this every lesson. I felt very comfortable pointing out when my notes differed from the text and when I felt a text example was worth reviewing in depth.	• Instructor demonstrated depth of knowledge. (Scored above Department average).

Assign design teams. In the real world engineers do not get to pick and choose who they want to work with. The professor should assign the teams based on some parameter(s) (background of courses, surveyed skills, in-class observations, etc.).[26] The assignment of students to teams

Assign Design Teams		
Peer	Self	Student
	• This is critical. I must set all teams up for success. Get to know them before assigning teams.	• I liked that teams appeared to be evenly stacked. • I would rather work with my friend on a design team (real world…?).

should be done early in the semester to allow teams to sit together and work together on in-class and out-of-class group exercises. Learning then truly becomes a team effort throughout the semester.

Develop homework after review of a block of lessons. This statement is as true for faculty teaching the same course every semester as it is for someone teaching a course for the first time. Since homework helps the student learn the material, all levels of Bloom's taxonomy should be covered.[27] Without a proper review of the course and lesson objectives, board notes, and reading assignments for a specific block of instruction (i.e., steel tension member design), a homework assignment could ask for something that will not be covered in the course or the textbook or beyond the skill level of the students. It is also important to work the assignment prior to handing it out to ensure that all required material is given or noted for the students to develop a proper solution. There is nothing more frustrating for students than to have key information missing in a homework assignment. A professor should not waste the time that a student is able to provide to a course by spinning their wheels while trying to solve a problem when some key information is missing in the problem statement.

Develop Homework After Review Of A Block Of Lessons		
Peer	Self	Student
	• I need to improve on development of homework that goes beyond repeating basic concepts covered in class. • Need homework that drives the in-class discussion.	• Out of class requirements met the 2hr guideline. (Scored below Department average – meaning homework could not be completed in 2 hours).

III. C. Hints – Practice

A professor who has been teaching the same course for a large number of years may be able to walk into a lesson with little to no practice and present it in an effective, flawless manner, while accomplishing the desired student reaction to the material. For the majority, some type of practice or in-depth review of the material is required. Who has the time? All of us must make time! Few of us are brave enough to walk into a conference without developing the slides, reviewing the order of the slides and thinking through what they plan to say. The same process must be used before presenting a lesson. Enough time must be set aside to ensure that the professor is confident about what, when, where, why and how material is to be presented.

Rehearsal. Bottom line, actors and actresses start with a script (board notes) and rehearse.[28] In the same way, a professor must rehearse to use the time available during a class as efficiently as possible. Good teachers will physically or at least mentally walk-through a prepared lesson one or two times. The last rehearsal may be on the way to class if it is not in the same building as your office. The lesson should have a certain flow to it with the questioning of the students (active teaching) used to not only lead the development of chalkboard material, but to provide

the transition (i.e., stage directions[29]) between lesson topics. The class should be organized, well thought out, energetic, and fun. Just think about some of the great lectures or classes you have been to, and then think about some of the worst. Even if the material was interesting, poor delivery has a huge negative impact.

The authors used the physical reproduction of the prepared board notes in the desired colors of chalk (using pens) as part of their mental rehearsal of the class. Difficult charts and figures to be presented on the chalkboard should be physically practiced at least once before the class (i.e., full dress rehearsal). It is amazing how difficult it is to recreate a complex chart or 3D picture on a chalkboard. Some would argue, why not just use an over-head of the picture or chart? If the completed chart from the textbook is the end result, then why not, but if the development of the chart is part of the learning process, then the chart must be developed on the board. It is usually very important to have an accurate figure on the chalkboard when done. Practice of what you will do during class is the only proven method.

Group exercises, demonstrations, and models will not have the desired affect if not planned and practiced. In fact, they may enforce a wrong concept if not executed properly or possibly embarrass the professor when they do not work or have missing pieces. The professor must be intimately familiar with all exercises, demonstrations, or models used during class.

Rehearsal		
Peer	Self	Student
• Black board drawings were very neat and easy to understand.	• Need to force myself to practice at the black board all tough figures. • Desktop rehearsal is more than adequate for me. I am satisfied. • More relaxed. Can concentrate on the students.	• Scored above Department average in all questions related to preparation, knowledge, and organization.

Memorize the board notes? The paradox is that the professor "needs to be thoroughly prepared yet appear spontaneous."[30] Over prepared may appear too rigid, while under prepared may appear as if you are confused. When a professor thoroughly understands the topic at hand, just knowing the order to present certain topics is all that is needed. Proper questioning and interaction with students will lead to development of the required board material. A new professor may want to nearly memorize the lesson. By not having to expend important memory thinking about what to present next, how to present it, what type of questions to ask, or constantly looking at prepared notes, the new professor can focus on engaging the students in the class through good questioning techniques, assessment of the levels of student understanding, connect seemingly off the mark responses to the over all concept, and even divert the discussion for very short periods to related student questions. Thoroughly knowing the preplanned lesson (almost memorized) and the end result of the lesson actually increases the freedom of the professor when presenting the lesson material.

Memorize The Board Notes?		
Peer	Self	Student
• Seldom looked at notes. Great flow to the class.	• To not have the board notes in my hands, I initially needed to memorize my notes. Now I visualize the flow and by rehearsing (rewriting the board notes, developing the student questions, and practicing the use of models or demos) the class a couple of times I can develop the board notes while engaging the students.	• Your classroom environment made learning fun.

III. D. Hints – Rapport

There are many who feel that developing rapport with the students in each course they teach is unnecessary, but it is obvious that students who enjoy the time they spend with their professor, enjoy the classroom environment, and are actively engaged in class feel they learn more or at least enjoy the learning process.[31]

Learn student names. Student names should be learned by the second class. The authors feel

Learn Student Names		
Peer	Self	Student
• Wow! You knew most names by the end of the first lesson.	• Knowing student first names makes teaching more personable. • More students actually wave or say hello around campus or at the mall. It used to be just a nod before. • More conducive atmosphere for learning.	• Was very surprised and happy that you took the time to learn my name. • The instructor served as a role model. (Scored above Department average). • Instructor demonstrated enthusiasm. (Scored above Department average). • Instructor cares about my learning. (Scored above Department average).

that learning the student's first names greatly assisted them in developing personal rapport with their students. It produces more engaging active instruction by allowing the professor to call on a specific student for specific questions.[32] It allows the faculty to greet students in a more personable way around campus or town. The simple requirement to have their first name on a folded 5x8 card (the professor provides) on the desk for one or two weeks is generally all that is required to learn everyone's name. A few great teachers are known to stop the first lesson early to videotape each student as they depart. This visual aid with the student saying the name they want to be called provides for a more rapid face to name recognition.

Ask each student a question daily. Active education implies engaged students through out the lesson. The best technique is to train the students to expect questioning during the lesson. Ask the question, pause, and call on a student using their first name.[33] Once trained, the simple act of posing a question will heighten everyone's senses (keeps all students "at risk"[34]) and cause them to think about an answer for the question. Once the students know that you will call on everyone, call on each student more than once each lesson to ensure that they do not disengage once they arrive for class or answer their first question.[35] Keep the students on the edge of their seat. Challenge them. Asking questions also slows down the presentation to allow students to ponder or catch up. Once the professor asks questions, the students will eventually be encouraged to ask the professor questions based on intriguing course material – and then true learning begins. Asking each student a question each lesson shows that you care about their learning and want to include them in the learning process.

Ask Each Student A Question Daily		
Peer	Self	Student
• Good questioning techniques. • You spread the questions around the classroom. • A number of students raised their hand to tackle what I thought were tough questions.	• Not easy to do. Must work at it. • I must ensure that a handful of students are not the only ones participating. • I must not always call on the brightest to answer my questions. • Questioning is an art form.	• I felt like I could not hide in your class. • You kept me focused in class because I never knew when you would call on me. You never let me off the hook with "I do not know". • I like to participate in class, but I do not want to raise my hand. You made it easy to participate.

Be early to class. Go to class early and even hang out after class for awhile, even if it is outside of the classroom waiting for the last class to end or the next to begin.[36] Engage the students in conversation to learn more about their interests and what is happening around campus.[37] Maybe answer a few questions concerning a past lesson or the current homework they are working on. Be personable and let the students learn more about the life of an engineering professor.

Be Early To Class		
Peer	Self	Student
	• I always get to class 15 minutes early. • I try to engage the students in some conversation. Over time more and more students arrived early to class and joined in on the conversations.	• I enjoyed talking to you about engineering practice. • I am thinking of going past a masters degree after talking to about your research projects.

Smile. If a professor does not enjoy teaching, change professions. It is extremely important that students see the faculty enjoying teaching.[38] A smile is a great invitation to join the learning process, to try to answer the question posed, and to ask a question that is probably on other's minds. Students are more likely to participate if they see the professor as friendly. Tom Lenox, ASCE Educational Activities Department, has been quoted to say on more than one occasion: "When you walk into the classroom or a meeting for after class assistance, there is NO other place in the world you want to be. Make the student feel that they are important to you."

Smile		
Peer	Self	Student
• Students appeared to enjoy being in your class. There was a lot of laughing and smiling by all. • Very enthusiastic. (30 of 35 assessments.)	• Allowing enthusiasm for subject material to come through. • Proper completion of all hints makes this easy to accomplish – being prepared makes it fun.	• Instructor demonstrated enthusiasm. (Scored above Department average). • I enjoyed being in your class even though the tests and homework were hard!

Know your students. Get to know more about who your students are by using a student survey on the first day of class. Ask what is their favorite movie, song, performing group, sport, university activity, etc. Who knows, you just might have something in common with them. Let the students know the results of the survey to show that you actually reviewed the information they provided. Usually there are a few unique responses that will provide instant humor in any setting. If activities that interest you are added to your schedule, then something that is fun for you can also be used to connect with your students.[39] A thumbs-up at the event for a great performance or personal comment before class starts or a class wide comment enlisting the future support of more students for an event, can help the students to connect with the faculty.

Know Your Students		
Peer	Self	Student
	• You can turn a student on to your course by just talking to them. This is very important. • I played the music at the beginning of class they mentioned in my first lesson student survey. • I enjoyed talking to those with an interest in soccer, volleyball, and wrestling. I usually was able to get the inside scoop.	• Instructor wanted to know what are my skill levels. Appeared to adjust lessons to meet my needs. • Instructor cares about my learning. (Scored above Department average).

IV. Benefits

The authors truly enjoy teaching. They are more relaxed and enthusiastic in the classroom, partly due to experience, but mostly due to the lessons (hints) learned at ETW. Although there are aspects of teaching that some people are born with and some without, ETW identifies several objective approaches to improve any faculty member's teaching ability. The training gives a sense of confidence through completion of a successful program taught by successful teachers. Ultimately, it is the students who benefit most by a program such as ETW. The one-week program is undoubtedly rigorous, but its benefits should last a lifetime.

Although revising teaching methods to incorporate the teaching principles advocated by ETW was a significant investment in time, the authors found that they were more effective in teaching preparation activities. A great deal of time can be saved when preparing in an efficient and effective manner. This gave them the ability to move beyond their preparation and look more closely at the student. How are they doing? Is the pace right for them? Do they understand? Who is having trouble? They look for continued improvement in teaching efficiency as they gain experience. The methods discussed in the workshop are adaptable to any engineering professor's individual teaching situation.

ETW taught us that teaching takes place only when the students are learning. Many equate teaching with the act of presenting material in a lecture. ETW showed us how to organize a class, effectively present the material, and establish good rapport with the students. The improved rapport with students is so valuable. It makes being a faculty member more enjoyable and productive. Generally, the classroom is filled with laughter as the students have fun and get caught up in the professor's excitement for the subject material.

A number of the authors were nominated for teaching awards with one winning a department teaching award. The accolades have increased from both peers and students alike. Most areas assessed have shown dramatic improvement to the point of generally exceeding departmental and university averages. Some peers are now adopting displayed techniques (i.e., board notes, models, demonstrations, etc.) for their own use.

V. Conclusions

Based on their experience in ETW and back at their home universities, team members conclude that formal instructor training should be required for every professor AND every teaching assistant. The granting of a degree (Ph.D. or MS) does not automatically bestow teaching skills, especially effective teaching skills. Most professors simply try to emulate observed styles without any justification as to the effectiveness of different teaching styles. The lack of formal training programs at most universities, and nearly nonexistent programs to provide constructive criticism from peers relegates most faculty to the very slow process of developing effective (if they are lucky and persistent) teaching styles through a long career of trial and error. Add the demands of research and the appearance at many universities (probably true) of the greater importance of research over teaching, and it is easy to understand the reason for the large number of ineffective teachers at the college level. However, it only takes a relatively small amount of focused effort in an exceptional program like ETW to lay the necessary foundation to become an effective teacher. Even though the workshop does not have to necessary look exactly like ETW, the workshop must present the principles of effective teaching (i.e., presentation skills and class organization), demonstrate effective teaching styles and techniques, and require the participants to practice their skills under a mentor's gaze and assessment.

The hints for successful teaching were presented as a synopsis of the key ingredients of the ETW workshop. These hints are not provided as a replacement for this exceptional program, but as a reminder of some of the key points to being successful as a teacher and to serve as a starting point for those waiting to get into a teaching workshop. There is no replacement for actually teaching a class under a mentor's gaze and learning through a personable assessment of the class. For more information concerning the ExCEEd Teaching Workshop, see www.asce.org/exceed.

ETW is a valuable experience for any faculty member no matter their level of experience. We all can continue to improve our teaching techniques – the students deserve no less. Teaching should be fun. Focused improvements in presentation and organizational skills and rapport with the students will make it a reality. Teachers have the greatest impact on our nations youth by influencing, and hopefully inspiring, major selection, elective selection, and possibly the desire for advanced degrees.

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