Ten Years of ExCEEd: Making a Difference in the Profession*

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> In response to the need for faculty training, the American Society of Civil Engineers developed and funded the ExCEEd (Excellence in Civil Engineering Education) Teaching Workshop, which was offered for the first time in 1999 and celebrated its tenth year during the summer of 2008. For the past decade, 21 ExCEEd Teaching Workshops (ETW) have been held at the United States Military Academy, the University of Arkansas, and Northern Arizona University. ETW has realized 497 graduates from 198 different US and international colleges and universities. This paper summarizes the content of ETW, assesses its effectiveness, highlights changes in the program as a result of these assessments, outlines future directions, and assesses the effect this workshop has had on the quality of civil engineering teaching in the US. The assessment data were obtained from multiple survey instruments conducted during each workshop, surveys taken six months to a year after the workshop, and a ten-year longitudinal survey.

Keywords: teaching workshop; teaching assessment; ExCEEd model; teacher training

1. INTRODUCTION

Many new engineering faculty members at major colleges and universities are assigned courses and students without any formal training on how to teach. The result is often a trial and error approach, in which students suffer the consequences of the teacher's errors. Seymour and Hewitt [1] concluded in a study of 355 students at seven institutions that poor teaching (inadequate organization, ineffective presentation, inaccessible faculty) was the most common student complaint and was a cause for many to switch from math, science, and engineering to other majors. The recommended actions for improvement were teacher development programs, faculty mentoring and a system for rewarding effective teaching. Similarly, a study conducted by Haag et al. [2] at Arizona State University demonstrated that students who switched out of engineering found better quality of instruction and more approachable faculty in their new majors.

In response to the need for faculty development as effective teachers, the American Society of Civil Engineers developed and funded the ExCEEd (Excellence in Civil Engineering Education) Teaching Workshop, which was offered for the first time in 1999 and celebrated its tenth year during the summer of 2008. For the past decade, 21 ExCEEd Teaching Workshops (ETW) have been held at the United States Military Academy, the University of Arkansas, and Northern Arizona University. The program now has 497 graduates from over 198 different US and international colleges and universities. In the early years, ETW relied on the dedication of its faculty and ASCE staff champions to keep the program alive; today it is supported and embraced by large numbers of department heads and deans.

The design of a workshop intended to improve

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teaching effectiveness must necessarily be based on an underlying model of what constitutes good teaching. After compiling the results of over 500 teaching award nominations from students and faculty, Lowman [3] defined the teaching exemplar as one who has mastered both intellectual excitement and interpersonal rapport. Intellectual excittement is developed through clear (well organized, technically accurate, and relevant) and stimulating (engaging and enthusiastic) classroom experiences. Interpersonal rapport is cultivated by encouraging student participation and displaying genuine interest in student learning and in students as individuals.

While Lowman's two-dimensional model emphasizes the teacher's behavior, others have defined teaching excellence in terms of student learning. Wankat and Oreovicz [4], Bain [5], Angelo [6] and Chickering and Gamson [7] offer research-based guidelines and principles that reflect how students best learn. Some common themes emerge from these compendia of learning principles. Students work best when they are challenged with expectations that are clear and positive. Student learning is enhanced by the use of well-articulated learning objectives. Bloom's Taxonomy provides an effective tool for developing measurable objectives based on the desired level of cognitive development [8, 9]. Students have different preferred learning styles, and successful teachers vary their teaching methods to accommodate multiple learning styles [10–13]. Interpersonal rapport and student-faculty interaction can also have serious implications on student learning. Vogt [14], Pajares [15], Zimmerman [16], Schunk and Ertmer [17], Linnenbrink and Pintrich [18], and Bandura [19] show that selfefficacy, which has been strongly linked to student achievement and persistence, was negatively affected by faculty who were distant, created chilling classroom environments or set unrealistically high demands on students. Bain [5] and Light [20] also provide compelling anecdotal evidence on the importance of positive personal interaction between teachers and students on student achievement.

Estes et al. [21] combined Lowman's two-dimensional model with these well-established learning principles to develop the ExCEEd Teaching Model, which defines quality teaching in terms of both teacher behaviors and student learning. The ExCEEd model emphasizes structured and organized classroom activities, techniques that appeal to the varied learning styles of students, active learning in the classroom, prompt and positive feedback, use of learning objectives, frequent positive interaction with students, instructor enthusiasm and appropriate use of technology. The ExCEEd Model forms the basis for the content of the ExCEEd Teaching Workshop (ETW) and is a useful framework for teaching assessment as well [22]

The ETW is an intensive, hands-on, five-day workshop consisting of seminars, demonstration

classes, and lab exercises. The workshop focuses on basic teaching skills, with the objective of helping participants improve their approach to teaching and their understanding of student learning. The overarching goal is to ultimately improve teaching and learning in civil engineering programs (and related disciplines) nationwide. The workshop is designed to introduce and model highquality teaching and assessment, to integrate well-established learning principles, and to provide ample opportunities for participants to apply and practice these principles and techniques they have learned. The ETW instructional strategy relies primarily on learning by doing. As such, the most important element of the workshop is a series of team-based labs in which each participant teaches three engineering classes while receiving assessments and recommendations for improvement from his or her teammates and mentors. The rigor and team-based format of ETW have encouraged the development of a community of engineering educators who are passionate about teaching and learning in civil engineering.

There is a modest amount of literature on the effects of teaching workshops and other teacher development programs on improving teaching. A recent study by Gibbs and Coffey [23] looked at the short-term (one year) impact of training programs at 20 universities in eight countries. These programs involved a minimum of 60 hours of training spread over several months. The study was completed using both student and teacher surveys. The researchers concluded that effective teaching programs can help faculty become more learner centered and can improve the quality of teaching. Short-term participant surveys from the Southeastern University and College Coalition for Engineering Education (SUCCEED) workshops found similar results, with 90% of respondents agreeing that their teaching had improved as a result of attending the workshop [24]. The SUCCEED found that attendance at teaching workshops increased attendees' use of active learning techniques in both their short-term and longterm surveys. Brawner et al. [25] conducted a longitudinal study of participants in the SUCCEED faculty development program and concluded that it had helped increase the use of active learning, team-based assignments and other nontraditional instructional methods. The Engineering Educators Scholars Workshop existed for over a decade to prepare young faculty and Ph.D. candidates in all science, math, and engineering fields for the professoriate. Attending faculty were motivated and enthusiastic about improving teaching at the end of the workshop [26], and short-term evaluations attributed some improvement in teaching to the workshop [27]. Sanford [28] cited an improvement in course objectives, learning activities and evaluation methods as a result of having attended.

There have been many faculty development initiatives at individual universities that have

attempted to improve the quality of undergraduate teaching. Fahrenholtz et al. [29] cited three systemwide faculty retreats at the University of Missouri as contributing to participants' willingness to adopt new classroom techniques to improve student learning. After a series of two-day cooperative learning workshops at San Jose State, Mourtos and Allen [30] reported that the faculty assessment showed minimal faculty support, but that student assessments indicated improved student learning and enthusiasm from those faculty who did participate. Graduate courses in educational methods in engineering have also benefited future faculty members. Wankat and Oreovicz [31] conducted a longitudinal study of participants in the graduate course ChE 685 Education Methods in Engineering and concluded that this course did have a very significant impact on the academic careers of the students who took it. The College of Engineering at the University of Illinois has developed the Teaching College, which introduces the scholarship of teaching to engineering professors. Results of the program show a strong shift in attitudes regarding teaching. Participants report that the use of course learning objectives actually saves them course preparation time and the incorporation of other pedagogies improve classroom interactions and make their teaching more enjoyable [32]. Fink et al. [33] used case studies at Carnegie Mellon University and the University of Oklahoma to argue that professors need focused programs in teaching and learning as part of engineering education reform.

The ETW has produced a great deal of anecdotal evidence from participants in terms of teaching awards, testimonials, tenure achievement, improved ratings, better preparation, increased satisfaction with teaching, better learning from students, and improved performance in the classroom, all as a result of the workshop. Welch et al. [34], Devine [35], Knapp [36], and Issacs [37] provide several such published examples. One purpose of this article is to offer more comprehensive quantitative data to supplement the broad array of anecdotal experiences reported by ETW participants.

To determine the impact of the ETW on faculty attitudes toward teaching and their performance in the classroom, a variety of workshop assessments have been completed. In an end-of-workshop assessment survey, participants provide numerical ratings and written comments on the value and conduct of the major activities. A follow-up assessment is conducted six months to a year after each workshop to evaluate longer-term effectiveness. In addition, the ASCE Committee on Faculty Development has conducted a longitudinal survey of all participants over the past decade to gain a broader perspective of the contribution made by the ETW. Participants consistently report substantial improvements in their class organization, presentation skill, and rapport with students as a result of ETW. This paper relies on data from the participants for assessment. A more challenging future research project would involve gathering and analyzing data from the third-party students of the participants.

2. HISTORY OF THE WORKSHOP

Because the faculty at the United States Military Academy (USMA) at West Point consists predominately of military officers who serve on the faculty for three years and then return to the field army, there is a substantial turnover of instructors every summer. To ensure that the educational experience of students is not compromised, new faculty members with no teaching experience need to acquire strong teaching skills quickly. The USMA Department of Civil & Mechanical Engineering (CME) has met this need over the past fifty years by conducting a rigorous annual six-week teacher training program, known as the Instructor Summer Workshop (ISW), for its incoming faculty. In the midnineties, a group of civilian and military faculty in CME developed a proposal for a one-week external version of ISW and received National Science Foundation (NSF) funding for the project. The result was the Teaching Teachers to Teach Engineering (T⁴E) workshop conducted at United States Military Academy (USMA) in 1996, 1997 and 1998 [38]. The 1998 version of the workshop included six senior observers (two each from ASME, IEEE, and AIChE) who examined how this workshop might be adapted by their organizations.

When the NSF grant expired after the 1998 $T^{4}E$ Workshop, the American Society of Civil Engineers stepped in to fund the workshop as part of its larger ExCEEd faculty development initiative. The first ExCEEd teaching workshop was held at West Point in the summer of 1999 with 24 participants using the proven T⁴E format as a model. In 1999, a group of nine educators formally evaluated ETW as part of a Program Design Workshop [39]. As a result, the curriculum of the ETW was refined and formalized and the program was successfully transported to the University of Arkansas in the summer of 2000. Supported by a grant from the Bechtel Corporation, there were ExCEEd Teaching Workshops in 2002 offered at West Point, the University of Arkansas and Northern Arizona University. These three institutions have hosted all 21 workshops to date, although ASCE is always considering new workshop locations.

In the summer of 2004, the United Engineering Foundation provided funding for ETW, and its member societies (ASME, IEEE, AIChE) sent participants to what became the ExcEEd (Excellence in Engineering Education—with a small "c") teaching workshops. The following year, ASCE again assumed sponsorship of ETW, and the participants ever since have come from the civil,

environmental, architectural and construction engineering and engineering technology programs that the society serves. ASCE has offered two of these workshops per year since 2005. International universities such as Durban Institute of Technology, Hong Kong Polytechnic University, University of Limerick and Universidad del Norte have sent participants as well. In 2008, three faculty members from Kabul University and the National Military Academy of Afghanistan participated. The tenth annual edition of ETW was offered in the summer of 2008 with workshops at both West Point and the University of Arkansas. The 2009 workshops will be conducted at Northern Arizona University from July 12-19 and at West Point from July 22–27.

Over the ten-year history of ETW, 198 institutions have sent 497 faculty members to the workshop. Many universities have sent multiple participants and have made the ExCEEd Teaching Workshop an integral part of their faculty development programs. Texas A&M has sent 13 participants. Washington State, University of Texas (Austin), and Clemson have sent nine participants, while Virginia Tech and Cal Poly (San Luis Obispo) have both sent eight. In addition, there are four universities that have sent seven participants, four universities that have sent six, nine that have sent five, and 17 universities that have sent four.

3. WORKSHOP ADMINISTRATION

Because of the learn-by-doing format and the large degree of personalized feedback provided in the ETW, attendance is limited to 24 participants per workshop. While the ETW is currently designed for civil engineering educators with less than ten years of teaching experience at the college level, a few veteran instructors with over 20 years teaching experience have participated. Each candidate submits an application, which includes a statement of teaching philosophy, a letter of support from the participant's department chair, a resume, a description of what the participant hopes to achieve from the workshop and a contract in which the attendee agrees to complete all workshop activities. ASCE typically receives 70-80 applications for ETW each year. Applications are due in mid-February.

Oversight of ETW is provided by the nationallevel ASCE Committee on Faculty Development (CFD). This committee is populated by a rotating group of volunteer educators and practitioners. The committee is supported by staff members from the Educational Activities Department of ASCE. The ASCE CFD reviews the applications and selects participants during the committee's spring meeting. ASCE staff collects the registration fees and handles all administrative coordination with the applicants. The workshop director from each host institution then provides participants with site-specific details about the workshop schedule, expectations, and travel logistics. The 24 participants assigned to each site are divided into six teams, organized to maximize diversity in subject matter expertise, teaching experience, gender and geographic location. Each ETW site is staffed by a workshop/program director from the host institution, six senior mentors and six assistant mentors. A senior mentor and an assistant mentor are assigned to each team of four participants, and each team of mentors and participants stays together throughout the week-long workshop. In addition to their primary responsibility of guiding their assigned teams, the senior mentors also teach much of the workshop content. Senior mentors are accomplished teachers who are familiar with the current literature on teaching and learning and well-versed in the ETW developmental model. Assistant mentors are typically ETW graduates who are interested in gaining a deeper appreciation of the ETW methods and helping colleagues develop a passion for teaching and learning. After serving in two or three workshops, assistant mentors are often asked to serve as senior mentors.

Because the ETW participant-to-staff ratio is never greater than two, implementing these workshops is expensive. ASCE's cost to run a single ETW is approximately \$60,000. In the first two years of the program, ASCE charged no workshop registration fee and paid a stipend to all ASCE members who attended. As the program gained greater acceptance and recognition, as well as greater support from department heads who were seeing tangible results, ASCE passed more of the cost onto the participating universities. Currently, the registration fee is \$425 per participant and the university pays the travel costs for their participants. ASCE still heavily subsidizes the workshop, in the form of a \$2100 fellowship to each participant to cover the remaining ETW costs.

4. WORKSHOP CONTENT

The content of ETW has evolved over the past ten years, though the changes have been relatively minor. The schedule for the 2008 USMA five-day workshop is shown in Figure 1 and is representative of those offered in previous years and at the other sites. The workshop activities are classified as seminars, demonstration classes, laboratory exercises, and social events. Each student receives copies of the textbooks [3, 4] for the workshop.

4.1. Seminars

The course schedule for the 2008 ETW contained 13 Seminars which were designed to provide a theoretical framework, as well as specific techniques for organizing and presenting class-room instruction. All 24 participants attend seminars together but participate in their six teams. A brief description of each seminar is offered in



Fig. 1. ExCEEd Course Schedule for the USMA 2008 Teaching Workshop.

Table 1. The seminars are presentations given by senior ETW faculty and include small group activities and facilitated collaborative discussions. The subject matter, organization and content of the seminars have varied slightly from year to year and site to site, as the workshop directors have responded to assessment data and feedback. Additional seminars not shown in Table 1 have included Creating Syllabi and Examinations, Group Projects, Managing Student Teams, Active Learning, Gender and Diversity, and Teaching with Technology (i.e., simulations, clickers, podcasting, e-texts, automated courseware, etc.) Classroom Assessment Techniques [40] was originally a separate seminar, but these techniques are currently integrated throughout the other seminars and illustrated by example. A copy of all 2008 ExCEEd seminars are publicly available at [41].

4.2. Demonstration classes

ExCEEd faculty members-typically the senior mentors-teach example engineering classes, with workshop participants role-playing as students. These demonstration classes are intended to serve as models of exemplary teaching, to illustrate active engagement with students, to demonstrate appropriate use of technology and to reinforce the teaching methods addressed in the seminars in a realistic classroom environment. The demonstration classes are deliberately spaced at intervals throughout the workshops so that participants can better observe and appreciate different aspects of teaching as the workshop progresses. Immediately after each demonstration class, the participants formally assess the class, commenting on its strengths and areas for improvement.

4.3. Laboratory exercises

The participants spend nearly half of the workshop in laboratory exercises with their six-person teams. Over the course of the workshop, each participant teaches three classes (with lengths of 25 minutes, 50 minutes, and 25 minutes) in his or her area of expertise, while the other members of the group role-play as students. Immediately after, each class is assessed. Initially the assessments are provided by the senior mentor, but on the second round of practice classes, participants assume

Table 1. Content of ExCEEd Teaching Workshop Seminars

ExCEEd Teaching Workshop Seminars	
Ι	Learning to Teach: Justifies importance of formally learning to teach and introduces a model instructional strategy that will be a road map for the ETW
II	Principles of Effective Teaching and Learning: Introduces Lowman's two-dimensional model of teaching [3] and provides a compendium of learning principles which together form the ExCEEd Teaching Model
III	Introduction to Learning Styles: Introduces Felder's Learning Style Dimensions [42] and examines how to accommodate all styles of learners
IV	Learning Objectives: Introduces Bloom's taxonomy of educational objectives [8] and demonstrates how to write appropriate and useful learning objectives
V	Planning a Class: Offers a structured methodology for organizing a class with emphasis on constructing an outline, board notes, and out-of-class activities
VI	Chalkboard: Covers the fundamentals of making written presentations using the chalk board, vu-graphs, and Powerpoint slides
VII	Teaching Assessment: Covers student, peer and self assessments and separates myth from fact regarding their usefulness. Classroom assessment techniques [40] are illustrated throughout the seminars.
VIII	Communications—Speaking: Covers fundamentals of communication skills with emphasis on speaking to a group and generating positive emotion from students
IX	Communications—Questioning: Examines different student questioning techniques and discusses effective strategies for their use
Х	Systematic Design of Instruction: Introduces a model for designing a new course in an established curriculum and examines the role of classroom teaching in that model
XI	Non-Verbal Communication: Offers useful insights and techniques for understanding how an instructor communicates non-verbally and for interpreting non-verbal cues from students.
XII	Developing Interpersonal Rapport: Offers useful techniques for building an effective rapport with students; discusses student personality types and offers hints to avoid chill in the classroom

XIII **Making It Work at Your Institution:** Discusses how the techniques and principles covered at ETW can be incorporated under conditions that exist at other institutions such as larger class sizes, no blackboards, etc.

greater responsibility for assessing their peers' teaching performance. On the final round of practice classes, the participant who teaches each class also provides a self-assessment of his or her own strengths and areas for improvement. Each assessment is recorded using a written Teaching Assessment Worksheet—reinforced by the verbal remarks of the assessors. A video recording of each class is also provided to facilitate subsequent selfassessments.

4.4. Team building and social events

While much of the evening time is spent preparing for the teaching laboratories, ETW also includes social events to promote team-building, collaboration, and the sharing of ideas. A key element to the success of the laboratory exercises and the overall workshop is the need for participants to become comfortable with each other and to form well-functioning teams. Team-building is fostered early in the workshop through an introductory banquet or picnic (depending on site and weather) with competitive team activities. The mentors also use meals and snack breaks for team building, reflection time, and discussion. A closing dinner provides participants with an opportunity to interact with others outside of their own teams and to celebrate their achievements after a week of hard work.

5. IMMEDIATE ASSESSMENT

Every ETW participant receives a comprehensive assessment survey on the first day of the workshop and is encouraged to rate and provide comments on each event as it occurs. Participants assess each major activity on both its value and conduct, on a scale of 1 (unsatisfactory) to 5 (excellent). Figure 2 shows the composite ratings for each activity by the USMA ETW 2008 participants in the top two bars. For this workshop, the seminar on interpersonal rapport and the laboratory on lesson objectives were rated most favorably. It is also worth noting that no workshop event received an average rating less than 4.

To compare the results of this workshop to the previous workshops, the two bottom bars in Figure 2 show the average responses on the same questions over the previous eight years for selected workshop activities. The demonstration and practice classes received lower scores for 2008 which was a clear anomaly. Of all the seminars, those addressing lesson organization, questioning techniques and lesson objectives have consistently received the highest ratings [43]. The associated narrative comments were overwhelmingly positive:

"I'm not a man of superlatives but this was a lifechanging experience. I feel I have a calling for teaching and this workshop helped me put my calling into a more focused/human/efficient perspective."

"It was totally worth my time, even if I felt exhausted at the end. THANK YOU, THANK YOU, THANK YOU!"

"Excellent workshop—I was very depressed about teaching before taking the ExCEEd workshop. I felt that I worked very hard but was not effective or appreciated by my students. I was ready to leave teaching for consulting—something that I felt I could excel at. The ExCEEd workshop has made it fun to come to work."

"15 lb. of great stuff in a 10 lb. Box!"

"This has been an extremely broadening experience—I will carry it with me forever! Thanks."

"The ExCEEd workshop was amazing. If I had known



2008 Workshop Assessment by Participants

Fig. 2. Comparison of the USMA 2008 ETW ratings to the previous eight years for selected workshop activities.

what I was in for ahead of time, I would not have ever gone. However, after surviving the week (sort of), I would not have missed it for the world. It is absolutely one of the most important and useful, although painful, teaching growth experiences I have had."

"Overall I felt this was an EXCELLENT workshop. I wish I had this three years ago when I just started my teaching career."

A comparison of ETW participants' assessments for West Point with those conducted at the University of Arkansas in 2006 and Northern Arizona University in 2007 demonstrates the portability of the ExCEEd Teaching Workshop when presented by passionate teachers. Figure 3 shows a comparison of the ratings for some selected workshop activities common to all three locations. In almost every case, the assessments by participants at Northern Arizona University and University of Arkansas were very similar to the average ratings by participants at West Point. Not surprisingly, the demonstration classes and the participant practice classes consistently received the highest values at all workshops. The data over time are useful. A score for an individual event at a workshop that is significantly higher or lower than the historical scores on the same event at the other workshops becomes an immediate candidate for more detailed assessment.

6. LONGER-TERM ASSESSMENT

To assess the longer-term effects of the ETW, participants completed a follow-up survey six months to a year after the workshop. The questions asked for an overall assessment of teaching ability followed by a self-assessment in nine different aspects of teaching on a scale of 1 (unsatisfactory) to 5 (excellent) both before and after the ETW. The post-course survey also asked for feedback on what should be improved, what ETW aspect helped the most, and whether they would recommend ETW to others.

A summary of the long-term feedback from the USMA 2007 ETW is shown in Figure 4. (The 2008 long-term data have not yet been collected.) The participants professed improvement in virtually every category questioned, from their confidence as teachers and interaction with students to their lesson organization and level of student learning. The survey response rate has typically been between 50% and 75%. The results also indicate that participants are finding it most difficult to bring demonstrations and physical models into the classroom.

The most relevant measure in this survey is degree of improvement, which is represented by the difference between the pre- and post-workshop ratings. For example, the degree of improvement in student interaction for the USMA 2007 ETW was +1.38 (4.23 -2.85 = 1.38) obtained from the values shown in Figure 4. On average, the improvement per category was +1.04 on a scale of 1 to 5—essentially a 25% improvement in every area. Figure 5 shows the improvement delta (postworkshop minus pre-workshop) for each question and compares the response to the benchmark, which is the average over the past five years. The sample size for the benchmark is 102. Participants reported the greatest improvement in student interaction, lesson organization, and presentation techniques. The participants' use of voice showed the least improvement.



Fig. 3. Comparison of USMA 2000–2008 data with the 2006 University of Arkansas and 2007 Northern Arizona University data for some common workshop activities.



ExCEED 2007 Long Term Self Assessment Feedback

Fig. 4. Long-term self-assessment feedback from ExCEEd 2007 participants.



E TW Effectiveness - Comparing Difference Between Post and Pre-Seminar Performance

Fig. 5. Magnitude of improvement self-assessed by respondents as a result of ETW.

Conscientious faculty members can be expected to improve their teaching performance over time, independent of their participation in ETW. Thus, in the long-term workshop assessment, participants were also asked to rate the contribution of the ETW to their improved performance on a scale of 1 to 5 (1 = none; 2 = small; 3 = moderate; 4 = high; 5 = very high). Figure 6 shows the results for 2007 and for the previous five years. Participants reported that the ETW contributed most to their improvement in student interaction, lesson organization, use of demonstrations, and presentation techniques-a result that is consistent with previously collected data. It is interesting to note that, while participants did not rate themselves as particularly effective at using physical demonstrations (Figure 4), they had improved substantially (Figure 5) and they attributed the improvement to the ETW (Figure 6).

7. LONGITUDINAL SURVEY

The ASCE CFD conducted a longitudinal survey in 2007 of all past ETW participants to further gauge the long term impact of this workshop. There were 173 responses—a response rate of 40%. The average length of time since attending the ETW was 3.7 years, with a standard deviation of 2.11 years. The respondents were asked how often they use the various skills that are taught in the workshop. Figure 7 shows that questioning techniques, lesson objectives, board notes, and interpersonal rapport seem to have the most



Contribution of ETW 2007 to Success

Fig. 6. Participant's assessment of the degree to which the ETW contributed to improvement in various aspects of teaching.



Fig. 7. Longitudinal survey results (ETW 1999-2007) regarding how often the skills taught in ExCEEd are used.

long-term benefit for participants. Over 50% of the respondents indicated that they apply these skills every day in the classroom.

The survey also asked a number of questions about the value of the ETW with respect to personal growth as a teacher and teaching ratings from students. Figure 8 shows the results for these questions. 82% of the responding participants reported that their teaching ratings improved after their attendance at the ETW. 91% of respondents indicated that the ETW was either essential or important for their personal growth as a teacher. When asked whether they would recommend the workshop to new faculty members in their department, the response was unanimously favorable, with 93% offering the highest possible response of "absolutely". Of the 173 respondents, 73 had been considered for tenure since attending this workshop. Of those, 86% indicated that the ETW helped their attainment of tenure.

8. RESPONSES TO ASSESSMENTS AND CHANGES TO ETW

The participants' assessments summarized above have been valuable for revising and improving the ETW. Several new seminars have been introduced as a result of participant feedback.



Fig. 8. Longitudinal survey results (ETW 1999-2007) on the long-term effectiveness of ExCEEd Workshop.



Fig. 9. Longitudinal survey results (ETW 1999–2007) on intensity of workshop.

The inclusion of the seminar on Systematic Design of Instruction was largely in response to previous feedback that such a class was needed to provide a broader perspective on the role of classroom teaching and instructional design in the larger context of curriculum development. The challenge in responding to such feedback is that the workshop duration is fixed—and the level of intensity is such that participants are typically exhausted by the end of the week. For every new seminar to be added, some content or activity must be deleted.

Because time is such a critical element of the workshop, the smallest details of the schedule have

been the subjects of intense debate among the workshop organizers. For example, the scheduling of practice classes—morning vs. afternoon—has been a persistent issue with no conclusive resolution. At the USMA workshops, practice classes are taught in the morning, when participants are fresh and focused. At the Arkansas and Northern Arizona workshops, mornings are reserved for the seminars, so that the small-group lab exercises can proceed at their own individual pace during the afternoon.

The workshops have typically started on a Sunday afternoon and finished by noon on the following Friday. However, in response to participants' requests for more time to prepare classes, the 2007 USMA workshop introduced a revised schedule, as shown in Figure 1, that started at noon on Wednesday and finished at noon on Monday. A four-hour break for rest and recreation was provided on Sunday morning.

As the workshop content and schedule have evolved, allowing sufficient time for discussion has been a persistent challenge. The workshop directors have struggled to balance their desire for open and productive sharing of ideas with the need to stay on schedule and, ultimately, to achieve the stated workshop objectives. The longitudinal survey asked participants about the length and content of the workshop. Figure 9 shows the results, with 80.4% of respondents opting not to change anything. This general satisfaction is an important reason why, despite frequent changes to individual seminars and schedules, the core of the workshop has remained surprisingly consistent since its inception.

151

9. THE FUTURE OF ETW

The ExCEEd teaching workshops are expected to continue as long as funding is available and participants continue to apply. An ever-increasing corps of mentors and assistant mentors is being recruited from the ranks of workshop graduates, and more schools continue to recognize the value of the program and are sending participants. In addition to the regular summer workshops, the Committee on Faculty Development has experimented with shortened versions of the ETW at ASCE technical conferences. While this abbreviated version is only a few hours long, the attendees tend to be practitioner adjunct professors who would probably never be able to attend a full-length ETW. A mini-ExCEEd workshop was offered at the 2005 CE Department Heads Conference to provide department heads a better understanding of the program that so many of them have been supporting. Two-day workshops have been implemented at individual campuses (Missouri University of Science and Technology, Portland State University and University of Delaware), with the support of ETW graduates at the host university. Two-and-a-half-day workshops were also conducted at the Helsinki University of Technology in Finland in the summer of 2004.

The ASCE CFD is planning a follow-up version of the ETW (tentatively named ExCEEd II) to provide a refresher on key material from the basic workshop, as well as new content on advanced topics. The pilot version of ExCEEd II will be offered at Northern Arizona University in July 2009. In the longitudinal survey, when asked if they would be willing to attend a follow-up version of the ETW, 79% of the respondents replied yes. Thus, demand for ExCEEd II is expected to be strong. ASCE has also established an on-line chat room and a Facebook page where ETW graduates can discuss issues involving teaching and learning, while preserving and extending the sense of community developed during ETW. Similarly, CFD is producing high-quality DVDs of ETW seminars and demonstration classes. These DVDs are intended to be used to enhance the training of part-time faculty.

10. CONCLUSIONS

The ExCEEd program, consisting of twenty-one workshops offered over the course of ten years, has enhanced the quality of teaching in civil engineering classrooms across the US. The shortand long-term assessment data provide overwhelming and consistently positive feedback concerning the quality and favorable impact of this program. ETW has provided rigorous, performance-oriented teacher training to almost 500 participants; it has developed a dedicated core of faculty mentors who can assist and support others at their home universities; and it is demonstrating that good teaching can be rewarded in terms of tenure and promotion.

Ultimately, engineering students are the real beneficiaries of Project ExCEEd. The findings of the Seymour and Hewitt study, noted above, suggest that, as teaching continues to improve, more students will persist in their engineering studies. More will graduate and become the nation's next generation of engineers and technical leaders. This outcome would have been far more difficult without ASCE's strong and persistent commitment to faculty development.

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