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Advancing the ASCE ExCEEd Teaching Workshop: A Multi-Year, Multi-Stage Evaluation Process and Implementation Plan

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Abstract

The *American Society of Civil Engineers* (ASCE) started the *Excellence in Civil Engineering Education* (ExCEEd) program in 1998, which includes the *ExCEEd Teaching Workshop* (ETW) first offered in 1999. Since its inception, the ETW has been offered as a multi-day-long practicum, both as an in-person workshop over forty times and as a remote workshop three times (whereby the remote workshop was developed during the COVID-19 pandemic and has continued to be offered in the post-pandemic period). To date, the ETW has contributed toward the instructional skills development of about 1,200 engineering faculty, positively influencing the formation of the many civil engineering students they teach across the nation and globe. The landscape in higher education has evolved significantly since 1999 and while the ETW has undergone incremental change over the years, its core structure and content has not incorporated more significant changes taking place across engineering education. In short, there arose an appropriate need to critically examine, assess, and evaluate the ETW such that the workshop could best leverage emergent instructional strategies for teaching and learning that all civil engineering instructors can and ought to adopt in their classrooms.

As such, the ASCE *Committee on Faculty Development* (CFD) (which oversees the planning, development, execution, and continuous improvement of the ETW) took steps in 2019 to engage in a multi-year, multi-stage program evaluation process for the ETW, a project dubbed as *Advancing the ExCEEd Teaching Workshop*. In this effort, CFD recruited external evaluators who had extensive program assessment experiences from the broader engineering education community to conduct two successive, comprehensive program evaluations for the ETW in Summer 2021 and Summer 2022. To diminish confirmation bias in the evaluation efforts, CFD intentionally sought external evaluators who had no prior connection to CFD or the ETW. The evaluations of the ETW in Summer 2021 and Summer 2022 focused on identifying the ETW's strengths and areas for improvement in topical coverage, schedule, means and process, content delivery, adoption, impact, and staff training. Based on those External Evaluation Reports, CFD prioritized strategic enhancements to be developed and refined by a working group made up of committee members and corresponding members. An initial suite of enhancements was identified and made for the Summer 2022 ETW while a more expansive suite of enhancements was incorporated for the Summer 2023 ETW.

This paper presents the outcomes of the overall program evaluation efforts, implementation of workshop changes, and an initial assessment of the changes made to the ETW as part of the *Advancing the ExCEEd Teaching Workshop* project. Specifically, this paper highlights how collective input from key stakeholders was facilitated to ensure community consensus on the

workshop development. Additionally, this paper provides a preliminary assessment of the changes made to the Summer 2023 ETW as gauged through ETW participant responses to survey questions and through a qualitative analysis by the ETW staff. By sharing the process by which the ETW was reviewed and advanced, this paper seeks to contribute valuable information and insights with the civil engineering education community on how advances in engineering education have positively shaped the ETW, ensuring the workshop's continued effectiveness and relevance within the broader landscape of higher education for many years to come.

1. History and Motivation

The *American Society of Civil Engineers* (ASCE) started the *Excellence in Civil Engineering Education* (ExCEEd) program in 1998 to provide opportunities for civil engineering faculty to develop their instructional capabilities. Several initiatives arose from that program including the *ExCEEd Teaching Workshop* (ETW), first offered in 1999. The ETW was designed to equip civil engineering faculty with the skills and tools needed to lead and deliver effective instruction in the classroom, which in turn has positively impacted many engineering students' learning of civil engineering topics across the nation and globe.

Since 1999, the ETW has undergone continuous review and improvement, resulting in incremental changes over the years to its six-day schedule and revisions of workshop content. Over this time frame, the ETW had not undergone a substantive, program-level review and evaluation, which limited the incorporation of advancements made in engineering education into the ETW. Thus, the ASCE *Committee on Faculty Development* (CFD) (which oversees the planning, execution, assessment, and continuous improvement of the ETW) began in 2019 a multi-year, multi-stage process to systematically evaluate the ETW to identify its strengths and areas for improvement.

This paper summarizes the process CFD undertook to evaluate the ETW, identify target areas for improvement, engage in an implementation process over a two-year period, build consensus among stakeholders to effect workshop changes, and conduct a preliminary assessment on the changes made to the ETW.

2. Background and Introduction

Incremental changes to the ETW and the *ExCEEd Teaching Model* during its first 20 years resulted in a workshop comprised of:

- Thirteen Seminars and three Demonstration (Demo) Classes delivered by experienced ETW staff, and

- Three Laboratories (Labs) and three Practice Classes where ETW participants applied the skills and tools they had learned from the workshop in preparing their own instructional materials.

The full workshop schedule spans a six-day period, commencing as early as 8 am and concluding at various times in the evening based on participant needs for Practice Class preparation. The incremental changes implemented between 1999 and 2019 are documented by Estes *et al*. [1]. Summarily during this 20-year time frame, incremental changes to the ETW included:

- Continual addition, removal, and consolidation of Seminars and workshop content;
- A refocusing of Demo Classes, providing participants the opportunity to see "experienced" engineering faculty instructors in action; and
- Scaffolding opportunities for participants to integrate workshop content into their teaching of Practice Classes.

However, many of these workshop modifications made over the years were motivated by internal factors alone with input primarily from CFD members and ETW staff, in addition to the information collected from feedback surveys of the ETW participants. Estes *et al*. [1] identified several challenges for the continued success of the ETW and offered ways in which the ETW might adapt new knowledge and advances in teaching and learning, adopt new instructional technologies, accommodate distance learning, cope with larger class sizes, incorporate new literature on learning preferences, and embrace instructional strategies rooted in diversity, equity, and inclusion (DEI) [1]. These noted opportunities along with developments in engineering education provided CFD the motivation for expanding the continuous improvement process of the ETW to include a seminal program evaluation effort conducted by external evaluators.

3. Overview of Program Evaluation Process

In 2019, ASCE allotted funds for CFD to recruit external evaluators to evaluate the ETW. CFD solicited applications from individuals with expertise in workshop assessment, faculty development programs, and adult learning. From these applications, three external evaluators were selected based on their substantive experiences in assessment of faculty development programs and adult learning. Additionally, none of the selected external evaluators had any prior connection to CFD, the ETW, or the execution of similar instructional-based faculty development workshops. These criteria, CFD believed, would diminish any confirmation bias in the generated Evaluation Reports. Two of the external evaluators were invited to evaluate the ETW in Summer 2021 and one external evaluator was invited to evaluate the ETW in Summer 2022. The first two external evaluators coordinated their efforts for the Remote ETW in Summer 2021, which was the only ETW offered that year. The remote offering of the workshop in Summer 2021 was a consequence of the persisting COVID-19 pandemic, yet the Remote ETW

was adapted and executed to be entirely comparable to the In-Person ETW [2]. The third external evaluator conducted an independent evaluation one year later for the In-Person ETW and portions of the Remote ETW, both offered in Summer 2022.

CFD provided the external evaluators with guidance on focus areas for their program evaluation efforts, including: topical coverage, schedule, means and process, content delivery, adoption/impact, and training/staff development. CFD tasked the external evaluators to share their findings with CFD in the form of an External Evaluation Report and presentation to the committee.

CFD received the 2021 External Evaluation Report prepared jointly by the two external evaluators, and CFD used it to inform their identification of target areas for improvement, classifying improvement areas either as "low-hanging fruits" that could be addressed relatively quickly or as "long-term investments" that would require significant committee time, energy, and effort. Targeted improvements identified by CFD as "low-hanging fruits" were implemented for the Summer 2022 ETW. During this same time frame, a working group made up of CFD members and corresponding members was established to begin implementing the "long-term investments" for the Summer 2023 ETW.

CFD asked the third external evaluator, who had not yet evaluated the ETW up until this point, to evaluate the In-Person ETW in Summer 2022 using the same guidance and focus areas as the previous duo of external evaluators. This third external evaluator additionally attended portions of the Remote ETW offering in Summer 2022 to observe the ETW in multiple modes. This third external evaluator singularly developed an independent External Evaluation Report and presentation to the CFD. CFD deemed it valuable to gain a triangulating perspective of initial changes already made and incorporated in Summer 2022.

CFD and its working group similarly reviewed the 2022 External Evaluation Report to inform and revise its ongoing "long-term investments" improvement efforts of the ETW. This second report informed the refinement of the priority areas categorized as "long-term investments" that the first report had originally germinated. Figure 1 depicts the timeline of this overall program evaluation process.
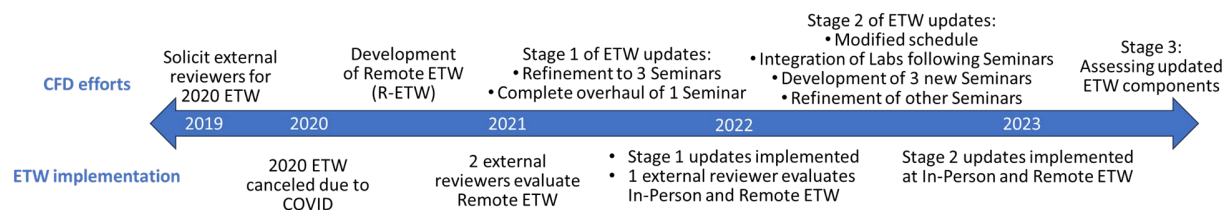

Figure 1. Timeline of the multistage program evaluation for the ExCEEd Teaching Workshop (ETW).

4. Multistage Implementation Plan and Assessment

4.1 Stage 1: CFD Implementation of "Low-Hanging Fruits" in Summer 2022

CFD tasked committee members and the Summer 2022 ETW staff to implement the changes it identified as "low-hanging fruits." The committee intentionally desired small working teams of two to three persons to work together on each workshop component such that collaboration and consensus could be achieved and that the workshop changes represented the input and viewpoints of a broad range of persons. Table 1 summarizes the four key updates of the "low-hanging fruits" implemented in the Summer 2022 ETW. Additional information about one of these updated seminars is detailed in the following section.

Table 1. A summary of four key updates (i.e., "low-hanging fruits") made for the Summer 2022 ETW and beyond.

Workshop Component	Summary of Key Updates
Seminar: Principles of Learning and Teaching	A seminar focused on Lowman's two-dimensional model of teaching and the *ExCEEd Teaching Model* was updated with more recent citations and references.
Seminar: Learning Objectives	A seminar focused on revised Bloom's taxonomy of learning, instructional activities, and assessment of learning was updated to deconflate verbiage on "assessment" and "evaluation."
Seminar: Learning Styles	A seminar focused on learning style preferences was updated to include actionable examples of instructional practices associated with each learning style.
Seminar: Systematic Design of Instruction	A seminar focused on instructional design, previously using Dick and Carey's model of design (1978) was updated to use Morrison *et al.*'s designing effective instruction (2018).

4.1.1 Updates to the Seminar: Systematic Design of Instruction

As an example of the updates made for the Summer 2022 ETW, the Seminar on "Systematic Design of Instruction" was redesigned in an effort to shift the ETW to a more learner-centered approach. This shift precipitated the transition away from the more linear approach taken by

Dick and Carey [3] to the circular design utilized by Morrison *et al.* [4], resulting in a Seminar that places a greater emphasis on the continually iterative nature of instructional design combined with the importance of continual assessment of instructional effectiveness. Figure 2 illustrates the ETW interpretation of effective instruction generated from the Morrison *et al.* [4] model.
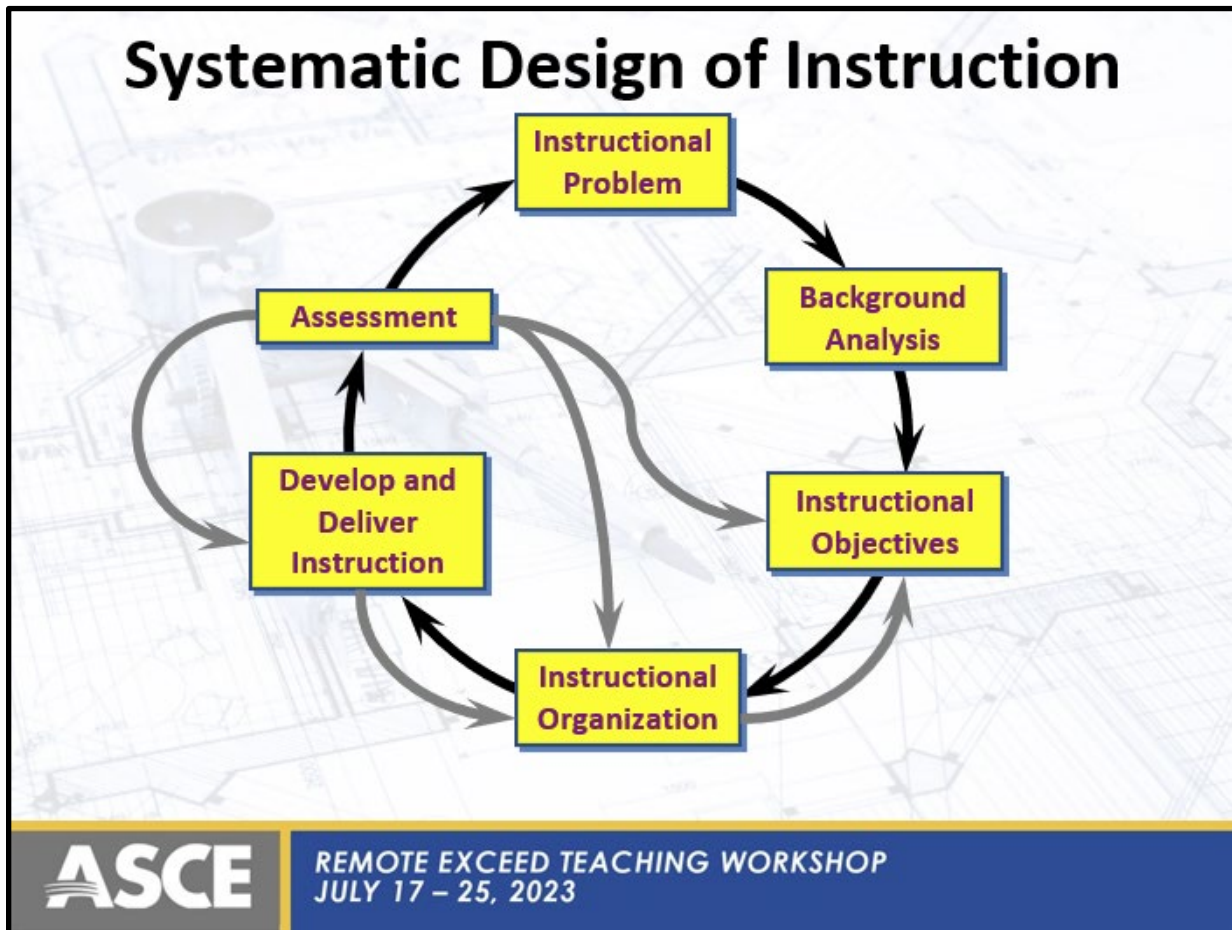

Figure 2. ETW visualization on effective instruction from the Seminar on "Systematic Design of Instruction" adapted from Morrison et al. [4].

4.2 Stage 2: CFD Implementation of "Long-Term Investments" in Summer 2023

CFD confirmed the final listing of "long-term investments" for the ETW at its February 2023 strategic planning meeting. At this meeting, adjustments and refinements to the initial listing of the "long-term investments" were made, resulting in the following priority changes to the ETW:

1. Refining the ETW Learning Objectives (i.e., Workshop Goals) to enhance alignment between the workshop-level learning objectives and the seminar-level learning objectives.

2. Refining the ETW Schedule to accommodate the new workshop structure and reduce the amount of practice class preparation done in the evening hours.
3. Updating and refining the ETW Study Guide with a new "Seminar Series" sequence to streamline the workshop activities.
4. Adjusting Demo Class execution to better meet workshop goals.
5. Refining the existing Seminars by adjusting seminar-level learning objectives and seminar content to maintain alignment with the Workshop Goals.
6. Creating fifteen new Labs associated with every Seminar to allow for "learning by doing" and increase the hands-on time with the workshop activities and tools.
7. Creating new Seminars on "Introduction to Active Learning" and "Creating a Civil Classroom" (i.e., to integrate DEI in the ETW curriculum) to make both of these inferred topics more transparent during the workshop.
8. Creating new Reflection-based activities in order to encourage participants to envision how their learnings could be adapted and applied in their classroom in the near-term future.

CFD established an implementation plan whereby CFD committee members would proceed with the creation of new "Base Slides" for the forthcoming Summer 2023 ETW. In anticipation of these workshop changes, CFD organized in December 2022 a "Town Hall Meeting" with prospective staff for the Summer 2023 ETW to engage those stakeholders early in implementing the workshop changes. This event was a critical element of the change management process, and a principal purpose of this meeting was to share with the ExCEEd community that the Summer 2023 ETW staff would participate in the implementation of the workshop changes, and that the anticipated commitments and work effort for the Summer 2023 ETW preparations would be larger than normal.

CFD confirmed its Summer 2023 ETW staff in March 2023, and tasked the ETW staff across the two forthcoming sites (an In-Person site and a Remote site) to work together to implement all workshop component changes. Table 2 summarizes the eight key updates made to workshop components by CFD and the Summer 2023 ETW staff. Additional information about select workshop components is detailed in the following sections, specifically for key updates 2, 4, 5, 6, 7, and 8.

Table 2. A summary of key updates (i.e., "long-term investments") made for the Summer 2023 ETW and beyond.

No.	Workshop Component	Summary of Key Updates
1	Workshop Goals	The seven workshop-level learning objectives were updated to enhance alignment with the Seminar content.
2	Workshop Schedule	The six-day workshop schedule was adjusted to accommodate the revised sequence of Seminars, Labs, Demo Classes, Practice Classes, and Reflection-based activities.
3	Study Guide	The 86-page study guide was streamlined into a new "Seminar Series" sequence to enhance relationships between workshop activities.
4	Demo Classes 1, 2, and 3	The three Demo Classes were clarified with new workshop-level learning objectives to clarify the role and purpose of each Demo Class for the ETW participants.
5	Existing Seminars	All thirteen existing Seminars were modified to follow a new 20- or 40-minute time limit and allow for the inclusion of new 40- or 20-minute Labs associated with each Seminar.
6	New Labs	Fifteen new Labs were created by either excising content out of the thirteen existing Seminars and/or developing new instructional materials to allow for more hands-on application of theoretical knowledge.
7	New Seminars	Two new Seminars were created to more transparently address workshop topics that had previously only been inferred. A third new Seminar was created by re-organizing content from existing workshop content.
8	New Reflections	Multiple new Reflection-based prompts were incorporated into the workshop activities to promote actionable plans on participant adoption of the workshop tools upon their return to their institutions.

4.2.1 Key Update No. 2: Restructuring the Workshop Schedule

Due to the changes made for the Summer 2023 ETW, the original six-day workshop schedule (see Figure 3) was restructured to accommodate the new timing and sequence of workshop activities presented in Table 2. The revised workshop schedule is shown in Figure 4.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
7:20 AM		Depart from Hotel	Depart from Hotel	Depart from Hotel	Depart from Hotel	Depart from Hotel
7:40 AM		Admin & Gift	Admin & Gift	Admin & Gift	Admin & Gift	Admin
8:00 AM		Demo Class 1	Admin & Gift	Admin & Gift	Group Photo	SEM 12: Design of Instruction
8:20 AM		Demo Class 1				
8:40 AM						SEM 13: Making it Work
9:00 AM		Debrief Demo Class 1				
9:20 AM			Practice Class 1	Practice Class 2	Practice Class 3	
9:40 AM						Assessment
10:00 AM		SEM 3: Learning Styles				
10:20 AM						ASCE Initiatives
10:40 AM						
11:00 AM		SEM 4: Learning Objectives				Graduation
11:20 AM						
11:40 AM						
12:00 PM		Group Lunch	Team Lunch (Watch Video)	Group Lunch		Depart to Airport
12:20 PM	Depart from Hotel					
12:40 PM						
1:00 PM		SEM 5: Planning a Class	SEM 7: Speaking		Discipline Lunch	
1:20 PM	Intro to ETW Facilities Tour			Practice Class 2		
1:40 PM						
2:00 PM			SEM 8: Questioning		SEM 10: Rapport	
2:20 PM						
2:40 PM		SEM 6: Writing				
3:00 PM			SEM 9: Classroom Assessment Technique	Demo Class 3		
3:20 PM	SEM 1: Learn to Teach				SEM 11: Non-Verbal	
3:40 PM		LAB 2: Objectives				
4:00 PM			Demo Class 2	Debrief Demo Class 3		
4:20 PM						
4:40 PM						
5:00 PM	SEM 2: Eff. Teaching		Debrief Demo Class 2			
5:20 PM				Prep for Practice Class 3	Dinner / Social	
5:40 PM		Prep for Practice Class 1				
6:00 PM			Prep for Practice Class 2			
6:20 PM	LAB 1: Team Building					
6:40 PM						
7:00 PM						

Figure 3. The original ETW schedule. Each ETW site maintains a customized schedule to accommodate site-specific needs (e.g., In-Person lunch breaks, Remote Zoom breaks, etc.).

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
7:20 AM		Depart from Hotel	Depart from Hotel	Depart from Hotel	Depart from Hotel	Depart from Hotel
7:40 AM		Admin & Gift	Admin & Gift	Admin & Gift	Admin & Gift	Admin & Gift
8:00 AM		SEM 3: Writing, Speaking, Movement	Practice Class 1	Practice Class 2	Practice Class 3	SEM 15: Making it Work
8:20 AM						
8:40 AM		LAB 3				Break
9:00 AM						Assessment / Hot-Wash
9:20 AM		Break				
9:40 AM		SEM 4: Learning Objectives				
10:00 AM						Graduation
10:20 AM		LAB 4				
10:40 AM	Depart from Hotel					Depart to Airport
11:00 AM	LAB 0: Team Building	SEM 5: Using the MIS				
11:20 AM		LAB 5				
11:40 AM		Reflection				
12:00 PM	Team Introductions	Team Lunch	Team Lunch	Team Lunch	Networking Lunch	
12:20 PM						
12:40 PM	Demo Class 1					
1:00 PM		SEM 6: Board Notes	SEM 8: Learning Styles	Demo Class 3	SEM 13: Civil Culture	
1:20 PM						
1:40 PM	Debrief Demo Class 1	LAB 6	LAB 8	Debrief Demo Class 3	LAB 13	
2:00 PM			SEM 9: Using LS Prefs		SEM 14: Design of Instruction	
2:20 PM	Break	Break	LAB 9			
2:40 PM	SEM 1: Learn to Teach	Demo Class 2		Break	Reflection	
3:00 PM			Break	SEM 11: Questioning	Admin: Wrap-Up	
3:20 PM	LAB 1		SEM 10: Active Learning	LAB 11	Break	
3:40 PM	SEM 2: Eff. Teaching	Debrief Demo Class 2		SEM 12: Rapport	Graduation Dinner	
4:00 PM	LAB 2		LAB 10			
4:20 PM		SEM 7: Assessment		LAB 12		
4:40 PM	Reflection	Reflection	Reflection	Cool Ideas Fair		
5:00 PM	Admin: Wrap-Up	Admin: Wrap-Up	Admin: Wrap-Up			
5:20 PM	LAB 1 & 2	Prep for Practice Class 1	Prep for Practice Class 2	Admin: Wrap-Up		
5:40 PM				Reflection		
6:00 PM				Prep for Practice Class 3		
6:20 PM						
6:40 PM						
7:00 PM						

Figure 4. The revised ETW schedule, as generated by the CFD at its February 2023 strategic planning meeting. Each ETW site maintains a customized schedule to accommodate site-specific needs (e.g., In-Person lunch breaks, Remote Zoom breaks, etc.).

4.2.2 Key Update No. 4: Refining the Aims and Objectives of the Demo Classes & Practice Classes

The ETW includes three Demo Classes taught by experienced ETW staff as examples of the application of workshop theory to class delivery. Additionally, there are three Practice Classes where ETW participants have the opportunity to apply concepts they are learning from the workshop activities and receive constructive feedback from ETW staff and other ETW participants. While both workshop components were deemed essential, CFD recognized opportunities to further optimize both of these experiences for the ETW participants.

First, workshop-level learning objectives were added to the three Demo Classes, which had previously only included instructional-level learning objectives. This change provided clarity to both ETW staff and participants on the goals of these Demo Classes in the context of the overall workshop goals. As a result, the timing and approach for Demo Classes was adjusted. Previously, participants were tasked to role-play as students in all three Demo Classes, and the

Demo Class instructor (an experienced ETW staff member) would fully engage the participant-students per the *ExCEEd Teaching Model*. Over the years, some ETW participants reported feelings of anxiousness and discomfort on being "called on" as a student as early as the first day of the workshop. The newly added workshop-level learning objectives for the three Demo Classes made it clear that the three Demo Classes could be scaffolded in a way to maximize workshop goals and minimize ETW participant anxiety and discomfort.

Thus, the first Demo Class was scheduled to occur much earlier in the workshop, allowing it to serve as a motivator and orientation to workshop goals and forthcoming Seminars. Additionally, this change precipitated a new mode of engagement whereby both ETW staff and participants role-played as students while ETW participants would not be "called on" by the experienced teacher at the first Demo Class (though ETW participants were allowed to engage as students by "raising their hands"). After the first Demo Class, ETW participants engaged in a qualitative assessment of their experience observing (and partially participating in) the first Demo Class. The discussion led by the ETW participants identified key instructional techniques that inherently provide motivation for workshop seminars in fundamental teaching skills, classroom management and organization techniques, and strategies for high engagement with students.

Having been provided an orientation to the Demo Class expectations, ETW participants became fully integrated as active students (i.e., being "called on" by the experienced teacher) in the second and third Demo Classes. By this point during the workshop, participants had also gained experiences in providing feedback through structured assessment, meaning that the debrief of the second and third Demo Classes maintained their richness and value in participant-learning of the *ExCEEd Teaching Model*. Moreover, the third Demo Class maintained its modeling of an instructor's self-assessment.

The primary change in Practice Classes was that the time duration was made consistent at 25-minutes for all three occurrences in the workshop schedule (see Figure 4). The revised timing continued to provide participants with opportunities to focus on various aspects of the *ExCEEd Teaching Model* shortly after the introduction of the topics, and the reduced time allowed for the integration of other workshop activities without extending the six-day workshop schedule.

4.2.3 Key Update No. 5: Refinement of Existing Seminars

The existing Seminars required some reorganization and updates, in four broad ways. First, existing Seminar content was condensed and refined to convey essential information related to the seminar-level learning objectives and to accommodate workshop time for hands-on application during new Labs. Second, Seminar content and visuals were edited to include inclusive pronouns, terms, and ideas to better resonate with a diverse group of ETW staff and participants. Third, typography, graphical content, and visuals were standardized and made

consistent to ensure accessibility (e.g., clip art, colors, text font, text size, other formatting issues, etc.). Last, citations and references were updated to incorporate the latest research and modern pedagogical insights available within engineering education.

4.2.4 Key Update No. 6: Creation of New Labs

Fifteen new Labs were created following each Seminar. These Labs aimed to reinforce the Seminar content through dynamic group activities and discussions in team-based, discipline-based, or individual-based settings. By doing so, the Lab sessions not only facilitated participant collaboration but also broke away from the unidirectional delivery of information. The schedule of Labs throughout the workshop schedule (see Figure 4) provided ETW participants with earlier and more frequent instances to develop instructional materials for their Practice Classes, reducing the amount of time needed at the end of the workshop days for extended Practice Class preparation.

4.2.5 Key Update No. 7: Creation of New Seminar & Lab: Writing, Speaking, and Classroom Movement

A new Seminar and Lab on "Writing, Speaking, and Classroom Movement" was created based on three separate, previously existing Seminars on "Writing," "Speaking," and "Nonverbal Communication." The goal of the new Seminar was to maintain the essential facets from the previous three Seminars in a shortened time frame. Additionally, the new Lab was designed to allow participants to practice these skills before their Practice Classes. Portions of the "Writing" and "Speaking" Seminars were also moved to the newly organized Seminar on "Building Rapport," while other seminar content not directly supporting the seminar-level learning objectives were removed.

4.2.6 Key Update No. 7: Creation of New Seminar & Lab: Introduction to Active Learning

Although active learning techniques have been used in the ETW over many years, this topic has not been explicitly addressed within the ETW. Therefore, a new Seminar and Lab on "Introduction to Active Learning" was developed. The purpose of this Seminar was to make the implicit topics of active learning explicit, by explaining the importance of active learning strategies to student learning and summarizing key factors to consider when developing active learning strategies. ETW Participants learned about various active learning strategies and were tasked to select a suitable active learning technique for their next Practice Class.

4.2.7 Key Update No. 7: Creation of Seminar & Lab: Creating a Civil Classroom Culture

CFD agreed that topics and techniques rooted in DEI needed to be added to the ETW to help

participants foster a welcoming classroom environment for themselves and their students. A new Seminar and Lab was created called "Creating a Civil Classroom Culture." This Seminar was created by connecting the *ExCEEd Teaching Model* with information from several universities' centers for learning and teaching on inclusive excellence and from several journal articles. The overarching goal of this Seminar was to create an inclusive classroom through guided reflection on the identity of the instructor, identity of the students, the course goals and content, and the manner of instructional delivery. Throughout the Seminar and Lab, ETW participants were asked to reflect on their experiences via prompted questions, and they were invited to share their thoughts within their team-based settings.

4.2.8 Key Update No. 8: Creation of Reflections

The External Evaluation Reports included commentary about how adult learning theories necessitate the immediate application of new theoretical knowledge by adult learners in order for them to see the relevancy of that theoretical knowledge to their own lives. Therefore, as part of new transitions between workshop activities, the ETW site host posted a reflective question and asked participants to write down a response, discuss a response, or write a plan of action. The prompting questions mirrored the higher order thinking skills as organized by the affective domain of learning [5], leading to ETW participants engaging in "Receiving" efforts on Day 1 of the workshop and ultimately "Characterization" efforts on Day 6 of the workshop. The ETW site host revealed on the final day of the workshop how the prompting reflection questions mirrored the taxonomy and how reflection-based learning activities could be used as a means for developing engineering students' attitudes and mindset toward engineering topics. The reflections also allowed the participants to decompress after a long workshop day.

4.2.9 Structuring of Staff Rehearsals & Training

CFD recognized the importance of communication, coordination, and collaboration among the Summer 2023 ETW staff to ensure the successful execution of changes to the workshop content, structure, and schedule. This effort is particularly important because the ETW staff are selected by CFD on an annual basis with particular attention toward selecting persons capable of supporting the workshop Seminar content delivery, leading the Demo Class instruction, and mentoring teams of four participants, resulting in approximately 12 to 13 people serving as staff at each ETW site with 16 to 24 participants. Moreover, because of summer scheduling constraints, there is a recurring need to develop junior staff to take on more responsibilities as senior staff become unavailable due to a variety of reasons in any given summer, necessitating staff development to pass on institutional knowledge of successfully executing the ETW.

Once the Summer 2023 ETW staff was confirmed in March 2023, the ETW site hosts were charged by CFD to ensure coordination between the sites and collaboration between ETW staff

as the workshop changes were implemented. The two ETW site hosts created an online calendar for ETW staff to sign up for remote rehearsals of all Seminars and Demo Classes, particularly communicating the expectation that all ETW staff would need to be aware of new workshop activities (e.g., Labs) that would shift the onus of facilitation away from a Seminar presenter and to a team-based "Mentor" and "Assistant Mentor." The remote rehearsals allowed all ETW staff to collaborate on adjusting the new workshop components and schedule. Continual refinement of the workshop components and schedule were made throughout the ETW staff rehearsal period to ensure consistent delivery of the workshop content across multiple ETW sites. The remote rehearsals also allowed new and junior ETW staff to attend more practice sessions, which resulted in enhanced staff training and development. Prior to this, limited staff rehearsals took place one-day prior to the start of the ETW.

4.3 Stage 3: Measures of Successes and Challenges for Summer 2023

4.3.1 Quantitative Analysis: Participant Survey Responses

During the Summer 2023 ETW, feedback was collected from ETW participants through daily surveys. A survey link was shared with the ETW participants every day to assess the Seminars, Labs, and other activities of the workshop day. The survey requested feedback on the value of the content (VoC) delivered and the conduct of the activity (CoA) by the activity facilitators. Table 3 contains the statistical results from the combined survey feedback from the ETW of Summer 2023, and only includes data for the Seminars and related Labs. The data available for the Seminars is further categorized as "All Seminars," which comprises two sub-categories of "Existing Seminars" and "New Seminars." All survey ratings used a 5-point Likert scale with a rating of 1 as "Very Poor", 3 as "Neutral", and 5 as "Very Good". Since the surveys were compulsory, the response rate varied for each event. To avoid bias, the data was sorted based on total response categories instead of individual activities. Thus, the sample size, *n*, for "All Seminars" is the total number of responses across all seminars. As a consequence, the sample size for "New Seminars" is much lower than the sample size for "Existing Seminars," since only three seminars were categorized as new and twelve seminars were categorized as existing. Upon inspection, "All Seminars," "Existing Seminars," "New Seminars," and "Labs" were rated by participants as being "Good" and "Very Good" suggesting that the overall ETW structure was well received by ETW participants. While it is possible to conduct a more extensive statistical analysis comparing the VoC and CoA of the Summer 2023 ETW in relation to prior instances of the ETW over its 20-year timespan, the statistical results in Table 3 suggest that the strength of these workshop components are very strong, with all categories exceeding 4.7 on the 5-point Likert scale. Any future, comprehensive statistical analysis of the ETW would need to establish a baseline metric to assess whether workshop goals and learning outcomes are being achieved.

Table 3. Statistical results from the Summer 2023 ETW based on participant responses to survey questions (VoC: Value of Content; CoA: Conduct of Activity).

	All Seminars		Existing Seminars		New Seminars		Labs	
	VoC	*CoA*	*VoC*	*CoA*	*VoC*	*CoA*	*VoC*	*CoA*
Average	4.797	4.799	4.779	4.785	4.866	4.854	4.748	4.723
Std Dev	0.450	0.425	0.459	0.441	0.409	0.356	0.519	0.551
n	403	403	321	321	82	82	274	274

4.3.2 Qualitative Analysis by the ETW Staff

At the conclusion of the ETW, the staff convened to assess the strengths and areas for improvement for all components of the workshop. The ETW site host and ASCE staff facilitated an open-ended conversation with ETW staff and recorded verbalized comments in a shared document. The shared documents for the two Summer 2023 ETW sites were inspected and qualitatively analyzed, and qualitative themes from those ETW staff discussions are elaborated in the following sections.

4.3.2.a New Seminars

A significant amount of feedback was provided for the new Seminars on "Writing, Speaking, and Classroom Movement," "Introduction to Active Learning," and "Creating a Civil Classroom." Thematic comments from the ETW staff indicated that the new seminars were found to be effective for both their content and time duration. A recurring comment in terms of improving those specific seminars suggested that a larger number of ETW staff needed to become familiar and confident with the new seminar content and activities. For example, the new Seminar on "Creating a Civil Classroom" was praised by ETW staff for incorporating DEI principles, yet ETW staff noted that not all ETW staff are ready to deliver such a seminar without considerable preparation.

4.3.2.b Demo Classes

ETW staff reported that having the first Demo Class as a motivating and orienting activity early in the workshop was a positive change to the workshop. However, an area for improvement was for participants to be provided with more time to digest and reflect on their observatory experience with the first Demo Class in order to synthesize more thematic elements on effective instruction (i.e., extend the Debrief of the first Demo Class – see Figure 4). Additionally, the ETW staff highlighted the integration of DEI topics into the workshop, particularly as it was

exemplified in the third Demo Class, as a strength and enhancement of the workshop. In order to better communicate the role and purpose of the three Demo Classes, ETW staff suggested further refinement of the Study Guide and Workshop Goals to make clearer how the three Demo Classes are inter-connected to each other and demonstrate increasing levels of student engagement, various levels of Bloom's taxonomy, and the increased use of workshop tools.

4.3.2.c Labs

ETW staff received the practical aspect of the Labs well. It was noted that the Labs effectively supported ETW participants preparing for their Practice Classes. However, a clear transition from the Seminars to the Labs was suggested. Some Labs were considered too long while others were considered too brief. An added benefit of the Labs noted by ETW staff, beyond the immediate application of the newly covered content, was that the time spent for the Practice Class preparation in the evenings by the ETW participants was reduced, improving the overall schedule and reducing ETW participant burnout over the multi-day-long workshop.

4.3.2.d Reflections

ETW staff reported that the new Reflection-based activities seemed beneficial for the ETW participants but that the timing of the activities could be modified to provide for longer scheduled breaks and improved transitions between workshop activities. Additionally, ETW staff reported that clearer instructions can be provided to the ETW participants on the Reflection-based activities.

5. The Future of the ExCEEd Teaching Workshop

The ASCE *ExCEEd Teaching Workshop* (ETW) has made its mark on civil engineering instruction since its inception in 1999, positively impacting faculty and students around the nation and globe. While the ETW has maintained continuous improvement processes, there remained opportunities for more significant modifications to the workshop to incorporate advances made in engineering education and evidence-based instructional practices. Thus, this paper summarized the efforts made by the ASCE *Committee on Faculty Development* (CFD) in 2019-2023 to evaluate and implement more robust changes to the ETW.

The first stage of this multi-year process entailed gathering outside, independent viewpoints on the strengths and areas for improvement of the ETW in an effort to eliminate confirmation bias. The external evaluation of the ETW in Summer 2021 and Summer 2022 informed the prioritization of key changes, identified either as "low-hanging fruits" or "long-term investments." The second stage featured CFD committee members, corresponding members, and ETW staff working together collaboratively to refine the existing workshop and generate new

workshop components to support ETW participant learning of the *ExCEEd Teaching Model*. The third and final stage assessed the Summer 2023 ETW, which revealed that both ETW staff and participants found the workshop changes to be positive and valuable.

A key mantra from the *ExCEEd Teaching Model* is there are always areas for improvement in instruction while striving toward the "complete exemplar" [6]. The program evaluation process of the ETW is no different in that new strengths and new areas for improvement have been identified for the ETW at this point in time, and that new strategies and efforts will be explored by CFD for future offerings of the ETW. Yet, this seminal advancement of the ETW, the first significant restructuring of the ETW since its inception over 20 years ago, demonstrates the continued investment that ASCE and the ExCEEd community have made in the ETW. The ExCEEd community, as manifested through past and present CFD members and ETW staff, collaboratively worked together to effect positive change. In doing so, the overall workshop goals and structure were refined, inferred workshop topics were made explicit, ETW participant experiences were enhanced, and ETW staff training and development opportunities were improved.

The foundation of the ETW is strong, and the collective contributions of the ExCEEd community in *Advancing the ExCEEd Teaching Workshop* truly demonstrates that the future of the ETW is stronger.

6. Acknowledgements

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