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Preparation of Documents for ABET Accreditation During the COVID-19 Pandemic

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Abstract

In March 2020, most colleges and universities in the United States switched from face-to-face to virtual instruction, due to the COVID-19 pandemic. The pandemic created new challenges for engineering programs preparing for reaccreditation or accreditation of new program. During 2020-21 accreditation cycle, ABET conducted all ABET evaluations virtually and extended the evaluation period into the spring 2021 semester. The programs were required to provide digital documents to support their assessment in advance of the visit. In addition, tour of the university facilities were conducted virtually. In most cases, the programs were required to provide videos of laboratories and equipment used for the experiments. This paper highlights the unique features of an accreditation virtual-site visit compared to a physical on-site visit.

Introduction

In 2009, the ABET's Engineering Accreditation Commission (EAC) started a process to review and revised Criterion 3-Student Outcomes (a-k) of the general accreditation criteria which was developed in late 1990s and implemented in 2000. After an extensive review process, in 2015 the EAC recommended changes to both Criterion 3-Student Outcomes and Criterion 5-Curriculum[1-3]. The changes, included:

1. expansion of definition of terminologies used in the general criteria,
2. changing student outcomes a through k into student outcomes 1 through 7, and
3. clarifying the statements in criterion 5 by stating that it requires a minimum of 30 semester credit hours (or equivalent) of a combination of college-level mathematics and basic sciences and a minimum of 45 semester credit hours (or equivalent) of engineering topics.

After two more years of public review and modifications the ABET Engineering Area Delegation approved the final changes in October 2017. An earlier publication[4] described these changes. The engineering program evaluation by ABET under the new general accreditation criteria started for the first time during the 2019-20 accreditation cycle. One of the authors of this paper participated in the ABET evaluation of an engineering program under the new criteria in fall 2019.

Traditionally, during an annual ABET accreditation cycle, the engineering programs up for reaccreditation submit a request to ABET for reevaluation (RFE) by January; 31st; complete and submit a self-study report by July 1st, select a three day period for the on-site visit within September-December time frame. ABET assigns team chairs (TCs) for the visit sometime in May; the team chair meets with the Engineering Dean or Associate Dean in July during the ABET Summer Commissions meeting to start planning for the visit. In June, appropriate engineering societies start assigning program evaluators (PEVs) to respective engineering programs that have requested ABET evaluation for accreditation. For example, ASCE assigns PEVs to civil engineering programs; IEEE assigns PEVs to electrical engineering programs, etc.

Impact of COVID-19 Pandemic on Accreditation Process

In late 2019, the news media reported the appearance of a Novel Coronavirus COVID-19 in China. Soon after the virus spread to other countries, including the United States. As usual, in early March ABET sent an email to the existing team chairs and PEVs informing them that the assignment of TCs and program PEVs for the 2020 visit season will start soon[5]. The TCs and PEVs were asked to update their ABET volunteer profile by March 31, 2020. This included updating contact information, listing the existing conflicts of interest with universities or colleges, listing unavailability dates, and identifying countries where a volunteer would not like assignment for evaluation.

By mid-March, most universities and colleges in the United States, stopped face to face instructions and asked their instructors to teach on line until a further notice. The initial plan was to allow institutions time to develop safe methods of instruction so that the students, faculty, and staff can resume operation on campus. However, with the rapid spread of corona virus and sharp increase in the number of death, institutions abandoned the plan for resuming full operation on campus shortly after and on-line instruction was continued.

In late May 2020, ABET sent a new email message[6] to PEVs informing them that the ABET Board of Directors has decided to conduct all 2020-21 program reviews virtually, due to the impact of COVID-19. This decision was made to ensure the safety of ABET volunteers and the people associated with colleges and universities that were scheduled for review. ABET recommended that, if possible, reviews originally scheduled in September and October to be rescheduled for later dates to allow for additional preparation time for virtual reviews. In the past, ABET completed all on-site review visits by early December. However, in the 2020-21 accreditation cycle, ABET scheduled some large reviews in January and February of 2021. Because of the extended period to conduct virtual reviews, ABET asked the PEVs to update their profile to indicate availability through March 31, 2021. The email also provided the following information regarding the virtual on-site visits[6]:

Logistics – No team travel to any site location. Team members will conduct their reviews from their home locations.

Information Technology – Zoom will be the default videoconferencing platform supplied and supported by ABET. Institutional requirements may drive alternatives.

Materials – All materials will be provided electronically (e.g., email, Dropbox, remote access, etc.) Printed/USB/physical formats are *not* to be requested or used.

Facility Tours – Facility tours including labs will be conducted virtually.

Interviews – All faculty and student interviews will be conducted virtually.

Exit Meeting – The Exit Meeting will be conducted virtually

In July 2020, ABET assigned one of the authors of this paper as the PEV of a mechanical engineering program in the United States. The following is a brief description of how the review process conducted. The TC contacted the PEVs providing them with the name of institution and the approximate date of virtual campus site visit. The TC asked the PEVs if they are still available for the review and if any conflict of interest exists with the engineering program up for review. The TC also asked the engineering programs if any conflict of interests exists with the PEVs assigned to the specific engineering program. If no conflict of interest existed between the PEVs and the institution, then the TC approved the PEVs for the review process. Instead of initial meeting between the TC and the Engineering Dean that traditionally occurred during the ABET's Summer Commissions meeting, the event was conducted virtually.

Self-Study Reports – As in the past the institution uploaded its Self-Study Reports in ABET's Accreditation Management System (AMS) prior to the July 1st deadline. The TC informed the PEVs that the availability of Self-Study Reports in ASM. Each PEV was given access to the Self-Study Report of the program they were assigned to, including all appendices. No observer was assigned to this specific review team. However, if any observers were assigned to the team, they also would have given access to appropriate Self-Study Reports.

Transcripts – In a letter to the dean, the TC asked for "the transcripts of six graduates of the most recent graduating class from each program to be uploaded to the ABET AMS Website under folder ADDITIONAL DOCUMENT: adjacent to the Self-Study Report folder, for access by the PEV of that program. The transcripts should be generated post-graduation so that they clearly show all courses used to satisfy the degree requirements and document degree completion. The transcripts should begin with the letter "D" in the alphabetical listing of graduates, extending forward through the alphabet as necessary to get six. If there are fewer than six graduates in any program, please send the transcripts of all graduates in the program. If you redact student names, please replace them with a code that will enable team members to reference the records of an individual student. Include with the transcripts any other information needed to demonstrate that the graduates satisfy published graduation requirements. Documentation should provide the relevant rationale in all circumstances in which individual transcripts vary from the published curriculum. Examples include curricular exceptions and course substitutions, evaluation of transfer credit, and waivers of published prerequisites, among others. Please include a copy of or links to the relevant curriculum for cases where the curriculum followed by the student is different from that described in the Self-Study Report."

The review process conducted prior to on-site virtual visit was almost the same way as the past. The PEVs contacted the program chairs to introduce themselves. During the review of self-study review,

a few email exchanged between the PEV and the program chair in order to clarify the content of information provided in the self-study report and prepare schedule for the on-site virtual visit. Prior to the on-site virtual visit, the review team virtually met several times to discuss the possible shortcoming in each of the criterions of the general criteria, as well as the specific program criteria. The team also discussed plans for the on-site virtual visits in these meetings. By the time of on-site visit, each PEV had a good knowledge of the engineering program they were reviewing and had identifies a set of possible shortcomings in meeting the requirement of the general that existed at the time. Prior to the on-site visits, opportunities are giving to the programs to provide additional documentations to resolve any of the possible shortcomings. The purpose of the on-site visit is to try to resolve any remaining shortcomings through the review of documents available on campus and interviewing faculty, staff, and students. Another purpose of the on-site visit is to see if the available facilities provide adequate educational experience for students.

Traditionally the on-site visit occurs on campus, within three or four day period. The visit team members arrive at a hotel near the campus location on Saturday. The team conduct its first meeting on Sunday in the morning either at hotel or on campus. The team discusses the list of possible shortcomings that still exists and possible remedies to resolve them during the visit. Around 1:00 pm on Sunday the visit team have short meeting with the dean of college. Shortly after, PEVs follow their respective program chair for a tour of facilities. The facilities include typical faculty offices, typical classrooms used for instruction, computer facilities used by students, and experimental laboratories used in undergraduate courses. Between 2:30 and 5:00 pm, PEVs spend time to review assessment documents and students work provided in support the assessment process and continuous improvement of the program. Around 5:00 pm on Sunday, the visit-team meets again for the second time either on campus or in the hotel to discuss what observed in the afternoon and whether any of the shortcoming are resolved or new shortcomings detected. Following this meeting, the team members have dinner together in a local restaurant. On Monday morning, the team returns to campus. Around 8:00 am, the dean of college gives a presentation highlighting the program available in support of undergraduate engineering education. Right after the Dean's meeting, each PEV meets with the respective program chair to provide an update on the status of review process, ask for additional information or documentation needed for resolving the possible shortcomings, and request for schedule changes, if needed. The PEV spends the rest of days in interviewing students, key instructors and staffs associated with the program, as well as some of the Industrial Advisory Board members who are available to be on campus on that day. Typically, the institution allowed hosting a luncheon for the visit team, if it chooses to do so. Typically, the institution invites some members of the administration, the department chairs of programs supporting the engineering program (Mathematics, Physics, etc.), student leaders, and some members of the Advisory Board to the luncheon. The PEV meets the program chair one more time, around 4:30 pm, to provide an update and request for scheduling additional meeting with the faculty or staff if needed. Around 5:00 pm on Monday, the visit-team meets again for the third time either on campus or in the hotel to discuss the observation during the day and whether any of the shortcomings were resolved or new shortcomings detected. Following this meeting, the team members have dinner together in a local restaurant. On Tuesday morning, the team returns to campus to complete any remaining interviews, complete the necessary ABET evaluation forms and prepare the exit statement. The team discusses the strength and weakness of each program, and make decision on the shortcoming found during the evaluation process. The TC meets with the Dean to give a briefing of the evaluation results. Each PEV debrief their respective

program chair on the summary of findings during the evaluation process. The on-site visit concludes when the TC and the PEVs read their exit statements in presence of the president (or Chancellor), Provost, the Dean, and any other administrator or faculty members invited to the Exit meeting by the institution.

The main difference in the review process conducted in in 2020-21 from previous visits was that the on-site visits were conducted virtually. ABET has had experience in conducting virtual reviews in the past, mostly involving international institutions. ABET typically conduct virtual evaluation visits when the institution is located in regions that there exists on-going armed conflicts, or in locations that it not very safe for the visit team to travel. In 2020, ABET developed online training modules on how to conduct virtual visits and made them available to TCs and PEVs. The main differences between the virtual reviews and on-site visits are described bellow:

Supplemental Materials – Section I.E.5.b.(2) of the Accreditation Policy and Procedure Manual[7] states that evaluators will review materials that are sufficient to demonstrate that the program is in compliance with the applicable criteria and policies. Much of this information should be incorporated into the Self-Study Report. Additional evidence of program compliance may be made available to the evaluators prior to and during the review, using an online storage location. Each program should make the following materials available to the team before and during the virtual review, without duplicating materials provided in the Self-Study Report:

- Representative examples of graded student work including, as appropriate, major design or capstone projects
- Materials addressing issues arising from the team's review of the Self-Study Report or online instructional materials
- Documentation of actions taken by the program after submission of the Self-Study Report as being available for review, and
- Materials necessary for the program to demonstrate compliance with the criteria and policies

The programs should confer with PEV to ensure that display materials will provide adequate evidence of meeting the accreditation criteria.

About two months prior to the on-site virtual visit, the program reviewed in fall 2020 provided the PEV access to an on-line OneDrive folder that contained the following electronic binders.

1. **Course Binder**: this binder contained some or all of the following documents for the 11 courses employed for the assessment process and continued improvement of the program:
    a. Syllabus
    b. Homework
    c. Project Assignment
    d. Project reports
    e. Exams
    f. Laboratory reports
2. **Student Outcome Binders**: This binder included the electronic copies of documents created for the assessment and evaluation of SO (1) through SO (7). Each SO subfolder contained the following documents

a. Performance Indicator and Student Work: Each SO was divided into several component and each component was evaluated by assessing several different courses. For example SO (1) states: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. Then the following four performance indicator areas were defined and evaluated through assessment of several courses
    i. Broke down a complex system into component parts, such that its performance could be understood.
    ii. Used the principles of science and mathematics including multivariate calculus and differential equations to analyze and solve an engineering problem.
    iii. Analyzed and solved well-defined engineering problems in the areas of thermal and mechanical systems.
    iv. Applied modern engineering tools, including software, codes, and standards to the solution of complex problems
b. SO Assessment Summary: provided a summary of results of assessments of performance indicators for each outcome.

Virtual Facilities Tours: Since the onsite visit was going to be conducted virtually, the TC asked each program in advance to prepare prerecorded, narrated virtual facilities tour videos (limited to 10 minutes per facility), and a live, on-camera walkthrough to be conducted on the first day of scheduled on-site visit. The TC also informed the programs that the PEVs might also request live, on-camera walkthrough of the facilities on the first day of on-site virtual visit. The TC requested that the recorded tours should focus on facilities used for teaching, to include laboratories, examples of typical classrooms and faculty offices, library and computing services, and other relevant facilities. Annotated photographs of equipment items available in each undergraduate laboratory as discussed in the Self-Study Report will aid the lab tours. The ABET-EAC Criterion 7-Facilities[8] requires that classrooms, offices, laboratories, and associated equipment must be adequate to support attainment of the student outcomes and to provide an atmosphere conducive to learning. Modern tools, equipment, computing resources, and laboratories appropriate to the program must be available, accessible, and systematically maintained and upgraded to enable students to attain the student outcomes and to support program needs. Students must be provided appropriate guidance regarding the use of the tools, equipment, computing resources, and laboratories available to the program.

Fifteen days prior to the scheduled virtual on-site visit, the programs provided the review team access to an on-line OneDrive folder that contained videos for walk-through of facilities that included:

- Engineering building lobby and hallways
- Administrative Assistant office and Resource Room that contained the copier/scanner, faculty and staff mailboxes, office supplies, and kitchen.
- Walk-through of a typical faculty office
- Fabrication Laboratory: Tour of the lab layout and the equipment
- Computer Lab- a Key carded lab for students to have 24-hour access.
- Student Lounge: Common space for students, faculty, and staff to use
- Conference room

- Walk-through of experimental laboratories used in undergraduate curriculum. The videos showed the safety equipment in the lab and experimental equipment employed in each laboratory.

Common Review-Team Virtual On-Site Visit Schedule

Zoom platform was used for all on-site interviews and meeting. In coordination with the institution and PEVs, the TC created the following general meeting schedule, common for all members of the review team. The scheduling considered that the TC, PEVs, and the institution were located at different time zones. The schedule for the on-site virtual visit was for near the end of October. The times listed here represent the Central time zone. The TC conducted the first Team meeting at 11:00 am on Friday, instead of the customary day on Sunday. The second team meeting was at 4:00 pm on Sunday, the same day as the customary day for the second meeting. The Dean's presentation meeting held at 7:00 am on Monday, on the same as the typical day for the campus visit. The third team meeting occurred at 4:15 pm on Monday and the fourth team meeting held at 5:30 pm on Tuesday. Each of the team meetings lasted approximately 90 minutes. The review team met again on Wednesday morning at 8:00 am to update the ABET forms for the review and finalize the exit statements. At 10:30 am, PC debriefed the Dean and the PEVs debriefed the program chairs on their findings. At 1:00 pm, the members of the review-team read their exit statements. The university administration present in the Exit meeting included the president, provost, the dean, and the program chairs. The Exit meeting ended approximately at 2:00 pm. That concluded the on-site visit. The Team chair sent all Zoom invitations for the virtual team meetings. The Institution arranged virtual meetings for the Dean's presentation and the Exit meeting.

PEV's Virtual On-Site Visit Schedule

As was described earlier all the supplemental materials supporting the assessment and evaluation of student outcomes made available to the PEV in advance, and reviewed prior to the virtual visit. The videos prepared for the virtual tour of facilities and made available to the PVEs were of such high quality that a live tour of facilities was not necessary. Therefore, at 2:00 on Friday (day 0 of on-site visit) the PEV met with the program chair on line to ask remaining questions related to the possible shortcomings and ask for additional documentations in order to resolve the possible shortcomings. For Monday and Tuesday of the virtual on-site visit, the PEV had scheduled interview meetings with the program chair, several faculty members, administrative assistant, the engineering technicians, the Mathematics department chair, four members of the Advisory Board, and students in three different courses. With the exception of the meetings with students, the PEV sent Zoom invitations to individuals scheduled for interview in all other meetings. The program arranged Zoom interview meetings with students. The program provided a roster for students enrolled in each course to PEV in advance. When the meeting started, the students were placed in the "waiting room" and only the students on the roster were allowed to enter the meeting. Each interview meeting with the faculty, involved a maximum of two faculty members. The purpose of the meeting with the faculty was to obtain more information about the assessment, the quality of students, support provided by the university for professional development, and to learn about the tenure and promotion process. A single interview meeting conducted with three staff members. The purpose of the interview was to get a better understanding of whether the funds available is sufficient for maintaining and replacing the

laboratory equipment and updating the computer hardware and software. The purpose of the meeting with the mathematics department chair was to get a better understanding of the quality of engineering students taking math courses and determine whether a line of communication existed between the engineering programs and the support programs. Four Advisory Board members participated in the interview meeting. Each of Advisory Board members were residing in different states. The purpose of the meeting was to determine how the members contribute to the engineering program and whether they has any role in the review of the program educational objectives. The purpose of meeting with students was to find out if the faculty have enough time for advising and mentoring students and see whether the laboratory equipment and computers available were functional.

Currently ABET has not made any decision regarding the conduct of reviews in the 2021-2022 Accreditation Cycle. "ABET staff and Commission Executive Committees are working to formulate contingency plans for the 2021-2022 Accreditation Cycle in the event we may need to review programs virtually[9]."

Conclusions

The review team did not encounter any technical difficulties during the virtual-site visit. The virtual visit has some advantages and disadvantages. The main advantage was that the institution provided supplemental materials well in advance of the virtual visit schedule, giving the PEV more time to examine the material. The virtual visit allowed the PEV to interview four Advisory Board Member who each resided in a different state. This might not have been possible, if the site visit occurred on campus. The main disadvantage of the virtual visit is the tour of facilities and interviewing faculty, student, and staff. Seeing the facilities on campus and live conversation with faculty, students, and staffs provide a much better understanding of the quality of the programs.

References

1. Karimi A., 2017, "How the Proposed Changes in ABET-EAC-Criteria 3 and 5 Effects Assessment Process?" *Proceedings of the* 2017- *ASEE-GSW Section Conference*, Paper ID # 111, March 12-14, 2017, Dallas, Texas
2. Barr, R.E., 2016, "Proposed Changes to ABET Criteria 3 and 5," *Proceedings of 2016 ASEE-GSW Section Conference*, Paper ID # 103, March 6-8, 2016, Fort Worth, Texas
3. Barr, R.E., 2017, "An ABET Preparation Perspective Under the New Proposed Criteria 3 and 5," *Proceedings of 2017 ASEE-GSW Section Conference*, Paper ID #20, March 12-14, 2017, Dallas, Texas
4. Karimi, A., and Manteufel, R. 2020, Most Recent Updates to ABETT-EAC Criteria 3, 4, and 5 , *Proceedings of the* 2020- *ASEE-GSW Section Virtual Conference*, Paper ID # 109, April 12-14, 2020, Albuquerque, NM.
5. Email from ABET to Team Chairs and Program Evaluators, dated March 6, 2020
6. Email from ABET to Team Chairs and Program Evaluators, dated May 29, 2020
7. https://www.abet.org/accreditation/accreditation-criteria/accreditation-policy-and-procedure-manual-appm-2020-2021/
8. https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2020-2021/
9. https://www.abet.org/accreditation/covid-19-update