

Virtually Speaking: Perspectives on ABET Virtual Reviews

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Virtually Speaking – Perspectives on ABET Virtual Reviews

Purpose and Scope

Due to the coronavirus pandemic and on-going travel restrictions, all ABET accreditation reviews in the 2020-2021 accreditation cycle were conducted virtually. Team Chair (TC), Program Evaluator (PEV) and university administrator trainings were also virtual. Communications among the visit team members and between team members and the institution used email and video conferencing tools. In lieu of in-person tours, programs undergoing review prepared a variety of materials including videos and annotated photographs of laboratories, classrooms, and other university infrastructure. Course and assessment materials were provided electronically. Self-Study Reports, transcripts, TC reports, and Program Evaluators' reports were posted on the ABET Accreditation Management System (AMS) website or in another cloud storage platform. While some of these changes had already been underway, the pandemic accelerated them.

Although ABET had conducted some partially virtual reviews in the past to address situations where team travel was unsafe or to evaluate an online program, the scale of the change was unprecedented, as was the time frame in which the transition was implemented. Prior virtual reviews had been dictated by safety concerns and had always included a small site visit team. While some prior practices could be brought forward, many new protocols had to be developed.

In the spirit of assessment and continuous improvement, the virtual evaluation process is being examined closely from the perspectives of TCs (who also serve on the ABET Engineering Accreditation Commission (EAC/ABET)), Program Evaluators (PEVs), and programs undergoing review in the 2020-2021 accreditation cycle. It should be noted that ABET has decided to conduct all 2021-2022 reviews virtually and it expects to review over 1080 programs across all four commissions during the accreditation cycle. Over 730 of these programs will be evaluated by EAC.

The objectives of this study were to:

- gather input on best practices and opportunities for improvement in all elements of the virtual review, including pre-visit preparation, virtual “on-site” operations, team dynamics, communication and training, and
- provide recommendations for future virtual reviews

Results of surveys, author(s)' observations, and recommendations to improve future reviews - whether in-person or virtual - are presented in this paper. Lessons learned address suggestions for improvement for future virtual reviews, if necessary, and elements of virtual reviews that can be retained, and perhaps expanded, to enhance future in-person visits. Although the lessons learned are based primarily on the experience of ASCE programs, and PEVs and TCs appointed by ASCE, the lessons learned are applicable to a broader ABET audience including ABET headquarters, Programs, and PEVs and TCs during future virtual reviews. A limited number of non-ASCE PEVs and TCs participated in the survey and provided feedback.

Background

All ABET program reviews in the 2020-2021 accreditation cycle were conducted virtually due to the COVID-19 pandemic. The visit component of the accreditation cycle typically begins in the fall and ends in the spring so that the appropriate Commission can approve the TC and PEV's findings at the subsequent July Commission meeting. Due to the timeline of the cycle, no one knows with any certainty whether evaluation visits in future cycles will be conducted virtually although ABET leadership has made a decision to conduct all reviews virtually in the 2021-2022 cycle. Virtual reviews are expected to continue in the future to some degree, either due to safety concerns or as needs arise to increase efficiency and save costs.

Virtual reviews -- program reviews where a portion of the review and site "visit" is conducted virtually by all members of the team -- have been used in previous accreditation cycles under a variety of situations. Examples included visits to locations where public health or political concerns made an in-person visit infeasible or unsafe. However, to date, there has been no systematic assessment of the strengths and challenges of virtual program reviews. The extensive use of virtual reviews in the 2020-2021 accreditation cycle provides an opportunity to collect data on the effectiveness of virtual visits. This information can be incorporated into best practices for future reviews - whether in-person or virtual.

ASCE Accreditation Activities and Processes

The American Society of Civil Engineers (ASCE) focuses significant effort on accreditation activities. The ASCE Committee on Accreditation (COA) administers all activities involving ASCE's participation in ABET accreditation, with a particular focus on strategic accreditation priorities, policies, and programs. The ASCE Committee on Accreditation Operations (COAO) focuses on recruitment, training, assignment, and evaluation of program evaluators for accreditation of programs in the six areas for which ASCE serves as lead society [1].

ASCE staff and volunteers provide significant effort to support accreditation activities. ASCE staff and volunteer time is required to recruit and support a 200-plus person roster of PEVs, 16 TCs who also serve as Commissioners in the Engineering or Engineering Technology Accreditation Commissions (EAC or ETAC), and three ASCE volunteers who serve as ABET Area Delegates. ASCE serves as the lead society for six sets of program criteria spanning two different ABET commissions (i.e., EAC and ETAC).

ABET Accreditation Activities and Processes

ASCE and ABET spend significant time and resources preparing PEVs and TCs for ABET visits each year. The ABET website notes that "*Our more than 2,200 experts come from industry, academia and government. They give their time and effort supporting quality assurance activities around the world by serving as Program Evaluators, commissioners, board members and advisors*" [2]. ABET acknowledges that successful accreditation visits would not be possible without ABET volunteer experts, who must be knowledgeable about ABET processes. Thus, successful training is necessary to ensure that subject matter experts serving as ABET volunteers are also well-versed in ABET processes.

As part of ABET's efforts to train volunteers, new PEVs must attend PEV Candidate training, which contains face-to-face and virtual components [3]. Sponsoring societies must also provide a mentor to assist the PEV Candidate. Each year, PEVs complete virtual training modules that include pre-visit preparation training. PEVs and TCs are required to complete cultural awareness training and training on accreditation visits outside of the U.S.

Author Positionality Statement

During the 2020-2021 cycle, the authors of this paper represent one program undergoing a general review, one PEV, and three ASCE Commissioners who served as TCs. Collectively the authors had over 46 years of PEV and TC experience and have evaluated programs at 67 institutions worldwide. Additionally, the authors have actively led their respective programs through ABET visits.

Changes for 2020-2021 Virtual Reviews

In preparation for the virtual reviews in 2020-2021, PEVs and TCs completed additional training specifically focused on conducting virtual reviews, made available to volunteers in late July. TCs were invited to participate in webinars during fall 2020 to receive real-time guidance and support to execute virtual reviews. Significant ABET resources and staff time were used to develop, provide, and maintain training resources and additional effort was required on the part of ABET volunteers to prepare for virtual reviews. For the 2020-2021 cycle, the term "review" was used more appropriately than the traditional term "visit," as no in-person visits took place.

In addition to the standard pre-visit training, ABET staff and volunteers developed and revised training materials to include elements relevant for virtual reviews. These materials were delivered to TCs and Programs at the annual meeting of the ABET Commissions, held in July 2020. Finally, ABET conducted separate virtual training sessions for institutional representatives highlighting preparations required for hosting virtual reviews.

To address the reality of conducting reviews virtually, ASCE staff and volunteers increased their efforts in preparing PEVs for virtual reviews. In August 2020, the ASCE's COAO launched a PEV Readiness Workshop to serve as an annual refresher for ASCE PEVs. COAO is preparing a Readiness Workshop for New ASCE PEVs to be launched in Spring 2021 to support new PEVs as they train for their first visit. This training will be more important than usual if the virtual reviews continue into the next cycle. For any PEV, conducting the first evaluation review virtually will present additional challenges.

Clearly, ABET and ASCE place strong emphasis on volunteer education and training, as well as on continuous improvement processes. Thus, results of this study are intended to support the continuous improvement of virtual reviews and will be of value to ABET and ASCE volunteers as well as programs seeking accreditation and PEVs and TCs representing other societies.

Literature on Virtual Site Visits

The shift to virtual accreditation reviews is not unique to ABET. However, little information is available in the literature on best practices or procedures to prepare all stakeholders for the successful implementation of a virtual visit. Cobourne and Shellenbarger [4] highlight adaptations nursing programs should consider in reaffirming accreditation and hosting a virtual site visit. Specifically, the authors identify eight major challenges of virtual reviews. For challenges related to paring and distributing electronic documentation, Cobourne and Shellenbarger [4] suggest using USB drives, sharing Learning Management System files, or access to password protected cloud storage. The authors further suggest that extension labeling and providing a file indexing system can improve the organization and retrieval of supporting materials.

To enhance the effectiveness of interviews with program staff, programs should practice using the video conferencing system, use reliable internet connections and have Information Technology (IT) backup personnel to assist in troubleshooting IT problems. Before the virtual meeting, all personnel should check lighting, cameras, and displays and all personnel should consider having back up equipment or facilities in case of problems. In case of complete IT failure, Cobourne and Shellenbarger [4] suggest sharing phone and email contact information with IT support personnel. To make attending virtual meetings easier, the calendar invitation should include all of the meeting information, including dial in and access code. For campus tours or observation of classes, the authors suggest that live interactive video streaming or pre-recorded videos can work equally well.

Although Cobourne and Shellenbarger [4] provide suggestions for effective use of technology, it is clear their suggestions are based on assumptions of the challenges that may arise during a virtual site visit. Therefore, a need exists to share best practices based on experiences from actual virtual visits, which can inform future virtual accreditation visits. Additionally, the recommendations from Coubourne and Shellenbarger [4] were focused on the execution of the visit and did not address other challenges that arise during the visit, such as accreditation team dynamics and communication between team members in the virtual environment.

Virtual Reviews in the 2020-2021 Accreditation Cycle

The decision to shift to virtual reviews for the 2020-2021 cycle was made by ABET leadership in spring 2020. Due to the timing of that decision, ABET staff suggested to programs and TCs to delay the start of the first reviews from early September to late October/early November. In previous years, all visits were typically completed by late November, but due to challenges posed by the COVID-19 pandemic, programs and TCs were encouraged to schedule reviews through February and March 2021. These recommendations were made to allow programs, PEVs, and TCs more time to prepare for - and complete additional training required for virtual reviews.

For the 2020-2021 accreditation cycle, 882 programs were scheduled for review by all four commissions of ABET. Of these, 350 reviews were completed by December 3 [5]. Immediately after the end of each virtual review conducted early in the cycle, ABET administered a short survey to PEVs and TCs to solicit feedback with the intent of real-time continuous improvement.

Some lessons learned from reviews conducted in September and October were incorporated prior to subsequent reviews. For example, although a TC could schedule simultaneous virtual meetings, only one meeting could be held at any given time. Because of issues with access to video conferencing tools, ABET staff agreed to reimburse volunteers for a one-month subscription to Zoom (or similar platform) during the period of the visit. Prior to this change, ABET had assumed that the free version of Zoom would be adequate for PEVs to use for virtual reviews, but the adjustment was made after some PEVs reported otherwise.

Engaging Constituencies

For this paper, authors conducted three surveys to collect feedback on the conduct and impact of the sudden and wide-spread use of virtual ABET reviews in the 2020-2021 accreditation cycle. Unique surveys were developed to solicit feedback from Programs, PEVs, and TCs. Department Heads and Chairs were contacted using the ASCE Collaborate Department Head community. Feedback from Department Heads and Chairs was included in the “Programs” constituency. ASCE staff members sent an email containing the survey links to ASCE PEVs and TCs. The authors of this paper disseminated the survey links to PEVs and TCs representing other professional societies to increase and diversify the number of TC responses.

Although different surveys were administered to each of the three constituencies, all surveys followed a common structure and addressed the following.

- General Review information. This section collects information regarding the programs reviewed, including the ASCE programs reviewed.
- Scheduling. This section collects information regarding time zones represented in the review to determine if time zones variations impacted review success.
- Display Materials and Facility Tours. This section included questions regarding the availability and appropriateness of display materials before and during the scheduled review. The questions collected information regarding the tools used to disseminate display materials and share virtual tour information.
- Pre-review Communication/Preparation. Questions in this section solicited data on the amount of training the program, PEV or TC completed to be prepared for a virtual ABET review. Questions in this section also addressed communication prior to the virtual review.
- Meeting Scheduling and Virtual Meetings. Questions in this section inquired as to who scheduled the meetings and asked if the meetings were secure.
- Team Dynamics. Questions in this section sought to determine whether team dynamics were the same in the virtual environment as the face-to-face environment and whether the lack of face-to-face communication negatively affected the review process.
- Accreditation Management System (AMS) and Exit Statement Writing. Questions in this section sought to determine PEVs and TCs experiences with the ABET’s AMS system. Although TCs had used the AMS tool in previous years, the 2020-2021 accreditation cycle is the first time PEVs used the AMS to submit the exit statement and Program Audit Form.
- Other. This section included questions to determine the PEV’s or TC’s willingness to participate in virtual visits in the future. Moreover, questions provided an opportunity for PEVs and TCs to provide suggestions to improve virtual review processes.

The three surveys included open-ended responses, Likert-scale questions, and short response questions. For some questions, respondents were asked to identify challenges experienced as well as best-practices to improve virtual review success. The total number of survey questions ranged from 30 to 35, depending on the constituency. Appendix A of this paper contains links to the surveys administered to each group of constituents. Comments provided by survey respondents are summarized in Appendix B.

TCs typically conduct two reviews per year, although one may be a report review, while PEVs typically conduct one review a year. In a few exceptional cases, a PEV may fill in for another PEV due to unforeseen circumstances or volunteer on behalf of more than one society. In contrast, programs only undergo a General Review once every six years unless an Interim Review is required. Thus, familiarity with ABET processes vary and can impact survey results. Regardless of prior experience with in-person visits, respondents from all three constituencies were more or less equally inexperienced with virtual reviews.

Survey respondents had the option to provide contact information if they were interested in receiving a follow-up. Each individual who provided contact information was contacted by email and invited to connect via phone or video conference for further discussion. Six individuals participated in non-structured follow-up interviews. In each case respondents were simply provided the opportunity to provide further observations and comments. These interviews did not use a prepared list of questions. Notes from the interviews were used to supplement the survey findings. One member of the research team conducted all of the interviews.

Analysis of Feedback from Constituencies

In all, 38 unique and usable PEV survey responses were received, and 16 unique and usable TC survey responses were received. Note that program evaluations for the current accreditation continue until end of March 2021, and thus the respondents would not represent all scheduled reviews at this time. ASCE assigned over 110 PEVs and TCs for the 2020-2021 accreditation cycle. PEVs were assigned to teams that conducted an average of six program reviews as part of the review (with a maximum number of 19 program reviews). The average number of programs included in the TCs' teams was slightly more than 5 and the maximum was nine. As shown in Figure 1 and Figure 2, most of those programs evaluated by the PEVs and TCs who responded to the survey were civil engineering. There are many more civil engineering programs than architectural or construction engineering programs. The "other" program category shown in Figures 1 and 2 refers to programs other than the three ASCE programs listed and can include one or more other programs included in that particular visit.

Only 8 unique and usable surveys were completed by Programs who underwent a virtual review. A total of 9 accredited programs were represented (one responding department had two ABET programs under review). Two of the Programs were environmental engineering, and the remaining programs were civil engineering.

A wealth of experience was represented among the survey respondents. Figure 3 indicates that the vast majority of the PEVs had prior experience conducting face-to-face ABET visits, with

only 8% indicating that the virtual review was their first. Conversely, 100% of the TCs had more than 10 prior ABET visits completed. Substantial PEV experience is a requirement before becoming a TC. A full 75% of the Program respondents had experience with 1-3 prior ABET visits. The other two Program respondents included one individual involved with their first ABET visit and one individual who had experience with 4-6 prior ABET visits.

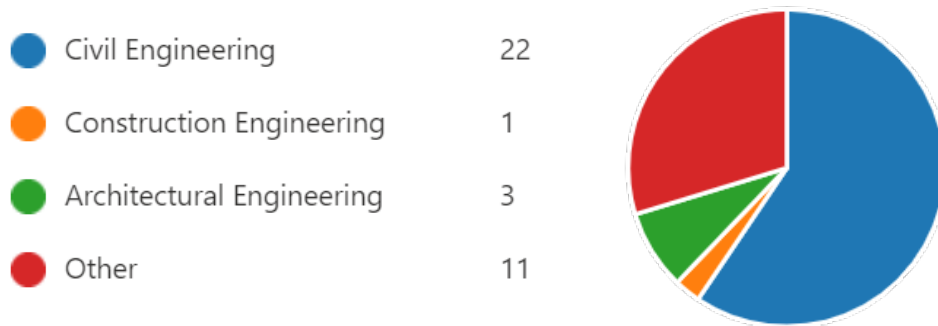


Figure 1. Engineering Program Types Evaluated by PEVs

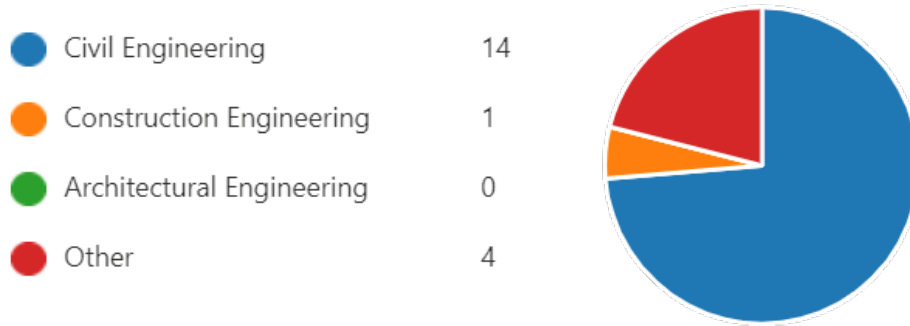


Figure 2. Engineering Program Types Evaluated by TCs



Figure 3. PEVs Experience with Prior ABET Visits

Review Schedules

ABET allowed and encouraged visiting teams and Programs to adjust the review schedules to accommodate the institution's and team's constraints. When asked if the traditional Sunday to Tuesday format was used, approximately 20% of the combined PEV and TC respondents responded affirmatively. Approximately 25% indicated that the meetings started on Sunday but continued at least one additional day into the week. The remaining PEV and TC respondents indicated a variety of other starting days, but most of those also indicated a longer period of time. Program respondents provided similar responses, with 25% indicating that the traditional Sunday to Tuesday schedule was followed.

Slightly more than 60% of the combined PEV and TC respondents indicated that four or more time zones were represented in their virtual review. Nearly 33% of the combined PEV and TC respondents indicated that time zone differences had an impact on communication and collaboration, with several noting that additional coordination was required to ensure that collaboration could occur at reasonable times. Several noted that the multiple time zones resulted in the need for additional days beyond the traditional Sunday to Tuesday schedule. Seven of the Program respondents indicated that only two time zones were represented in their review and the remaining Program respondent indicated three time zones were represented. With a relatively small time zone gap, it is not surprising that Program respondents did not report a time zone impact on communication and collaboration.

Pre-Review Training

As mentioned previously, ABET provided various online training modules and ASCE conducted a pre-visit workshop. All but two of the PEV respondents reported participating in pre-review training provided by their associated professional society. Nearly all of the PEV respondents indicated that they completed both the virtual review and 2020 PEV Pre-Visit workshop (see Figure 4).

Similarly, all but one of the TC respondents indicated that they completed the virtual review training. A large percentage of TCs indicated that they participated in at least one Team Chair review seminar conducted by ABET (see Figure 6).

Fewer PEVs and TCs participated in Cultural Awareness training and Training for Visits Outside the U.S. Those who did participate in these training modules were likely conducting international visits. This training was required by ABET even before the 2020-2021 Accreditation cycle.

When training was mentioned during the participant interviews, it was largely in the context of encouraging the implementation of team member training related to video conferencing systems.

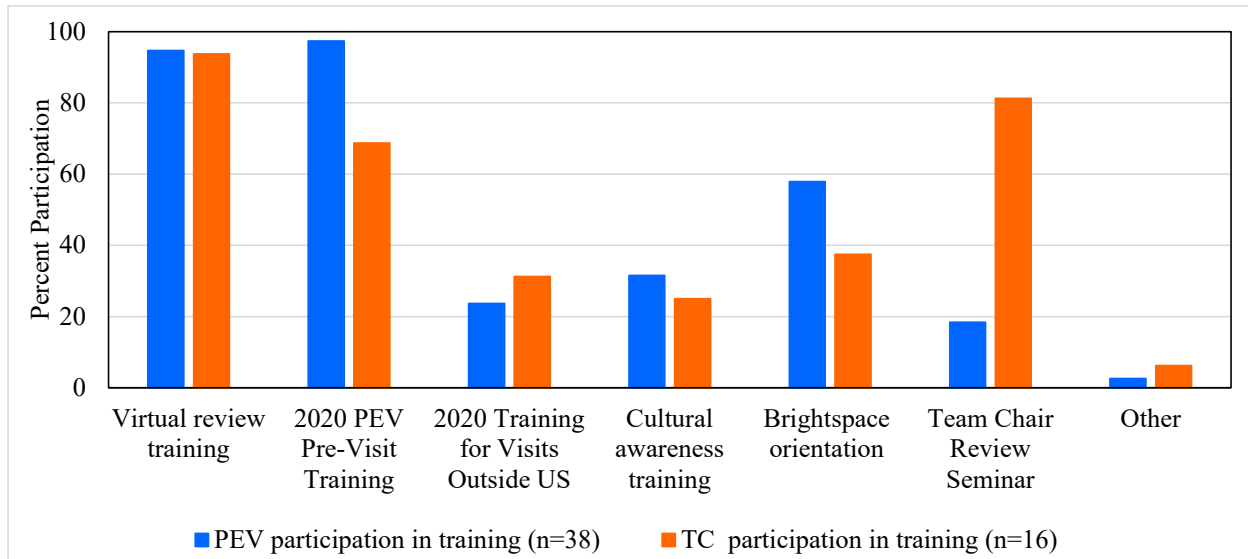


Figure 4. Participation in Pre-Review Training by Program Evaluators and Team Chairs

Pre-Review Display/Materials and Facility Tours

PEV, TC, and Program respondents noted that display materials were accessed via cloud storage (e.g. Dropbox, Google Drive, SharePoint) for half of the material exchanged, with a learning management system (e.g. Canvas, Blackboard) and the ABET Accreditation Management System making up the other half. Display materials provided electronically consistently included transcripts, outcomes assessment data, culminating design work, minutes and notes of faculty meetings, minutes and notes of advisory board meetings, and course notebooks showcasing student work. In a relatively small number of cases, textbooks were provided electronically. Beginning with the 2020-2021 accreditation cycle, ABET’s Accreditation Policy and Procedure Manual does not require access to textbooks unless the Team specifically asks for them.

When asked if there were any issues with either timeliness or completeness of display material, the majority of PEVs and TCs responded “no.” However, the handful of respondents who responded “yes” noted delays in posting material for review and difficulty navigating through poorly organized content. In fact, when asked for “best practices” associated with displaying program materials, the PEVs and TCs stressed the need for one common system and structured organization and naming of files and folders. The need for a consistent and organized repository of display materials was echoed by multiple interview participants.

The majority of Program respondents did indicate that materials were posted more than three weeks before the start of the virtual visit (see Figure 5). ABET requested the programs to make materials available at least one month prior to the visit. The majority of the Program respondents also indicated that the level of effort required to prepare display materials for the virtual visit was about the same as it was for prior in-person visits (see Figure 6). Echoing the PEV and TC call for well-organized display materials, the Program respondents’ best practice comments included: *“It is important to provide detailed descriptions of the file structure containing the virtual material”* and *“careful coordination among departments so consistency for the team.”* One

Program respondent expressed a desire for ABET to specify a standard file sharing method, folder structure, and naming convention.

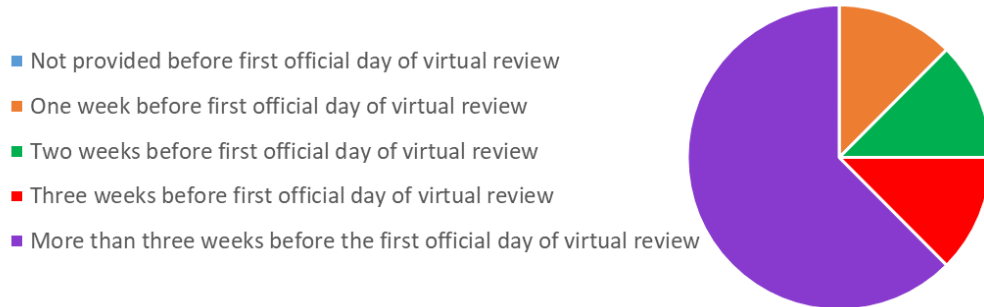


Figure 5. Program Timeline for Posting Display Materials

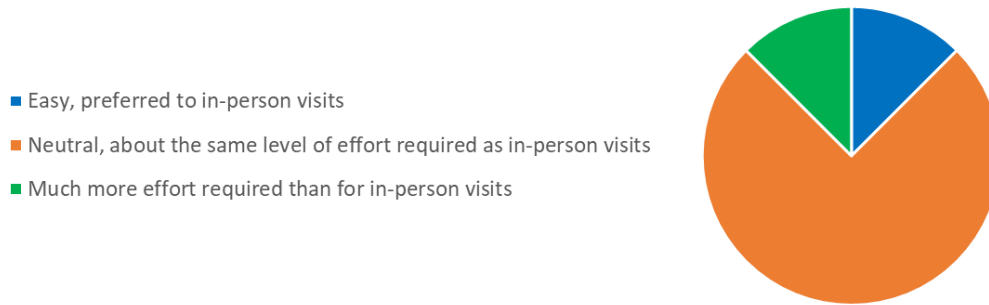


Figure 6. Program Level of Effort to Prepare Display Materials

PEV, TC, and Program respondents indicated that pre-recorded videos were the most common means of providing virtual facility tours. Laboratories and classrooms were included in nearly every facility tour. The PEVs and TCs indicated that the virtual tours were done well, but many expressed frustration that videos simply could not replace doing in-person tours. Several noted that it was spatially difficult to orient themselves and that looking for safety concerns was a challenge. Indeed, when asked for “best practices” the PEV and TC respondents strongly emphasized using wide-angle formatting and being very detailed in creating facility tour videos. Conversely, the Program respondents indicated that while forethought needed to be given to recording videos, they emphasized that high-quality, polished videos were not required to meet expectations of the PEVs and TCs they worked with. Multiple interview participants strongly encouraged ABET to maintain in-person facility tours if a hybrid model were adopted in the future.

Pre-Review Communications between the Team and the Program

Six of the eight Program respondents confirmed that someone from the institution attended the ABET EAC Institutional Representative Meeting. One of the remaining Program respondents indicated “not sure” and the other replied “no.”

Slightly more than 75% of the PEV respondents indicated making first contact with the Program(s) two or more months before the virtual visit. However, half of the Program respondents stated that the PEVs made first contact more than two months before the virtual visit and the remaining reported that the first contact occurred less than two months before the review. As indicated by both PEV and Program survey responses, the majority of pre-visit communication between the PEV and Program occurred via email, but phone conferences and video conferences were also used. Notably, video conferences were used twice as frequently as phone conferences, possibly due to broad use and familiarity with video conferencing tools after March 2020. The majority of the PEV respondents indicated that the frequency and effectiveness of the pre-visit communication was either adequate or more than adequate to facilitate dialogue. A very small number indicated insufficient access to video/phone conferencing tools (see Figure 7). Similar responses were generated by the Program respondents (see Figure 8). As best practices, PEVs and Programs recommended more communication in general, with more frequent use of video conferencing platforms. In fact, several PEVs suggest that video conferencing should be used for pre-visit communication even if ABET returns to in-person visits.

When viewing Figures 7 – 12, the full width of the multi-colored bar represents the full study population. Individual color bands correspond to the responses listed in the legend. The width of each color band is an indication of the percent of respondents. The position of the band's center, relative to zero the horizontal axis is an indication of the average response.

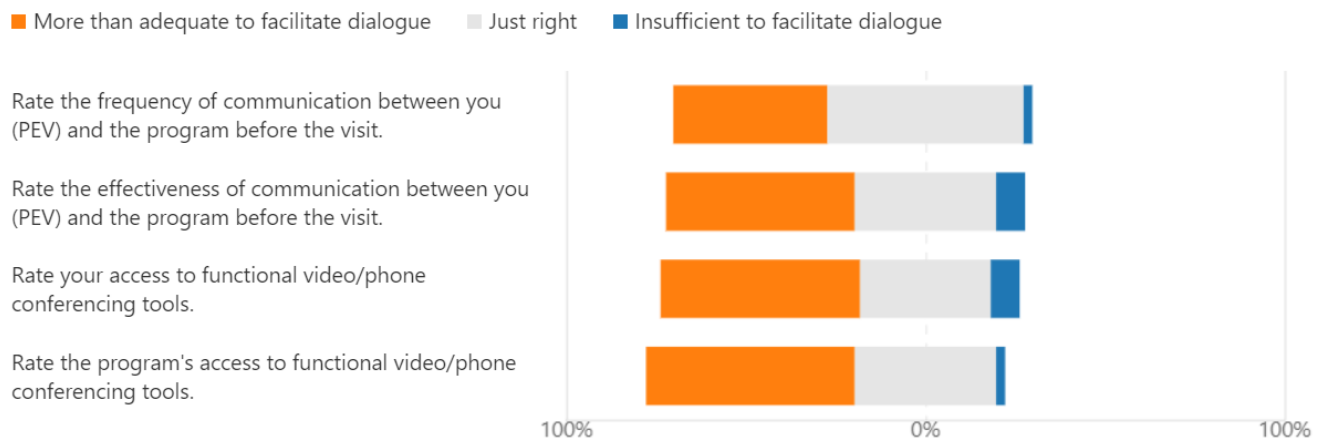


Figure 7. PEV Feedback on Pre-Review Communication

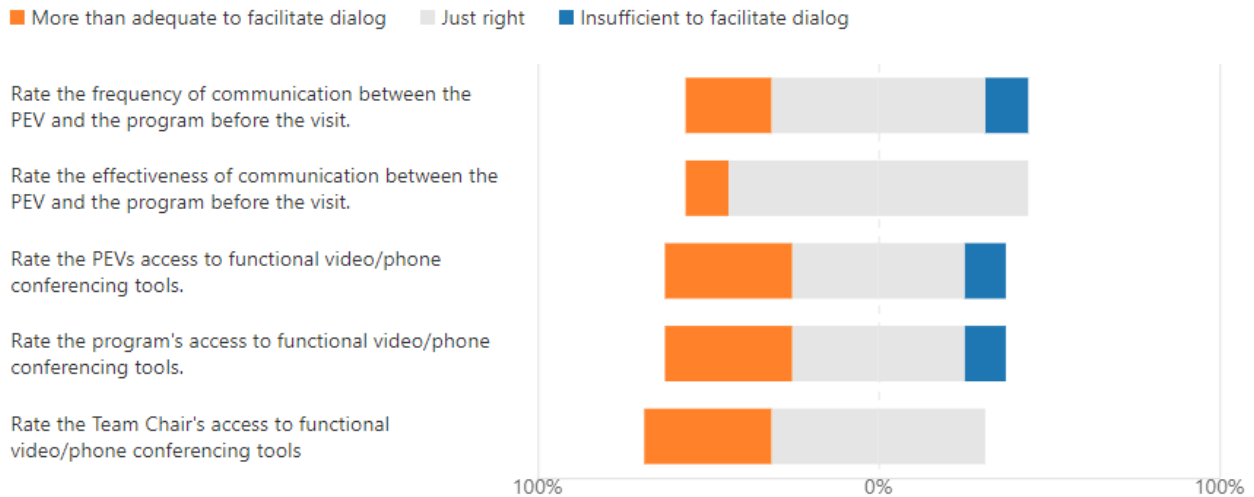


Figure 8. Program Feedback on Pre-Review Communication

Communications with Institution/Program Personnel and Scheduling

PEV and TC respondents indicated an even split between Program Coordinators, PEVs, and TCs in responsibility for scheduled interviews. The Program respondents indicated they were responsible for half of all interview scheduling. Even if the Program respondents carried more of the scheduling load, the majority reported that the level of difficulty in scheduling interviews was about the same as an in-person visit.

All PEV and TC respondents stated a belief that faculty member/institutional representative interviews were conducted confidentially. One TC stated that there may have been a breach of confidentiality during the student representative interviews (responding that others were present during the interview). Further, one PEV and two TC respondents stated that there may have been a breach of confidentiality during the alumni/employer interview. One interview participant noted that interviews were easier to schedule and without the traditional time constraints to conduct the interviews, the discussions were more insightful. Another interview participant indicated group interviews conducted electronically do not generate the traditional group discussion dynamics.

When asked about challenges related to scheduling virtual meetings, the primary PEV and TC response, although infrequent, centered around timing and time zones. Program respondent challenges focused more on internal schedule conflicts. Cell phones were frequently identified as back-up options in the event of issues with video conferences, but none of the respondents indicated that such options were needed. One respondent commented on reliability of internet access. Back up measures are recommended. Early scheduling and the need to remain flexible were the most common “best practice” recommendations provided by PEVs, TCs, and Programs related to virtual meeting scheduling.

PEVs were asked to compare prior face-to-face visits to the virtual visits specific to communication and collaboration. Those results are summarized in Figure 9. The majority of

PEVs stated that the frequency of communication (email and meetings) before the visit, availability of TCs, and ability to collaborate during the virtual visit were “about the same” as prior face-to-face meetings. PEVs did perceive that there was less collaboration between TCs and team members during the virtual visit.

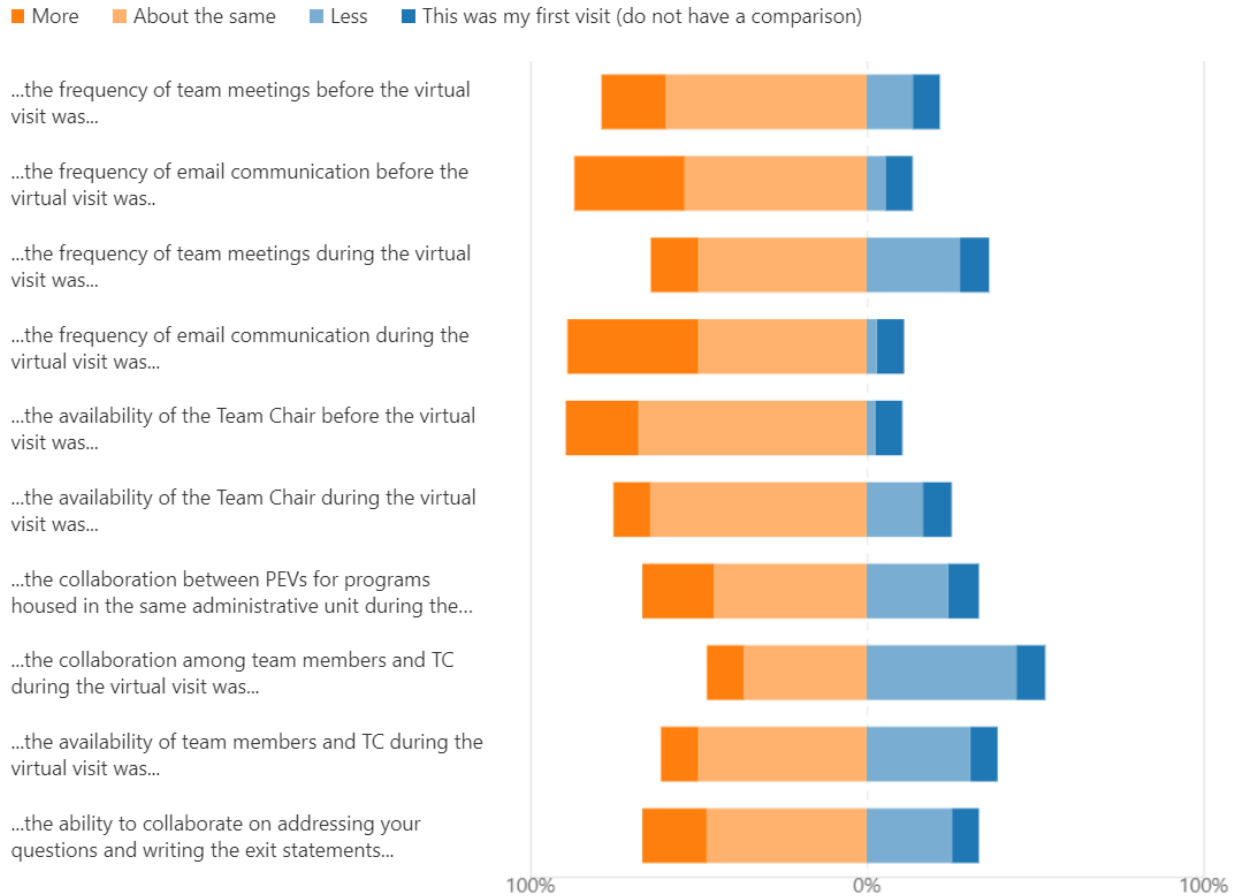


Figure 9. PEVs Comparison of Virtual Reviews to Face-to-Face Visits

TC respondents were asked the same series of questions to compare virtual reviews to face-to-face visits (see Figure 10). A higher percentage of TCs (than PEVs) felt there was a greater frequency of pre-visit communication for the virtual review. PEVs and TC respondents reported that team members were less available during the virtual review and their ability to collaborate was diminished as a result of the virtual review.

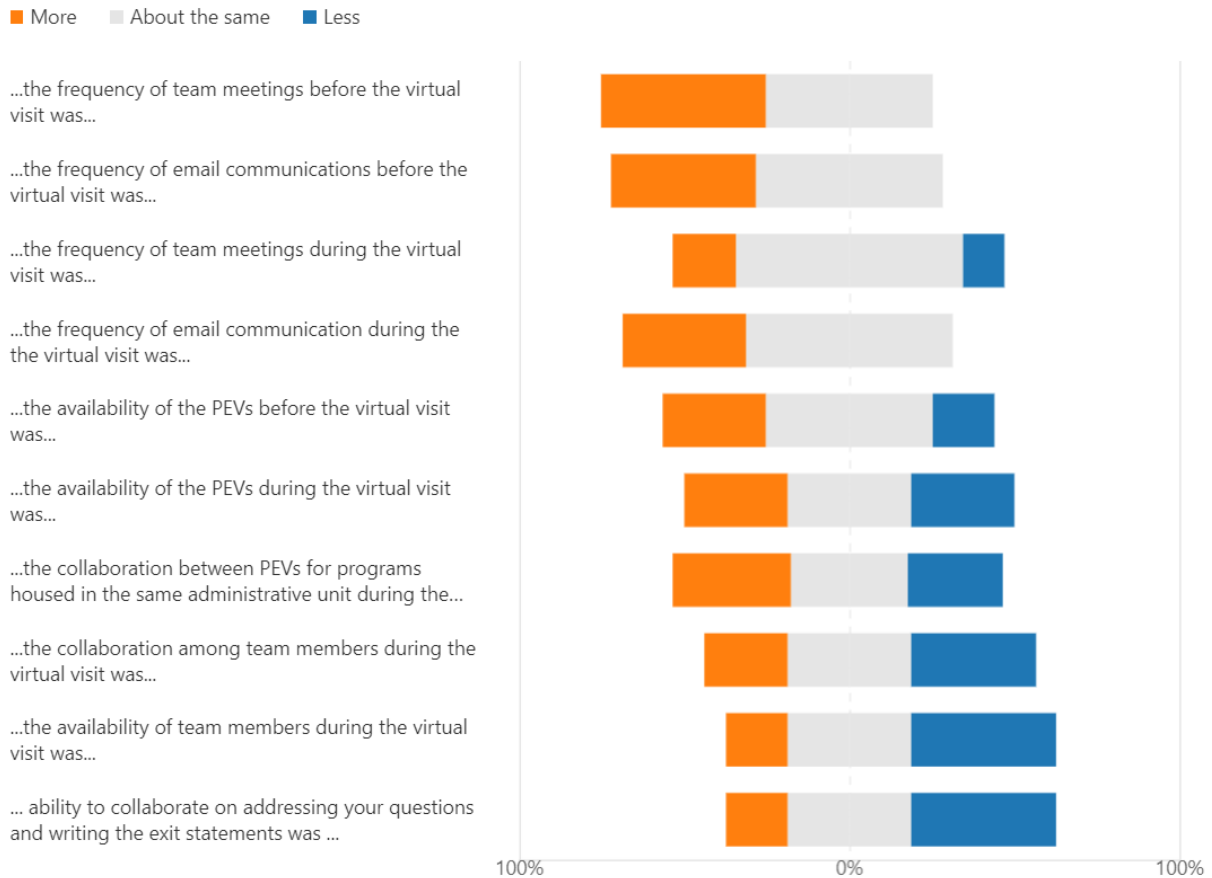


Figure 10. TCs Comparison of Virtual Reviews to Face-to-Face Visits

Team Dynamics and Volunteer Persistence

PEV and TC respondents were asked if their experience during the virtual review would impact their willingness to serve in the future. All but three of the PEV respondents indicated that the virtual review experience would not impact their willingness to serve in the future. Five of the 16 TCs indicated that they were less likely to serve in the future and two of those indicated that this would be their last visit. Those two might, however, be completing their five-year term of service as a TC.

Several PEVs and TCs went on to highlight specific aspects of the virtual review that they liked and some stated that they would be more willing to serve in the future if virtual reviews were retained. Several PEVs and TCs who did indicate that they would be less likely to serve in the future stated a belief that in-person visits were more effective. One respondent offered the following:

“All the perks that attract PEVs to volunteer for ABET are completely removed through virtual visits. My favorite parts of being a PEV is the ability to visit a new campus, new labs, meet new faculty and students, and learn from other programs on best practices. All these are severely diminished through virtual visits. The team dinners are another perk that we lost, in addition to the collaboration and comparing of notes between the team

members during the time between the interviews. There is no replacement to the added value of face-to-face interaction with faculty and students of the programs, and sitting behind a computer screen talking to people through a conference call for 4 days is not conducive to quality program evaluation.”

Figure 11 indicates that the majority of the PEV respondents agreed that communication among team members and team rapport during the virtual review was not as effective as it is during a face-to-face visit. Figure 12 shows similar feedback from the TC respondents. These figures also reinforce earlier indications that the virtual facility tours were not as effective. The one significant disparity is that the TCs more commonly rated the ability to focus on their duties during the visit as “less effective” than did their PEV colleagues.

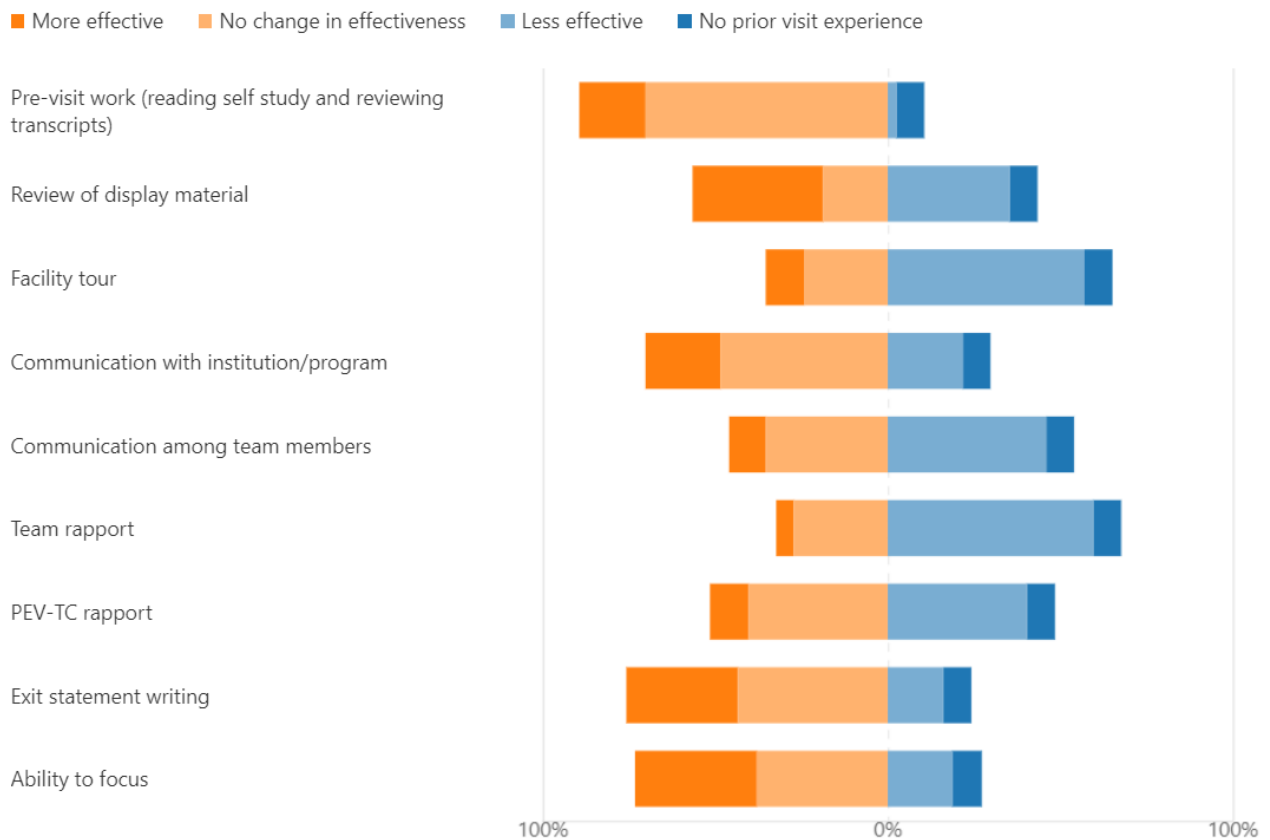


Figure 11. PEV Perceptions of Effectiveness of Virtual Review Activities

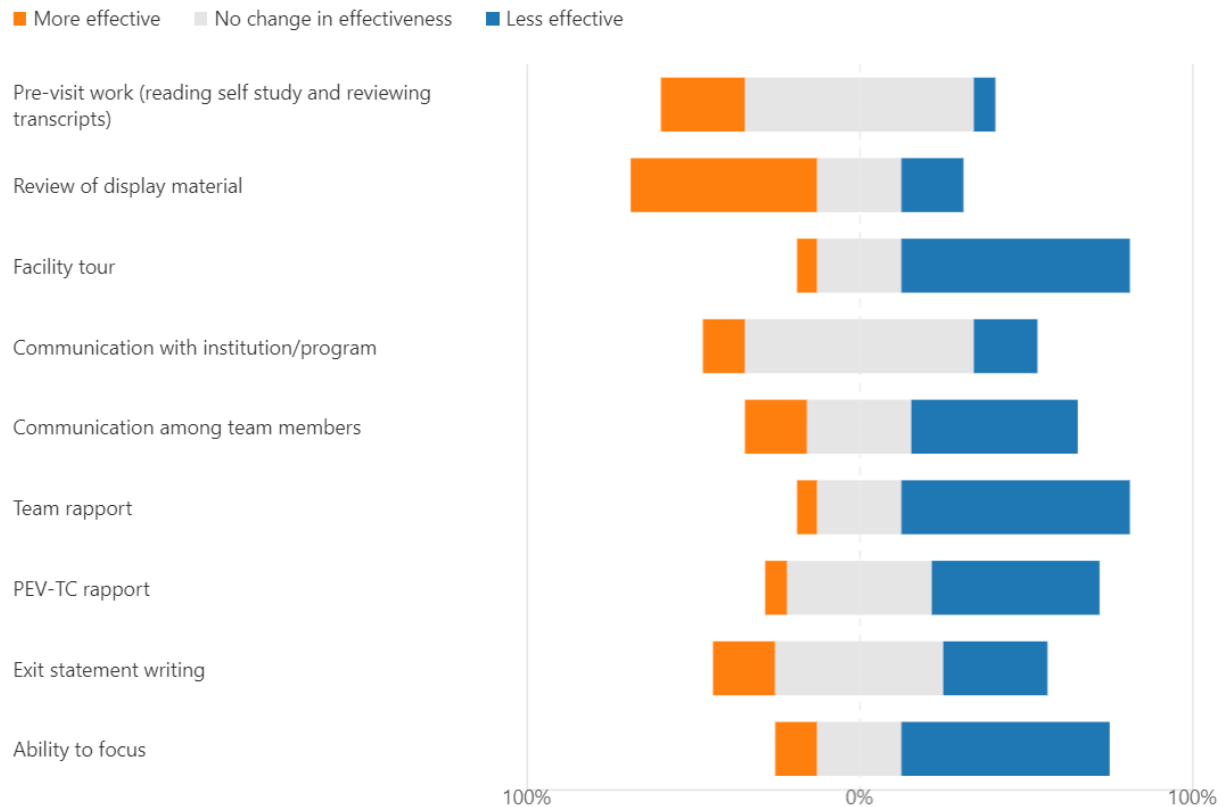


Figure 12. TC Perceptions of Effective of Virtual Review Activities

When asked whether ABET should continue virtual reviews, PEV responses were notably mixed. Over 50% of the respondents stated that virtual reviews should only be conducted if no alternative exists. Only one respondent simply stated that virtual reviews should no longer be conducted. Approximately 25% of the respondents stated that virtual reviews should continue and over 40% support the introduction of a hybrid visit approach (see Figure 13).

When asked the same question, a slightly smaller percentage of TCs supported continuing virtual reviews, but a similar percentage of both PEVs and TCs supported the idea of introducing a “hybrid” approach. Approximately 40% of TCs supported having only highly trained volunteers conduct the virtual reviews (compared to 20% of PEVs who supported this position). Notably, none of the TCs suggested no longer conducting virtual reviews (see Figure 13).

Finally, the Program responses showed considerably more support for a “hybrid” approach and more support for continuing virtual reviews in general. Just like the TCs, none of the Program respondents suggested no longer conducting virtual reviews (see Figure 13).

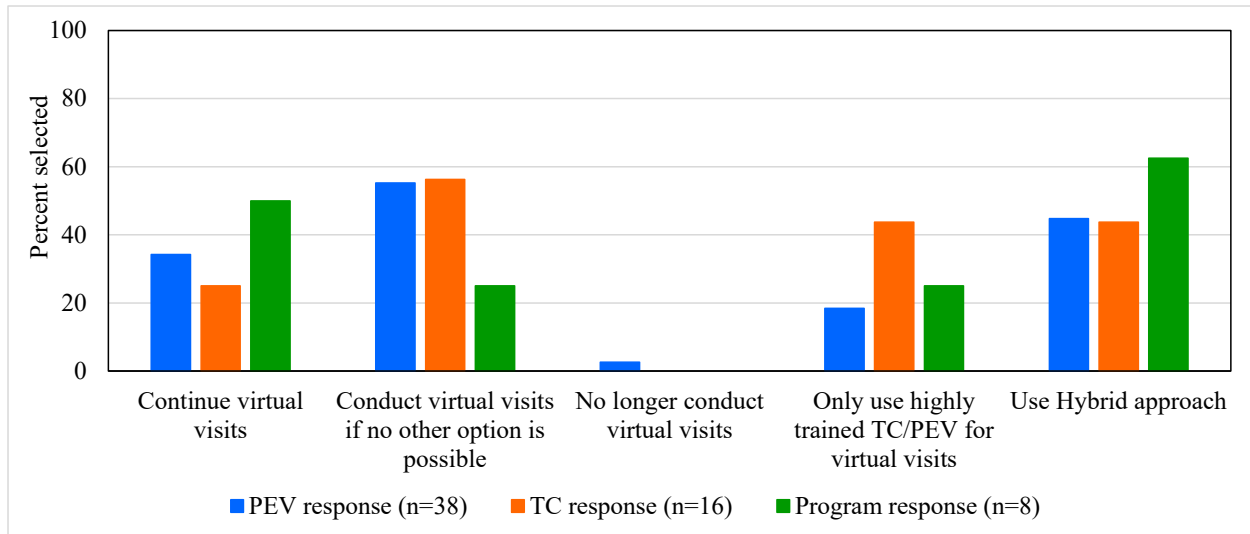


Figure 13. Feedback on Conducting Virtual Reviews in the Future.
(Note that each respondent could select multiple options.)

Summary and Lessons learned

Based on survey results and the authors' experiences with virtual reviews, we offer the following suggestions.

1. Strengths: Items to retain for future visits (virtual, hybrid, or in-person)
 - Pre-visit communication was stressed by PEVs, TCs, and Programs as a strength of virtual meetings; however, the groups encouraged more communication in general, with more frequent use of video conferencing platforms. A specific recommendation is to encourage use of video conferencing for pre-visit communication. Video conferences can enhance ABET team dynamics as well as institution/TC rapport building.
 - TCs and to a slightly lesser extent, PEVs, agreed that access to the display material prior to the visit was more effective in the virtual environment. Adopting the practice of providing display materials electronically prior to the visit can be used to enhance future in-person visits.
2. Areas for Improvement: Items that need attention for future visits (virtual, hybrid, or in-person)
 - In the area of team dynamics, TCs believed collaboration between team members during the virtual review, availability of team members, and collaboration among team members in writing exit statements and answering questions was less effective than in face-to-face visits. PEVs also agreed that team collaboration was less effective than in face-to-face visits. Collaboration and consensus-building during the visit are keys to conducting a thorough, fair, and accurate review. These characteristics also are invaluable in the training and professional development of volunteers, especially for new PEVs. This is an

area of improvement, not just for virtual reviews but also for face-to-face visits. The literature on business and organization management is sparse on teams that operate completely virtually, but some studies address topics impacting virtual team effectiveness such as managing, communications, knowledge sharing, and building trust [6] – [8]. Intentional structure, organization, interpersonal relations, and effective communications are keys to success of virtual teams. Although ABET visits may return to face-to-face site visits after the 2021-2022 accreditation cycle, the program review process begins much earlier than the site visit and some work might be conducted virtually in advance. ABET training highlights the importance of communication and team-based decision making. Referencing current literature on virtual teams may provide guidance for best practices that can be incorporated into TC and PEV training and inform the 360 review process, which seeks feedback on PEV and TC performance. For example, White [9] provides suggestions on many aspects of virtual teams, including how to train virtual teams and manage difficult participants.

- Although most PEVs indicated that the virtual review did not impact their ability to focus on the review, the TC respondents to the survey indicated that their ability to focus was an issue. Wasson [10] provides suggestions to engage team members in virtual team meetings. Her work acknowledges that multitasking during virtual meetings can be positive and highlights approaches to ensure employee engagement. Many of her suggestions may enhance team dynamics rather than address overall engagement in the visit. For instance, if a PEV is relegated to a passive listener role for a long period of time, such as hearing program by program feedback, the PEV may begin multitasking and disengaging from the meeting. Therefore, the TC should consider a more interactive meeting format to engage PEVs on a more regular basis. Rather than reviewing one program at a time, a better option is to hear one issue or review one criterion at a time, to keep everyone focused. Best practice techniques should be further explored and incorporated in ABET PEV and TC training.
- Facility tours were identified as a specific challenge of virtual reviews. In some cases, videos were of poor quality, did not provide sufficient perspective on the layout and equipment, and it was difficult to assess the status of safety equipment and of the lab. In virtual visits prior to the 2020-2021 cycle, ABET may have sent the TC or a trusted agent to conduct the physical visit of the campus and campus facilities. Unfortunately, the COVID-19 pandemic eliminated the possibility of conducting on-site campus and facility tours. Based on TC and PEV feedback, physical campus facilities tours should be integrated into future virtual ABET visits. Note that ABET leadership has decided that there will be no physical visits during the 2021-2022 accreditation cycle.
- Although some TCs/PEVs preferred face-to-face visits, others surveyed as part of this study valued the virtual review format. ABET and lead societies that assign PEVs could consider TC and PEV interest in participating in virtual reviews. In fact, virtual reviews may allow for greater participation among some volunteers and increased representation of under-represented groups. Specifically, the lack of travel and time away from the office and other responsibilities may allow caregivers, parents, practitioners, and volunteers with health challenges greater flexibility to participate in ABET visits. As

such, ABET may want to consider virtual or hybrid visits as a means of increasing under-represented group involvement, offering an opt-in option when volunteers are asked to identify their availability and geographic interests. As two respondents indicated, one unexpected advantage of the virtual review format was that alternate PEVs were able to quickly join the team when the originally assigned PEVs had to bow out due to extenuating circumstances.

- Participation in an ABET visit requires a significant amount of time and effort on the part of volunteers. Although the time associated with travel was eliminated because of the virtual review, the overall demands on the volunteers' time and effort may have increased to conduct a virtual review. Many of the processes associated with a virtual review were new or had to be developed by the teams, volunteers were required to complete additional training, and having 100% virtual communications among the team members and with the programs presented additional challenges. These processes must be reviewed and refined. Otherwise, the additional demands placed on the volunteers may not be well received and may result in attrition among the volunteer ranks. Although extending the visit from the traditional Sunday-Tuesday to additional days will give flexibility to the ABET teams, unreasonably extending the visits could result in less desire for volunteers to participate. None of the interview participants stated that the visit schedules posed a problem, but at least one interviewee strongly encouraged ABET to consider more flexibility from the traditional Sunday to Tuesday format when virtual reviews are conducted. Authors believe extending the duration too long will risk the willingness of volunteers to participate. Additionally, focusing the review within a limited, reasonable number of days will be helpful for programs and volunteers to stay focused.

Although the PEV, TC, and Program respondents predominantly represented programs for which ASCE serves as the lead society, the questions and responses were not specific to the civil engineering discipline. These recommendations are applicable to the other disciplines represented in the EAC/ABET. Since all reviews in the 2021-2022 accreditation cycle will be conducted virtually, the authors believe that the lessons learned and best practices presented in this paper will be very valuable to the TCs, PEVs and programs that will undergo review during the 2021-2022 accreditation cycle.

Acknowledgments

The authors sincerely appreciate feedback and insightful comments provided by ASCE and ABET volunteer experts and Department Heads, Chairs, and representatives. We also thank Leslie Nolen, ASCE Director of Educational Activities, and Dion Coward, Manager, ASCE Educational Activities, for their assistance in disseminating the ABET surveys to constituent groups.

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Appendix A - Study Surveys

Note: full surveys be accessed using the following links. Each survey is approximately 12 pages long.

PEV Survey

https://forms.office.com/Pages/ResponsePage.aspx?id=EYj_mRc1qUC_EEXqCjIfC4iSEREgcr1FrkPtWBIwKZ9UMjZBRjlWTjc4Q1NQUlgwSE1aRUVCSUdFM4u

TC Survey

https://forms.office.com/Pages/ResponsePage.aspx?id=EYj_mRc1qUC_EEXqCjIfC4iSEREgcr1FrkPtWBIwKZ9UQ01FVUxXUIVIU1pTMIRNQ0c1QTJFQThZRS4u

Program Survey

https://forms.office.com/Pages/ResponsePage.aspx?id=EYj_mRc1qUC_EEXqCjIfC4iSEREgcr1FrkPtWBIwKZ9URTBRR1VGWjhIRVRDVFBTQThDSzQ2STdaUC4u

Appendix B - Summary of Suggestions for Best Practices

These are direct quotes from the surveys and thus preserve the original wording, spelling, grammar, and syntax.

Overall comments

- Some of the "Day Zero" activities should move to virtual, especially review of materials. Allow option for interviews to be held virtually before visit would be helpful as well.
- I had a lot more time to review course material beforehand. Provide all course materials electronically before the visit.
- ABET may impose specific policy/instructions for virtual facility tours (such as, 3D filming, panorama photography, etc.).
- Not being able to visit a class in person further limited interaction with students.
- Early review of self study, display, and virtual tour. Strong communication with program representative.
- With the pandemic or physical security concerns, it can't be helped, but it is a terrible idea otherwise. None of the very informative informal discussions within the team - or between team members and institution personnel - took place. Not possible to truly assess the learning environment. We may have called a senior design shortcoming that could have been avoided if we had been there and had true dialog with the program and access to more than just pdfs of the final report. More work and time invested than with an in-person visit without the reward of taking a trip, seeing a new campus, and meeting new people.
- All display materials should be submitted with the self-study. I would still want to travel but could imagine holding the exit meeting virtually a few days after the visit to avoid the rush or hectic nature at the end of the visit.
- Include more breaks (Zoom fatigue) and extend the visit by one day or more. If translators are included, allow more time for interviews.
- PEVs and TCs need appropriate organizational skills and personality to be efficient team members during virtual visits.
- Virtual visits would be a good way to reduce climate impact of ABET (no flying/driving around the country) and perhaps lower the cost of accreditation.

Team Management

- ABET (and ASCE) should consider time zones if assigning teams for virtual visits (avoid numerous time zones, especially significant gap in time difference)
- The TC contacted all the PEVs right away and was very flexible with PEVs commitments. TC provided deadlines and files for PEVs to organize their work and continuously followed up with updates from meetings with institutions and reminders to submit information.
- Team chair set up the data management system, kept the team informed and held weekly meetings.
- Team can open an extra virtual meeting room all day during the visit as a place for team members to drop in and talk to each other, similar to a virtual team work room.
- Conduct team building meeting and activities prior to the visit to build team cohesion
- PEVs reviewing programs housed in the same department should have their own meetings to enhance collaboration.
- At the end of each team meeting, the meeting organizer should go "around the room" allowing each participant a chance to add any needed comments to the team. This around the room practice is critical to effective online meetings.
- Encourage frequent communication among team members.
- In case of significant time differences, spread the visit duration to additional number of days so that no one is required to get up unusually early or stay up unusually late.
- All the PEVs should be able to access the shared file system

Scheduling and communications

- Use a single meeting code with "waiting room" control feature to simplify scheduling and eliminate unauthorized entries so the Program representative can join as needed
- Try to clear out as much of your schedule at home as possible.
- Schedule meetings at least one month in advance, if possible, especially if working across time zones.

- Communicate clearly and frequently, especially with the program.
- Schedule breaks between meetings, otherwise it can get exhausting.
- Establishment (by ABET) of a guide schedule for virtual meetings. Doesn't have to be the same as an in-person meeting, but some guidance is needed so that the school and the PEVs have the same expectations.
- Team should test technology with the Dean and Program Chair prior to the visit
- Create a master document on a shared drive with the Team's Zoom links.
- Provide alternative reachable phone number and e-mail for the PEVs, TC and program coordinator

Facility Tours and Videos

- Have the camera mounted on a tripod with wheels to minimize camera movement by someone holding it in their hands.
- Having prerecorded videos and live tour combination was very helpful (especially with lab technician or faculty in charge)
- Provide floor plans showing square footage along with videos. Combine video of space with stills of equipment to better illustrate all capabilities.
- Tours should start with reviewing safety equipment and instructions, followed by a review of equipment.
- Detailed photos covering all spaces, applying 3D filming and panorama photography techniques would help a lot.
- ABET could provide guidance on the contents of a facility tour pre-recorded video for consistency. E.g., Safety contents, equipment and experiments, suggested length of videos
- Check the audio portion of the video tours.
- Wide angle cameras, camera with a stand reducing vibration and quick movements.
- Have the institution deliver prerecorded tours at least one month in advance of the visit so that PEVs can view and ask questions and institution can respond.
- A single camera (e.g., a smart phone) per evaluator. The narrator follows the camera.
- Provide floor plan of the facilities that shows the location of various equipment (e.g. laboratory apparatus, material storage, safety equipment, etc.) would be helpful for the team to inform the program of specific areas to highlight.

Display Materials

- Use one central location for all materials (LMS, OneDrive)
- Program materials should be available electronically one month before the visit. Although this was suggested by ABET this year, not all programs followed it. In the future, ensure it is an ABET policy and TCs should make it clear to the institutions.
- Organize assessment materials according to ABET criteria.
- Clear use of folders and sub-folders, consistent labeling of files, index provided, early initial meeting between PEV and ABET coordinator to discuss layout
- Ensure that individual file sizes are manageable for opening/downloading
- Organizing materials in two ways: 1. With respect to student outcomes (separate folder for each outcome, and each of those folders include content from all assessment instruments; 2. With respect to courses. For each course, provide a separate folder that includes student material / portfolios.
- Good Table of Contents/indexing. Security measures that are workable: E.g., use of ABET passwords instead of school controlled ones, which sometimes don't work.
- Clear and consistent naming conventions for all programs' materials.