ExCEEd Impact on a New Professor

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Abstract

The purpose of this paper is to present quantitative information and qualitative remarks regarding the impact of the ExCEEd Teaching Workshop (ETW) on an assistant professor of civil engineering technology at a regional campus of a large state university system in the Midwest. The participant attended the ETW during the summer between the first and second years of a tenure eligible appointment. Features of the ETW were adapted to the participant's teaching immediately following the workshop and have continued in use with some adaptation since then. Aspects of the workshop that were adopted immediately were listing of objectives for each class, development of board notes, movement away from the chalkboard during class and use of colored chalk. The manner for class preparation of board notes, presentation style, and the use of colored chalk and its impact can not be over-stated. Furthermore, the workshop instilled a confidence to conduct class in manners other than routine lecture that was not gained from experience as a teaching assistant in graduate school, as a visiting assistant professor, or from a tenure eligible position for 1 year. The impact of the ExCEEd program has been significant and quite positive.

Introduction

The author began a position teaching after over 10 years experience in the civil engineering field. The teaching position was in the disciplines of civil engineering technology and construction engineering technology and while previous work experience did include 3 semesters as a teaching assistant, no formal training in what a professor is supposed to do was a part of the author's background. While work experience in industry is a requirement of the teaching position, no experience in teaching was required in order to be hired. The initial teaching position of the author was as a visiting assistant professor in August 2001. Subsequently, the author was hired as an assistant professor on a tenure track appointment in the summer of 2002.

Initial aspects of this career change were not completely positive. The visiting appointment was accepted much due to the loss of a job with an engineering consulting firm and occurred with less than 3 weeks before the first class began. This made the work of preparing to teach 3 classes for a first time instructor all the more challenging. Syllabi were prepared, classes were held, and grades were assigned for this first semester of teaching but the effectiveness of teaching was suspect and the amount of learning by students was questioned by the instructor. Student evaluations and comments from the first year of teaching were below department averages and oftentimes quite critical of the

instructor. Regular faculty did offer assistance to improve instruction, campus workshops on teaching were attended, and consideration was made to apply for the ExCEEd program for the summer of 2002. The application was not supported by the department due to the applicant being a visiting assistant professor. As the end of the year teaching as a visiting assistant professor neared, no hire had yet taken place to fill the vacant assistant professor position and a job with a county surveying department in another town was accepted. Consequently, the assistant professor, tenure track job was accepted later in the summer.

Teaching on a tenure eligible appointment opened resources for better teaching and instilled a desire to plan for a career in the field. Campus resources to improve teaching were used including CELT (Center for the Enhancement of Learning and Teaching) and FACET, the Indiana University Faculty Colloquium on Excellence in Teaching. An application was submitted for the ExCEEd program in the first year of this appointment. ExCEEd stands for Excellence in Civil Engineering Education. ExCEEd and the ETW are well documented in past ASEE Conference Proceedings, particularly by Estes and Ressler[3] and by Welch et al[6]. ETW is a week-long, intensive workshop that instills the ETW teaching model. This is done through a series of presentations; labs; demonstration classes conducted by ETW mentors; and practice classes conducted by participants, video recorded, and observed and critiqued by mentors and other participants. The author was accepted to ETW and received a fellowship for attendance. The fellowship ensured participation. The investment of over $3000 in the workshop, travel, and lodging would likely not have been covered. This is particularly the case after changing careers and uncertainty of a new chosen line of work.

ETW Changes

Many changes to teaching style were adapted immediately following participation in ETW. Furthermore, aspects of ETW continue to be adapted to various classes and molded to fit the instructor, class, and group of students. ETW practices used pertain to both class preparation and class delivery.

Class preparation changes concern the manner that class is planned. Class is planned as a performance. This is done for each individual class. Specific actions in class are choreographed on a regular basis although not for every class. Such actions may include minute papers, group discussion, or the use of props to illustrate concepts or draw attention. Board notes are prepared for each class. This is done from the perspective of putting on the chalkboard all information in a manner that is easily followed by students in order for them to record in notes. Board notes are prepared with colors matched to the use of colored chalk.

Class delivery concerns the use of the chalkboard, physical presence & movement, and timing. The chalkboard is used extensively and colored chalk is employed for nearly every class. The chalkboard is washed clean with water & rags prior to each class. The chalkboard is washed clean with water during class if the board if the board needs to be erased. While PowerPoint presentations were used for many classes in the year prior to

ETW, this technology is now used sparingly. A deliberate effort is made to physically move around, if only 1 or 2 steps, every 10 to 15 seconds. This is also when students can be asked questions. Furthermore, every 3 to 5 minutes, effort is made to walk away from the chalkboard, into the class aisles. Hand gestures are used and notes are left on a desk at the front of the room, not held in the hand. Momentum shifts to class are planned every 10 to 20 minutes to break up the flow of class so that students can reset their attention span. These shifts range from short durations of 10 seconds by walking deep into an aisle and making a comment not related to subject matter or tangent to subject matter to longer durations when minute papers and group exercises are conducted. Momentum shifts have been the most difficult aspect to adhere to because the class content momentum often drives forward past these plans.

Initial Impact

The initial impact of ETW was monumental. While the author has always had a desire not only to succeed but also to exceed in each and every endeavor, the ExCEEd program provided inspiration to work toward teaching at a level of a "Complete Exemplar"[3,5]. Preparation for classes immediately following the ETW included using board notes, using colored chalk, getting away from the front of class, and posing many more questions to the class & individual students in class. Furthermore, teaching was done with more confidence and thought, much attributable to the practice classes during ETW. Video tapes of classes were also made to allow after class assessment and reflection of what the students saw during class.

There is ongoing thought of how much of the ExCEEd model to adopt and how will it work out for the particular instance of each class now being taught. Class and the job of being a professor are all considered in the realm that focus is on student learning. Thus, at different times, for different classes, different aspects of ExCEEd have been used in class. The general opinion is that teaching and student learning has improved significantly due to ETW attendance. The reaction of students has been positive.

Quantitative Impact

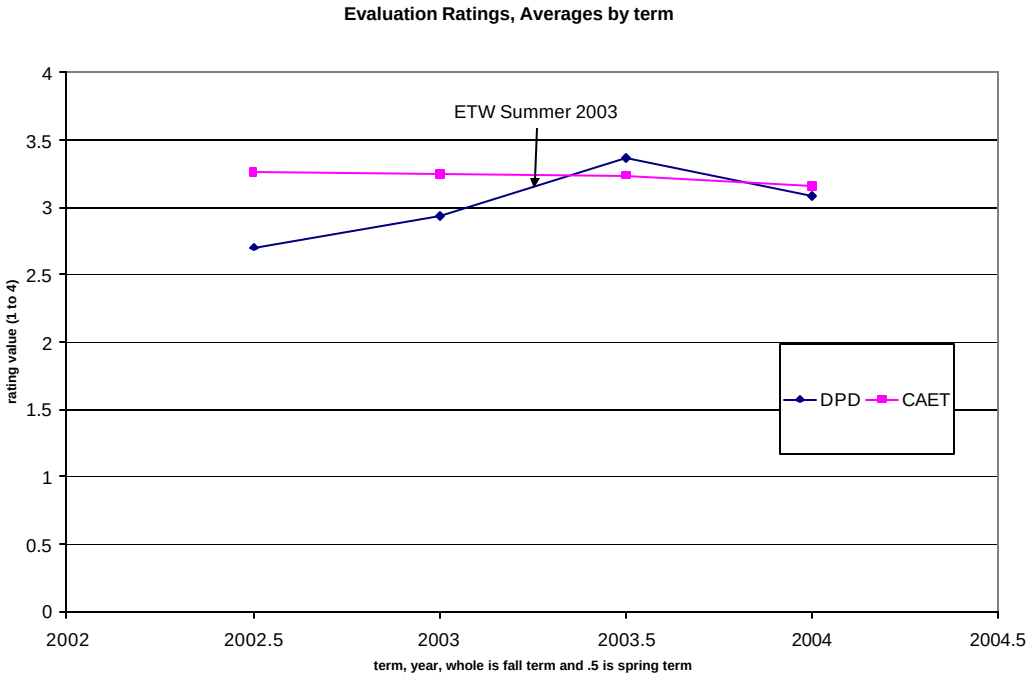
Quantitative aspects of the impact ETW has had are primarily shown through ratings students make on the end of semester evaluation forms. Standard school CAFETERIA rating forms are used by the School of Engineering, Technology, and Computer Science. The rating forms have a series of 17 questions/comments that students respond to by filling in bubbles on a Scantron sheet. Annual faculty review reports ask for use of student responses to only 8 of these questions/comments. Students rank these as 4 = Excellent, 3 = Good, 2 = Fair, or 1 = Poor. These eight questions/comments are

- The instructor's knowledge of subject
- The instructor's ability to present material in a clear and organized fashion
- The instructor's interest and enthusiasm for the subject
- The instructor's concern and helpfulness with individual students
- The instructor overall

- Assignments/homework are related to course goals
- The exams, quizzes, reports, etc. adequately measured my understanding of the information presented in this class.
- The course overall

The increase in average ratings for all eight of the questions/comments by academic year was 12% of the year before ETW compared to the year after ETW. Ratings from the second year after ETW will be available at the 2005 ASEE Conference. Not all students registered for the class elect to participate in these ratings. Figure 1 shows the average ratings per semester for the author compared to the overall value of all faculty in the department. The average student ratings initially exceeded the department average and then were near the department average for the semesters following ETW. Ratings prior to ETW were below the department average. An updated chart with data from the 2004-2005 academic year will be presented at the conference. Attending ETW as well as reading *Teaching Engineering*[5] allows a much better interpretation of student ratings and their value. The text *Teaching Engineering*[5] was provided to ETW participants. Some aspects of class that influence student ratings, which are based in research, can be considered when using these student ratings in annual performance reports, discussions, and promotion and tenure documents.

Figure 1



While the student ratings are an indication of improved teaching, they are not necessarily directly attributed to ETW. Experience likely accounts for some of the improved ratings. A Specific Instructor Evaluation (SPIE) can be used to assess teaching and learning in classes as well as determine student response to particular aspects of class that were done as a direct result of ETW. The details of using a SPIE are presented by Devine[1]. An

example of a SPIE is included in Appendix A. Each student in class is required to complete the SPIE and it is termed as an invitation to the final exam. Students complete the SPIE evaluations in much more detail that the standard rating forms.

Results of the SPIE used to quantify aspects of ETW that students can assess are presented in Table 1. Aspects of the SPIE used most recently are very much concerned with how the chalkboard is used in class. It is expected that these aspects of class would be well received by students since ETW is based on conducting class in manners that have proven effective in the past and is supported by research to be effective. A majority of the responses from students that are not positive in regards to the value of ETW practices come from a class that covers the subject of economic analysis while the other classes are all based in structures. The structures classes make much more use of diagrams, sketches, and images. Thus the ETW model, particularly with the use of colored chalk & the chalkboard, are rated more positively by students.

Table 1
Results of the SPIE

Question	Yes	No
Did you notice when the chalkboard was wiped clean during class?	91%	9%
Was this beneficial to you as a student?	79%	21%
Were you able to read and see the board more easily when the chalkboard was cleaned during class?	98%	2%
Do you encourage the practice of cleaning the board during class?	70%	30%
Did you notice the use of colored chalk during class?	88%	12%
Did the use of colored chalk enhance learning?	79%	21%
Did the images/photos or music in class enhance your learning of the subject matter?	68%	32%

The SPIE also included related questions that students responded to on a 5 level Likert scale. Results of these questions are as follows:

It is important for the instructor to clean the chalkboard during class.

Strongly Disagree **Strongly Agree**

1	**2**	**3**	**4**	**5**
Average		Max	Min	Mode
3.26		5	1	4

I follow information on the board better when colored chalk is used.

Strongly Disagree			**Strongly Agree**	
1	**2**	**3**	**4**	**5**
Average		Max	Min	Mode
3.59		5	2	4

These results suggest less enthusiasm from the students for cleaning the board and using colored chalk than the yes and no questions that assess the same aspect of class.

Qualitative Impact

Qualitative aspects of the ETW impact are expressed through thoughts and reflections by the author and by various student comments as reported on SPIE. The main point of writing this paper is to express that the ETW has a very significant and positive impact on this individual attendee. This sentiment is shared and documented by other ExCEEd graduates[6] although not in a quantifiable manner directly to classes that are taught. The author teaches classes in a more confident and active manner and believes that students are learning more in class.

Students provided comments to aspects of class that are directly attributed to ETW. Responses to specific questions on the SPIE to assess the impact of class components done as a result of ETW are presented in Appendix B. The results in Appendix B are from only one class in the Fall 2004 semester. These results are consistent with other classes. It is beyond the scope of this paper to present a comprehensive listing of all results. Each student in this class of 29 completed the SPIE. Student responses are characterized for particular questions as follows:

Did you notice when the chalkboard was wiped clean during class? Yes No
Was this beneficial to you as a student? Yes No
How or why/why not:
- It was easy to see
- Made things nice and clear
- Board was clear of other work

(positive comments like this are predominant)

Did the use of colored chalk enhance learning? How/why not:
- it made following the diagrams easier when the perspective of the diagram changed.
- It helped to distinguish between certain aspects of a problem
- It helped because it separated different parts of each problem

(positive comments like this are common although not predominant)

Did wiping the board clean during class distract you?
- No, [response of many students]

- No, It actually provided a brief moment to gather the information you just talked about.
- Yes
- Yes, took up time

(somewhat mixed results by students, although generally positive)

Remarks by students on more generic evaluation forms also indicate that students evaluate the instructor in a much more positive manner. Recent comments from student evaluations include remarks such as follows.

What did you like most about this course?

- The instructor.
- Well organized and presented in a format that made learning easier.
- The instructor's ability to explain difficult and abstract concepts clearly made this course easy.
- I understand Physics a lot more because of this class.
- The instructor's attitude. Relate to students.

What do you consider to be the instructor's strengths?

- His enthusiasm of the course.
- Excited about structures.
- He really has a great interest in the subject and engineering.
- Well organized, knows the subject well and seems to care.
- Knowledge of the subject and ability to explain the subject clearly.
- Knowledge of and his presentation of the subject, he should teach Physics. I learned more about Physics from him that I did my Physics teacher.
- Concern for student and what they are learning.

What do you consider to be areas where the instructor could improve?

- Have some handouts on what he is going to talk about.
- Review for tests more by doing example problems before test.
- Answering questions one on one.
- Not sure there are any.
- Sometimes overly enthusiastic.
- His approachability and being a little dry.

Questions about how the instructor could improve or how the course could be improved seem to be left blank or students write "N/A" and "no comment" sometimes. Whereas prior to ETW students often responded much differently in negative fashions, often with comments not fit to be repeated. In the first year of teaching in the capacity of a visiting assistant professor, the suggestion of a new instructor was common. Some students were even critical of the base knowledge exhibited during class. Prior to ETW the author did not make a point to be outgoing and expressive in class as that is not a personal or natural characteristic. Subsequent to ETW, playing the role of "Professor" in a production called "Class", class consists of physically moving away from the chalk board, moving hands

and creating gestures, as well as forcing "fun" is a rehearsed and conscious effort. Thus, the comments students make about instructor enthusiasm are interpreted as a direct result of ETW.

Negative Impact

Some impacts of ETW are considered negative or are construed in a negative manner at the moment. The workload to prepare for class has at times remained high and time consuming. A statement made during ETW has also troubled the author. This statement was in regards to the ethics of teaching, qualifications for teaching, and quality of teaching. The author does not have a Ph.D. as is common to many university instructors and teaches many classes in structural analysis while having degrees in civil engineering that have been concentrated in study of environmental engineering and water resources. Thus concern is raised by the author's own ethics, qualifications, and quality of instruction. As student evaluations have improved this concern is subsiding. Reading comments by students in a statics class of how that instruction improved understanding of physics and suggesting teaching a physics class further diminishes this concern.

Some student comments on evaluation forms for the first semester following the ETW expressed discomfort by the number and manner of questions asked during class. One student was critical of the questioning and remarked "calls on me for no reason." These comments were discussed with tenured faculty and it was suggested that questioning of students not be done in the ETW mode for classes conducted at this university.

ExCEEd staff devoted significant amounts of time outside the actual workshop schedule that was so impressive it makes it difficult to not want to devote so much time in preparation of class. The thought is that with more work and effort, class can be better. A comment about the amount of time ExCEEd staff worked elicited a response, "we are here to serve you." But this thought simply humbles the author when considering that most of the ExCEEd staff and the person who made this response are active duty members of the United States Army who are in fact very much serving me and my country in this present day.

The concept of performing in class has at times made it difficult to sleep. When the surrounding environment is quiet and relaxed near bedtime, it is common to have thoughts race about of how the next day's class could be delivered differently or more effectively as well has just doing a mental rehearsal of class. It then becomes difficult to clear the mind and go to sleep.

Conclusion

Features of the ExCEEd Teaching Workshop were adapted by the author for class. Student evaluations improved and teaching is perceived to be better following ETW. Significant improvements in student evaluations of the teacher were evident in the first semester following the workshop. Student responses to aspects of the workshop adopted in class have been nearly overwhelmingly positive. Continued use of aspects of the ETW

are planned in the future as well as a review of workshop materials, correspondence with workshop mentors and attendees, and adaptation of additional aspects of the workshop. The experiences of the author are that the ExCEEd program has an enormously successful impact.

Bibliographic Information

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5 Wankat, P.C. and Oreovicz, F.S, *Teaching Engineering*, McGraw-Hill, Inc. 1993.

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Biographical Information

David P. Devine, P.E. is an Assistant Professor of Civil Engineering Technology in the Department of Civil and Architectural Engineering Technology at Indiana University Purdue University Ft. Wayne (IPFW). He is a registered Professional Engineer in Indiana and has earned a Bachelor of Science degree in Civil Engineering from the University of Notre Dame and a Master of Science degree in Civil Engineering from Purdue University.

Appendix A
Example of a Specific Instructor Evaluation (SPIE)

CET 283 Spring 2004, Final Exam Invitation
Specific Instructor Evaluation of David Devine

Did you notice when the chalkboard was wiped clean during class? **Yes** **No**

Was this beneficial to you as a student? **Yes** **No**
How or why/why not:

Did wiping the board clean during class distract you?

Were you able to read and see the board more easily when the chalkboard was cleaned during class? **Yes** **No**

Do you encourage the practice of cleaning the board during class? **Yes** **No**

It is important for the instructor to clean the chalkboard during class.
Strongly Disagree **Strongly Agree**

1 **2** **3** **4** **5**

Did you notice the use of colored chalk during class? **Yes** **No**

Did the use of colored chalk enhance learning? **Yes** **No**
How/why not:

I follow information on the board better when colored chalk is used.
Strongly Disagree **Strongly Agree**

1 **2** **3** **4** **5**

Late assignments should be accepted and missed quizzes & exams should be allowed makeups.
Strongly Disagree **Strongly Agree**

1 **2** **3** **4** **5**

Do you believe the standard evaluation forms are of any value? **Yes** **No**
Why/why not:

How would you improve the standard evaluation forms?

Did the images/photos or music in class enhance your learning of the subject matter?
Yes **No**
How/why not:

Did the ethics assignment enhance your learning of the subject matter?
Yes **No**
How/why not:
Should an ethics assignment be a part of this class? **Yes** **No**

How/why not:

Please offer any other advice that may enhance student learning or improve Professor Devine's teaching ability. Use other sheets if needed. Thank you for your response.

Appendix B
Complete Student Qualitative Remarks on SPIE from a Fall 2004 class
(note that spelling and grammar errors have not been corrected from original student responses)

Did you notice when the chalkboard was wiped clean during class? Yes No
Was this beneficial to you as a student? Yes No
How or why/why not:

- It was easy to see
- Made things nice and clear
- Board was clear of other work
- If someone before used the chalk board then you could see their marks.
- it made diagrams more clear
- It makes examples easier to follow
- It made the problems much clearer to see and easier to follow
- The material on the board is easy to make out when it is wiped clean
- It was easier to read the problems
- I could clearly see the problems
- clearer to see
- [no response or comment by some students]
- Clean chalkboard has no distractions. Allowed me to focus on the new information.
- The board did not have remineants (sic) of other profs writing. It was easier not to get confused.
- I could read the board a lot easier
- I was not distracted by the unclear board.
- It removed the possibility for poorly erased material to cause confusion during following problems.
- There was no confusion of what whas (sic) being wrote (sic).
- It didn't help me in any way.
- The Board was still ledgible (sic) if wasn't wiped down, it just made it better
- (arrow to "Were you able to read and see the board more easily when the chalkboard was cleaned during class?") student responded Yes
- I thought it wasted time
- The board is really not that dirty Dave
- I don't like stuff from other classes in my current class
- could see your writing clear

- because it was clean
- Yes because I wasn't overwhelmed w/ info. & the info. was in big enough print for me to see from the back of the room. The board wasn't cluttered. No. because sometimes info. erased I would have a question about & you would have to reference your notes.
- I admit, it does make it easier to see what the instructor is writing, and it looks nicer, but it really isn't necessary, I've survived this far.
- see items on board more clearly
- help me read the board more easily
- The material on the board could be seen better
- It was easier to read what was written
- Made it easier to see
- It really doesn't matter.

Did the use of colored chalk enhance learning? How/why not:

- clear to see
- No [response by several students]
- kept things organizes
- separated different elements
- everything was separated
- it made following the diagrams easier when the perspective of the diagram changed.
- It helped to distinguish between certain aspects of a problem
- It helped because it separated different parts of each problem
- I didn't pay a whole (lot-sic) of attention to it.
- It helped to visualize certain aspects
- I could differentiate between different things.
- distinguishes between different elements
- It organized the problem. Less confussion(sic).
- It was easier to understand what was what. It would have been too cluttered with only one color
- helped
- specified sections in problems
- drew attention
- It showed different elements of the problems being worked
- When used in coordination properly the writing and points were more clear.
- It kept different things separate
- The different color represents a different step
- separates (sic)
- Call out more important aspects.
- Didn't make that much of a difference
- kept the different steps clear
- easier to see different steps
- No, it didn't help for this class but it can help to differentiate or make one thing stand out more than others.
- Especially on some CFD's, however it seems to be harder to erase.

- Differentiate among items in problem Pertinant (sic) data used different colors
- help me understand separate parts of a problem and which help understand the problem even better
- I didn't pay any attention to it.
- sometimes its nice but the colors aren't that apparent
- There is not that big of a diff. from the students (sic) standpoint
- Shows different aspects of diagrams
- It made it easier to distinguish between different measurements & layers in a drawing
- I didn't notice it
- [no response by 1 student]
- Clarifies items.

Did wiping the board clean during class distract you?

- No, [response of many students]
- No, It actually provided a brief moment to gather the information you just talked about.
- Yes
- Yes, took up time

Not really
No, but I think it did take more time than w/ chalkboard eraser.
?
somewhat
Yes

- I think it was only done before class, not after the teaching started.
- It's a chalkboard! Who cares.

Remarks by students on more generic evaluation forms also indicate that students evaluate the instructor in a much more positive manner. Recent comments from student evaluations include remarks such as follows.

What did you like most about this course?

- The instructor.
- Well organized and presented in a format that made learning easier.
- The instructor's ability to explain difficult and abstract concepts clearly made this course easy.
- I understand Physics a lot more because of this class.
- The instructor's attitude. Relate to students.

What do you consider to be the instructor's strengths?

- To the point teaching style.
- His enthusiasm of the course.
- Excited about structures.
- He really has a great interest in the subject and engineering.
- Well organized, knows the subject well and seems to care.
- Knowledge of the subject and ability to explain the subject clearly.

- Knowledge of and his presentation of the subject, he should teach Physics. I learned more about Physics from him that I did my Physics teacher.
- Concern for student and what they are learning.
- His knowledge and ability to teach the subjects at hand.
- He has a lot of knowledge about the subject and shows enthusiasm.
- No comments.
- He explains things in a way I could understand.
- Knowledge of course material.
- Knowledge of material and professionally conducted classes. Class is taught at true college level.
- Interaction with class.
- He knows his stuff and is well prepared for class.

What do you consider to be areas where the instructor could improve?

- N/A. [2 responses]
- Have some handouts on what he is going to talk about.
- Review for tests more by doing example problems before test.
- No comments. [multiple responses]
- Answering questions one on one.
- Have more office hours.
- Not sure there are any.
- Sometimes overly enthusiastic.
- More visual aids.
- His approachability and being a little dry.