

## **AC 2010-134: EXCEED II: ADVANCED TRAINING FOR EVEN BETTER TEACHING**

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## **ExCEED II: Advanced Training for Even Better Teaching**

### **Abstract**

In 2007, the American Society of Civil Engineering's Committee on Faculty Development (CFD) conducted a longitudinal survey of all the past participants of the ExCEED Teaching Workshop (ETW). The CFD received 173 responses, representing 40% of the ETW population at that time, to its survey about skills and the long term value of ETW. Important to this paper, 73% of the survey respondents said that they were interested in attending a post, advanced ETW. Motivated by these survey results, the CFD began its planning for a pilot ExCEED II workshop during the 2008-2009 academic year. In the summer of 2009, ASCE offered its first ExCEED II workshop for past ETW participants. This paper describes the day and a half ExCEED II workshop along with a summary of results captured from two structured evaluations. All activities, except two, received average scores for value and conduct of 4.0 or better on a 1.0 to 5.0 scale. The participant teaching experience followed by the demonstration class taught by a master teacher were rated the highest in terms of their value to the participants. For some participants, the hands-on teaching experience coupled with the constructive and supportive feedback environment were cited as the main reasons for attending ExCEED II. The program's cost was deemed reasonable and appropriate to the length, value, and conduct of the workshop. The participants recommended increasing the length of the workshop to two days; incorporating two participant teaching sessions; providing more information or time to the topics of brain functions, problem based learning, ETW review, and short in-class demonstrations or models; and adding content on evaluating student learning and integrating new teaching technologies.

### **Introduction**

In the summer of 2008, the American Society of Civil Engineers' ExCEED Teaching Workshop (ETW) celebrated its tenth year of existence<sup>1,2</sup>. By the summer of 2010, twenty-five ETWs will have been delivered, producing nearly 545 graduates from over 200 different U.S. and international colleges and universities. These workshops have been hosted by the United States Military Academy, the University of Arkansas, and Northern Arizona University. A new site at the University of Colorado, Boulder is opening this summer.

Post ETW participant surveys have yielded a large body of anecdotal evidence about the accrued benefits of this hands-on, learning-by-doing workshop<sup>3,4,5,6</sup>. One consistent theme regularly identified by the workshop site directors was the interest by participants for a second, more advanced, ExCEED-type experience. In 2007, ASCE's Committee on Faculty Development (CFD), a national-level committee tasked with overseeing ETW, conducted a longitudinal survey of the past participants of ETW to detect the long-term impacts of the workshop and to determine the level of interest for an ExCEED II workshop. Motivated by the overall positive

results, the CFD began its planning of ExCEED II in the fall of 2008 for a pilot delivery in the summer of 2009 at Northern Arizona University. Never before has a second, more advanced workshop in teaching and learning been offered that is built upon the principles and skills developed in the earlier workshop. This paper describes this novel project - the day and a half ExCEED II workshop - and gives insights into the interests and reasons that would motivate faculty to attend additional training on teaching and learning. This paper also includes a brief description of the originating ETW, relates results from the longitudinal survey of ETW graduates, and presents an analysis of the ExCEED II pilot based upon captured evaluations.

### **ExCEED Teaching Workshop**

The ETW is an intensive, hands-on five day workshop that focuses on basic teaching skills to help participants improve their teaching and their understanding of student learning. A key feature of ETW is the small group labs in which each attendee teaches three classes during the workshop, and receives guidance and feedback from his or her mentors and peer group members. The workshop is designed to review and demonstrate the best methods of teaching and assessment, to integrate the latest in learning theories, and to provide ample opportunities for participants to apply and practice the methods and theories. The ETW has created a nation-wide community of engineering educators passionate about the teaching and learning of civil engineering at the university level.

Over its long history, the primary financial support for ETW has come from ASCE. The estimated cost to run a single ETW is approximately \$60,000. Currently, ASCE partially offsets the costs by charging each participant a \$425 registration fee, and subsidizing the remaining \$2100 for each participant in the form of an ETW fellowship.

The continuing success of the ETW as a high-quality workshop comes from the long-standing dedication of faculty volunteers serving as site directors, workshop presenters, workshop mentors, and CFD committee members. Traditionally, each workshop is led by site director who controls all aspects of the workshop including staff invitations, schedule design and control, participant communications, and all logistics. The ETW history, administrative structure, and workshop content have been well documented<sup>1,2,7,8</sup>.

The majority of participants from each workshop are overwhelmingly positive about the experience and its potential impact on their performance in the classroom<sup>9</sup>. The successes of ETW have not gone unnoticed. The ETW has evolved from a grass roots movement to a program that is supported by large numbers of department heads and chairs.

## CFD's Longitudinal Survey

The ASCE CFD conducted a longitudinal survey in 2007 of all past ETW participants to gauge the long term effects of this workshop. The CFD received 173 responses, which represented 40% of the ETW population at that time. The average length of time since attending an ETW was 3.55 years with a standard deviation of 1.77 years. The published results<sup>1,2</sup> confirm the long term contribution of the ETW towards high quality learning environments for civil engineering students. Fifty percent of the respondents reported using questioning, lesson objectives, board notes, and techniques to enhance interpersonal rapport in their respective classrooms every day. Furthermore, 82% reported that their class evaluation ratings improved post-ETW, and 91% indicated that ETW was essential or important for their professional development as a teacher. These results are consistent with a meta-survey that confirmed that training does make an impact on teaching<sup>10</sup>.

Table 1. Potential Topics for an Advanced ExCEED Per Previous ExCEED Participants

Topic Id	Potential Topics	Number of Times Mentioned
1	Project-Based Learning	80
2	Student Teams	72
3	Interdisciplinary Projects	49
4	Service Learning	35
5	Assessment & Evaluation	21
6	Learning Styles	10
7	Review and Practice ETW Techniques	7
8	Teaching at Various Levels	7
9	Using New Technologies in the Classroom	6
10	Teaching Laboratory Courses	6
11	Teaching Professional Skills	5
12	Large Classes	4
13	Distance Learning	4
14	Senior Design	4
15	Difficult Students	4
16	Teaching Research Techniques	3
17	The Process of Creating New Courses	3
18	Engineering Education Research	2

The survey included a question regarding participant's interest in attending a second or advanced ExCEED workshop. Seventy-three percent (n = 127) responded with a "yes", they would attend a post-ExCEED workshop if it was offered. The respondents were asked what topics are of interest; inviting them to chose from a menu of four topics and to provide additional topic suggestions. There was no limit placed on the number of topics of interest. The list of the four

prepositioned topics, which are distinguished from the suggested topics in Table 1 by the dotted line, included: teams, project based learning, service learning, interdisciplinary projects.

Although most of the topics of Table 1 are self-explanatory, a few need further explanation. Topic 5, Assessment and Evaluation, broadly captures comments ranging from traditional evaluation methods of testing, grading, and homework to assessment-focused topics including in-class and program outcomes. Topic 8, Teaching at Various Levels, speaks to an interest in learning about the differences in teaching to first-year students vs. seniors vs. graduate students. Topic 11, Teaching Professional Skills, captures an interest in how to integrate skills such as writing, presentation making, ethics, professionalism, and life-long learning into the civil engineering classroom.

The CFD, motivated by the strong interest detected through the longitudinal survey results, took on the challenge of designing an advanced ExCEED and seeking out ASCE's approval for the pilot. Their work began at a fall 2008 meeting whereby they made decisions about workshop length, timing, costs, and potential topics. Further development occurred at the spring of 2009 meeting<sup>11</sup>. The determination of final details, planning, and implementation was lead by the ExCEED II site director and supported by the chair of the CFD. The final topics and activities of the workshop were chosen in an attempt to balance the interests displayed in Table 1 with the expertise of the workshop presenters and mentor staff. As explained in greater detail in the next section of this paper, this balancing of interests with available expertise helped to keep the costs of ExCEED II workshop lower. The design of activities was premised on participants holding pre-existing knowledge about core ExCEED principles and methods thus minimizing workshop time devoted to introductory topics. Furthermore, the CFD determined that those topics directly related to accreditation-based processes such as outcome assessment were better handled by other workshops with ExCEED II concentrating on teaching skills and learning environments. The CFD planned to offer the pilot in the summer of 2009 in association with an ETW, refine and revise it based upon the results of formal evaluations, and to then offer the advanced workshop every other summer with the second offering in the summer of 2011.

### **ExCEED II Workshop Pilot**

The guiding vision for ExCEED II was to provide a workshop that focused on advanced skills so that participants could “become the next generation of master teachers leading our (civil engineering) profession.” The specific participant workshop objectives were to:

- Refresh and refine ExCEED skills covered in ETW,
- Develop learner-centered approaches to teaching students,
- Discuss advanced topics of classroom teaching,
- Interact with others in the profession, and

- **Rennergize the passion for teaching.**

The workshop organization and activities were mirrored after ETW, albeit in a compressed schedule of one and half days . ExCEED II contained six seminars, one demonstration class taught by a master teacher, three hands-on labs including one session in which each participant taught for 25 minutes and received feedback from their mentor and peers. The workshop schedule and organization is depicted in Table 2.

Table 2. ExCEED II Workshop Schedule

Friday, 17 July 09		Saturday, 18 July 09	
		7:45-8:00	Announcements
		8:00 - 11:35	Lab II: Participant Practice Classes
		11:45-12:40	Lunch
1:30 - 3:00	Meet Your Team and Introduction to ExCEED II	12:45-1:30	Lab III: Case Study Discussions
3:00 - 4:00	Master Teacher Demo Class, Assessment, and Discussion	1:35-2:45	Seminars IV & V: PBL, Design, and Teams
4:00 - 4:30	Seminar I: ETW Review	3:10-4:20	Seminars VI & VII: Large Classrooms & Difficult Students
4:45-5:45	Seminars II & III: Novice to Experts & Distance Learning	4:20 - 5:10	Workshop Feedback Session
6:00 to 8:00	Lab I: Ice Breaker Dinner and Team Building	5:10 - 5:30	Wrap-up & Thank You's

The ExCEED II pilot consisted of sixteen participants, each graduating from one of the three ETW sites between the years of 2001 and 2008. ExCEED II was staffed by four senior mentors and the site director who took turns leading various activities and seminars. Like ETW, the participants were organized into teams of four and each team was led by a senior mentor. The pre-organized team-based environment is designed to facilitate small group activities and to provide a supportive environment for the practice teaching laboratories.

An important design constraint to ExCEED II was that this workshop needed to be self-funded and not subsidized by ASCE. As such, the workshop designers scheduled the pilot to follow nearly immediately after an ETW. This allowed the staff of ETW to remain at one site for the delivery of both workshops, which saved on their travel expenses. ExCEED II participants funded their own travel costs as well as the workshop fee of \$375.

*Seminars*

ExCEED II included six formal seminars which were intended to inform the participants about advanced techniques and theories, beyond what they experienced at ETW. All participants and mentors attended the seminars together and participated in the numerous integrated small group activities as teams. The learning objectives for each seminar are presented in Table 3. Seminars

IV and V, project-based learning and student teams incorporated examples of service learning and interdisciplinary projects; addressing the interests of respondents from the CFD longitudinal survey.

Table 3. Learning Objectives for ExCEED II Seminars

	Title	Learning Objectives
I	ExCEED I Review	Recall previous ExCEED content to reaffirm a solid foundation to build ExCEED II content upon.
II	Novice to Expert	Review the advances in knowledge about the human brain and learning. Compare and contrast novices and experts. Identify the teaching and learning implications. Motivate interest in follow-on workshop activities.
III	Best Practices in Distance Education	Describe the key attributes of successful distance learners and educators. Extend the ExCEED Model to distance learning. Explain why the online community is important in distance learning.
IV	Project Based Learning	Describe the benefits and challenges in project based learning. Identify the principles that make problem based learning successful
V	Managing Teams	Describe the principles that lead to successful student team learning experiences in college-level courses
VI	Large Classroom Techniques	Identify unique challenges in applying the ExCEED model in a large classroom. Determine methods to address these challenges. Discuss advantages of a large classroom.
VII	Dealing with Difficult Students	Describe the behaviors that would cause a student to be considered "difficult". Evaluate the effectiveness of some suggested techniques for handling difficult behaviors. Apply the effective techniques to mitigate difficult student behavior at your home institution.

### *Demonstration Class*

One of the more valued activities of ETW is the demonstration class; whereby a senior mentor who is also a master teacher of the ExCEED method<sup>12</sup>, teaches an example engineering class to participants who role-play as students. The essential purpose of the demonstration class is to provide the participants with an authentic experience in a high-quality teaching and learning environment so they can place the various workshop activities into this context. The CFD longitudinal survey, discussed earlier, indicated an interest (e.g. Topic 9 of Table 1) in seeing how computer models, numerical methods, and challenging in-class demonstrations could be effectively integrated into the classroom. In response, the master ExCEED II teacher provided a lesson on introductory probabilistic design that included: an interactive graphical illustration of

correlation using a spreadsheet, a simulation of a stochastic event using MATLAB, a physical demonstration of a random event using a catapult, and introductory music featuring “Take a Chance on Me” by ABBA.

### *Laboratory Exercises*

ExCEED II, like ETW, included many opportunities for participants to learn-by-doing. Formally called Labs, the learn-by-doing labs included: a team building exercise, a participant teaching experience, and the completion of two case studies. The practice teaching class provided participants the opportunity to teach one 25-minute class to their team of peers and their senior mentor, followed by a feedback session. Led by the senior mentor, the feedback session included a participant self-assessment of strengths and areas for improvement, feedback from the team of peers, and wrap-up comments by the mentor. A digital recording of the teaching presentation and feedback session was made and given to the participant for their future review. In addition, the mentor and teammates each completed a Teaching Assessment Worksheet<sup>13,14</sup>, which they recorded observations and insights. These worksheets were given to each presenter.

The case study laboratory was designed to introduce participants to the use of case studies in engineering by having the participants work through two cases: one within the discipline and the second focusing on the possible perils of using advanced teaching methods by a novice instructor in a traditional research-focused university environment.

### **ExCEED II Workshop Questionnaire and Evaluations**

Each ExCEED II participant was asked to complete a pre-workshop questionnaire plus an evaluation worksheet that was completed during the workshop. The intent of the pre-workshop questionnaire was two-fold: to provide mentors with insights into what the participants hoped to accomplish and to provide the CFD with insights on how to improve future offerings of ExCEED II. Table 4 shows that the participants attended ExCEED II, because they were interested in improving upon their own individual teaching abilities while learning from others. Learning about and trying new techniques were of lesser importance.

Each participant was given a workshop evaluation worksheet at the beginning of the workshop and was encouraged to rate and provide comments on each activity immediately after each activity. The participants rated the activity on both its value and conduct as follows:

Value: How valuable was this event to your development as an educator? (1 = low to 5 = high)

Conduct: How well was this event organized and conducted? (1 = unsatisfactory to 5 = excellent)



Table 4. Pre-ExCEED II Workshop Responses by Participants (n=15)

	Percent Responding
1. What do you hope to gain or accomplish by participating in this ExCEED II workshop?	
Continue to improve teaching abilities	53.3%
Refresh and renew ETW skills	26.7%
Managing student teams	26.7%
Setting up problem-based learning environments	20.0%
Networking with and learning from colleagues	20.0%
2. What are your goals for your practice teaching class?	
To receive feedback on the effectiveness of current lesson presentation	71.4%
To observe and learn about what others are doing in their classrooms	61.9%
To practice assessing my own teaching	52.4%
To practice assessing other's teaching and learning environments	33.3%
To try out a new technique or two	28.6%

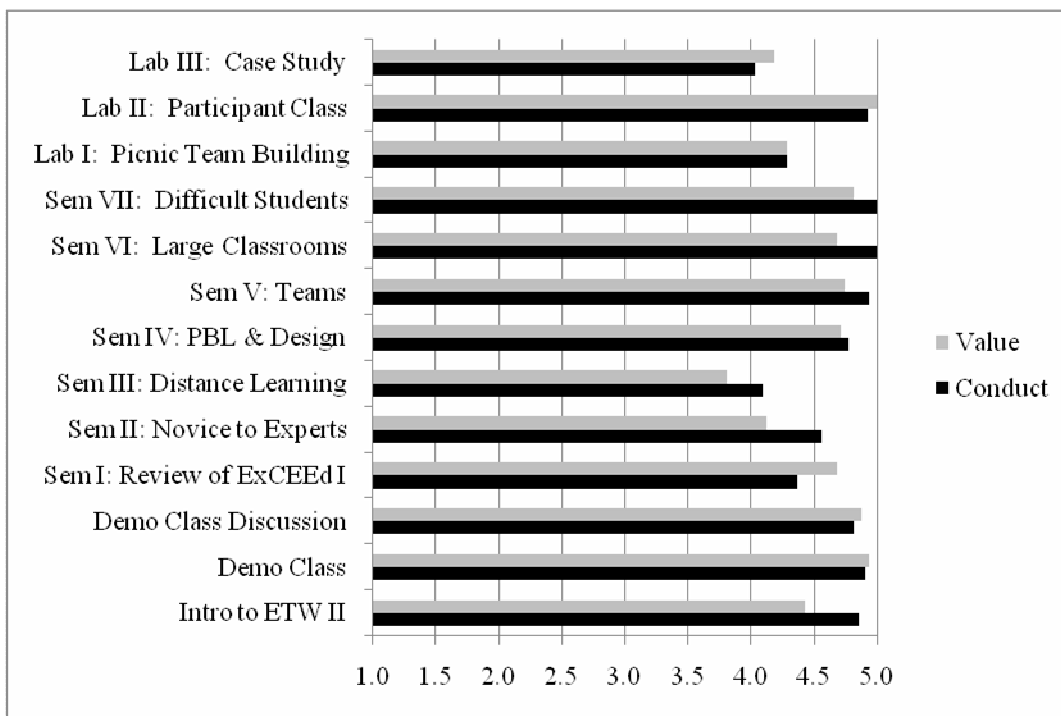


Figure 1. Evaluation of Various ExCEED II Activities by the Workshop Participants (n = 16)

Figure 1 shows the averaged results from the responding participants for many of the ExCEED II activities. In terms of value, the participants universally rated their experience teaching to their peers (Lab II) as the most valuable followed by the master teacher demonstration class and the large group facilitated discussion of that class. These are exactly the activities that are missing

from most other workshops on teaching and learning. In particular, Lab II provides all participants with the opportunity to present a class within a supportive environment under the guidance of seasoned experts and it is this experience that produces real changes in teaching. As exemplified by one comment about Lab II: “This was my main reason for attending ETW II - to see other participants teach, to see new techniques, and obtain feedback on MY teaching!”

Consistent with the 2007 CFD survey and the pre-workshop questionnaire, the participants also highly rated the seminars on Difficult Students, Teams, Problem Based Learning and Design. In the end, all seminars and activities were rated in value at 3.8 or above, and in conduct at 4.0 or above. These are strong indications that the workshop content and the delivery of such content were successful.

In addition to content design and delivery, the participants also rated and commented on logistics and high-level workshop issues. The averaged results are presented in Figure 2. An examination of the associated comments suggested that the workshop was too short, which resulted in a fast pace and not enough time to interact with others. Many participants agreed that the workshop would be better if it was a half-day longer as exemplified by the following comment: “Nicely organized, but too short. Two days would be great.”

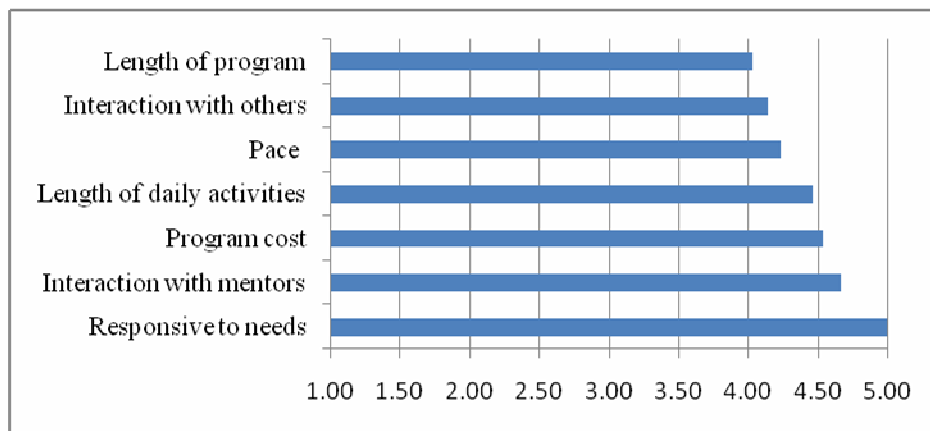


Figure 2. Evaluation of ExCEED II Logistics and Organization by the Workshop Participants (n=15)

The workshop organizers were concerned about the cost of ExCEED II to participants. In contrast to ETW where costs are covered primarily by ASCE, ExCEED II needed to be self-funded. As shown in Figure 2, the participants found the costs acceptable and reasonable, although many indicated that their respective departments covered their program fee and travel expenses. With tightening budgets becoming common, there is some concern that future faculty development expenditures like ExCEED II by departments may be harder to come by. Future enrollment is a concern because the first year class was reduced from 24 to 16 based on the number of applications. In addition, some of those applicants were already scheduled to be at NAU for the ETW as assistant mentors and did not incur additional travel costs to attend

ExCEED II. Conversely, any future ExCEED II workshops will be easier to advertise and populate now that one has been successfully conducted.

Table 5. ExCEED II Hot Wash Assessment

Strengths	Improvements or Recommendations
<ul style="list-style-type: none"> <li>• Review ExCEED model (after demo class) and referring back to the model often throughout workshop</li> <li>• Practice teaching classes (Lab II)</li> </ul>	<ul style="list-style-type: none"> <li>• More review of ExCEED I or make an assignment to review before arriving at workshop</li> </ul>
<ul style="list-style-type: none"> <li>• Seminars: PBL, Large Classrooms, Student Teams, Brain Functions, Difficult Students, Novice to Expert</li> <li>• New reference materials on advanced topics</li> <li>• Discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Hands-on opportunities (e.g. difficult students in practice class), Two practice classes with one of the classes with participants from one common discipline, Smarter practice class</li> <li>• More Brain Function, more PBL, and schedule PBL right after brain function. Hand out seminar materials (e.g. copies of presentation) before seminar</li> <li>• Provide a summary list of the references.</li> </ul>
<ul style="list-style-type: none"> <li>• Pre-workshop assessment worksheet</li> <li>• Followed immediately after ETW</li> <li>• Demonstration class</li> <li>• Participant team building through games (kickball)</li> </ul>	<ul style="list-style-type: none"> <li>• More time for discussion by extending the workshop to two days</li> <li>• Discuss the pre-workshop assessment</li> <li>• More time between ETW and ExCEED II</li> <li>• More time for personal reflection</li> </ul>
<ul style="list-style-type: none"> <li>• Participant team rapport</li> <li>• Had meals together</li> </ul>	<ul style="list-style-type: none"> <li>• Need time to talk as a team before sports, Low impact sport, but keep it competitive</li> <li>• Ice breaker party, perhaps at the hotel</li> <li>• Vegan options and a meal where participants from the same meal sat together.</li> </ul>
<ul style="list-style-type: none"> <li>• All topics were timely</li> </ul>	<ul style="list-style-type: none"> <li>• Additional topics: Grading, New teaching technologies, Web-based learning, More ExCEED I, Time management</li> </ul>
<ul style="list-style-type: none"> <li>• Duration</li> </ul>	<ul style="list-style-type: none"> <li>• Have each participant present a five minute in-class activity or demo</li> </ul>
<ul style="list-style-type: none"> <li>• Mentors</li> </ul>	<ul style="list-style-type: none"> <li>• Better advertisement of workshop and more pre-workshop communication from ASCE.</li> </ul>
<ul style="list-style-type: none"> <li>• Was less structured than ETW</li> </ul>	<ul style="list-style-type: none"> <li>• Incorporate a certificate and/or professional development credit</li> </ul>
<ul style="list-style-type: none"> <li>• Expectations were higher than ETW</li> </ul>	<ul style="list-style-type: none"> <li>• Have the participants complete homework and send assignments out one month before workshop.</li> </ul>
<ul style="list-style-type: none"> <li>• Proximity of the hotel, and everyone stayed at the same hotel</li> <li>• Flagstaff</li> <li>• Gift of the day - hats</li> </ul>	<ul style="list-style-type: none"> <li>• Include a self-assessment on what from ETW using now.</li> </ul>

Finally, one last assessment activity was conducted at ExCEED II. This was a full group – participants, mentors, and staff – thirty-minute activity known as the Hot Wash whereby a facilitator elicits feedback in a structured way and records that feedback to the boards for all to track. The identified Hot Wash strengths of Table 5 tracked well with the formal paper workshop evaluation results shown in Figures 1 and 2, while further emphasizing the value of

interacting and networking including: staying together in the same hotel, socializing and walking time between the hotel and engineering building, and the taking of all meals together.

The identified areas for improvement included: more time devoted to the topics of brain functions, problem based learning, and an ETW review; more time for discussion and personal reflection; and better advertisement of the workshop. Additional recommendations included: expanding to two practice teaching classes; adding seminars on grading and student evaluation techniques and the effective use of new teaching technologies; and incorporating five minute demonstrations from the various sub-disciplines of civil engineering on in-class models, activities, or assessments.

## Conclusions

The pilot ExCEED II workshop described here uniquely builds upon the principles and methods of ASCE's successful and long standing ExCEED Teaching Workshop. Only graduates of ETW were permitted to attend the ExCEED II. Their interests in the advanced workshop were focused on furthering the development of their teaching skills through the practice class and the corresponding feedback session, by interactions with and observations of other teachers, and attendance at the various seminars that built upon, but went beyond ETW. These interests mapped well to the overarching mission of the ExCEED II, which was to encourage civil engineering educators to “become the next generation of master teachers leading our profession.”

True to the tradition of ETW, the ExCEED II pilot was an exceptional workshop. It was well organized and conducted by expert presenters and senior mentors. Every activity was highly valued and participants were sufficiently challenged and inspired. Even so, areas for improvement were identified that will form the basis of the CFD's future work in refining the next offering of ExCEED II. With nearly 550 ETW graduates, the audience is large enough to support the advanced workshop. In addition, this is a community that wishes to reconnect and renew their passions for teaching and learning with ExCEED II nurturing those interests.

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