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Digitalization of ABET Assessment, Evaluation, Continuous Improvement, and Material Display Techniques – A Verifiable and Effective Tool for Successful ABET Accreditation

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Abstract

Display material and the associated data are critical for a successful ETAC-ABET accreditation or reaccreditation visit. Long past is the old display room with piles of binders containing years of information for each Program Evaluator (PEV) to dig through on Day 0. The introduction of file-sharing now allows real-time collection and distribution of related display materials. This provides an option for ETAC-ABET PEVs to view the display materials before they arrive on campus, freeing time for them onsite for deeper analysis and frontloading any additional requests for information from the host institution.

This paper presents a unique technique for gathering information and structuring a digital representation of the display material. The display is intuitively organized using ABET harmonized general criteria one through eight, making it adaptable to any commission. These criteria, a subset of the general criteria for baccalaureate and associate degree level programs, maintain consistent language across all ABET's accreditation commissions. Implementing this method encourages faculty members to actively participate in their data collection, such as grading examples, in a longitudinal assessment effort over multiple years. The structure also benefits department heads and assessment committees by providing a quick and organized space for long-term assessment meeting minutes, industrial advisory minutes, and other outcome-based achievements or actions. This one-stop, logically arranged location serves as a continuous repository for assessment-related material accessible to all stakeholders. A continuous collection of artifacts can demonstrate an ongoing, mature assessment process.

When fully implemented, this structure promotes the ongoing participation of stakeholders, offers a central location to access historical artifacts supporting continuous program improvement, and ensures up-to-date display materials. The display material, collated in this structure over time, can be instantly accessed by the PEV without the institution rushing to organize it at the last minute.

School of Polytechnic at Purdue University Fort Wayne

Purdue University Fort Wayne (PFW), the largest university in northeast Indiana, boasts a diverse academic portfolio comprising 25 graduate and over 100 prestigious undergraduate degrees and certificates. With a student body exceeding 10,000 individuals of varied ages, races, and nationalities, PFW fosters a vibrant educational community. Its sprawling 594-acre campus in Fort Wayne, IN serves as a home to over 7,000 degree-seeking undergraduate and graduate students [1].

Established on September 17, 1964, through a merger of two prior institutions, Indiana Purdue University (IPFW) was born, evolving into the fifth-largest university in Indiana. In response to challenges such as declining enrollment and research funding, a restructuring initiative was undertaken, culminating in separating IPFW into two distinct universities in 2018 [2]. This transition led to the establishment of Indiana University Fort Wayne, a campus specializing in health service fields, while PFW retained its broader academic focus.

Within PFW in the College of Engineering Technology and Computer Science, the School of Polytechnic, formed in 2018, continues a rich legacy dating back to the institution's founding era [3]. Originating from engineering technology programs established in the 1960s, its offerings have evolved and adapted over the decades. Notably, the School's programs attained ABET accreditation in the early 1970s, with ongoing advancements in assessment methodologies culminating in successful reaccreditation in Fall 2022, reflecting the institution's commitment to academic excellence and innovation [4].

ABET Suggested Display Material

Effective ETAC-ABET accreditation or reaccreditation visits hinge on the significance of presenting the necessary materials and corresponding data to support the Self-Study concisely and clearly. PEVs will assess materials that adequately showcase the program's adherence to relevant criteria and policies. A significant portion of this information should be integrated into the Self-Study Report. Supplementary evidence of program compliance may be shared with reviewers before and during their visit through an online storage platform [5].

ABET's glossary defines display materials as "textbooks, course syllabi; sample student work including assignment and exams, ranging in quality from excellent, average and poor, and assessment materials [6]." While the overall glossary term is relatively short, "assessment materials" can take on a much broader range of materials the institution can provide. At a minimum, an institution should provide the following materials onsite during the visit while not duplicating within their Self-Study Report [5].

- Materials that deal with concerns emerging from the team's examination of the Self-Study Report or online instructional materials.
- The program took measures after submitting the Self-Study Report, which will be accessible for examination during the visit.
- Essential materials required for the program to showcase adherence to the established ABET criteria and policies.
- Illustrative instances of graded student work, which may include significant design projects or capstone endeavors.

While the Self-Study Report will be as inclusive as possible, the visiting team might request additional materials beyond the report to ensure compliance. It is the responsibility of the institutions to be prepared to quickly fulfill these requests, or better yet, have them preemptively prepared for display. ABET suggests possible materials based on each stated harmonized general criterion for all commissions [7].

- Criterion 1. Students: Additional transcripts that might be requested by the team, accompanied by supporting cover memoranda, graduation check sheets, and degree audit reports. Additionally, supplementary documentation for any possible course substitutions.
- Criterion 2. Program Educational Objectives (PEO): Duplicates of tools utilized to engage constituencies in reviewing PEOs, along with the corresponding data and analysis. Records such as meeting minutes or other evidence indicate the faculty's review and approval of PEOs.

- Criterion 3. Student Outcomes (SO): This is already required within the Self-Study report.
- Criterion 4. Continuous Improvement: Illustrative instances of graded student assignments, including significant design, capstone, or comprehensive projects, are employed to collect assessment data for specific SO. Assessment and evaluation tools, along with the associated data and analysis of SOs. Proof of incorporating assessment and evaluation into continuous improvement initiatives with resulting improvement measures. Records of faculty discussions resulting in the analysis of SO achievement and program enhancements derived from this assessment.
- Criterion 5. Curriculum: Sampling of student work that provides evidence that topical areas supporting the elements listed in Criterion 5, in the General Criteria, or Program Criteria are covered. Examples of significant student design or capstone courses.
- Criterion 6. Faculty: Only information of faculty changes after self-study submission.
- Criterion 7. Facilities: Any facility changes after self-study submission, laboratory safety procedures, or inspection reports.
- Criterion 8. Institutional Support: Any changes in institutional support after self-study submission.
- Program Criteria: Materials (notes, PowerPoint, etc.) that confirm that all topics cited under program criteria are covered.

Rethinking the Modern Material Display

From the beginning of the most recent reaccreditation preparation, the authors realized that the display materials must be set up differently than in past accreditation visits. Once filled with stacks of binders containing extensive information for PEVs to sift through on Day 0, the antiquated display room needed a more efficient system. ABET integrated specific terms into its accreditation policy to accommodate engineering technology programs opting for digital display materials during accreditation audits [8]. Over the past several years, various ABET seminars have consistently advocated digital technology as a feasible means to display materials efficiently and effectively. Moreover, the unprecedented conditions imposed by the global COVID-19 pandemic have, by force, disrupted the standard protocol of onsite accreditation visits, accelerating the need for a digital material presence. [9].

The authors investigated displaying materials in a way that accounted for ABET suggestions, incorporating best practices and highlighted program evidence of criteria and policy achievement. The generated list of requirements for displaying material further considered the advantages of digitizing while using effective practices of the past.

- All the information is identifiable and easily recognizable.
- All the material is organized logically and systematically.
- All areas of accreditation criteria and policy are addressed.
- The material illustrates the program's assessment and continuous improvement method.
- Examples of student work showcasing student learning.
- Provide documentation demonstrating curricular requirements and program-specific criteria.

- Display interactions with constituents within the educational process.
- Provide a timeline with ongoing assessment material and milestone documentation.
- Provide new or supplemental documentation on faculty achievements or hiring.
- Provide new or supplemental documentation on program laboratories.
- Provide new or supplemental documentation on institutional support.

Additional requirements considered using an online digitally archived system for display material.

- Integration of multimedia examples of student work (presentations, etc.).
- Providing an interactive environment between student work and PEV (programming code, CAD files, etc.).
- Provide display materials to PEV pre-visit before Day 0.
- Provide local up-to-date travel and visitor information to the team.
- Main location for requested team materials during the visit (Day 0-Day 2).
- A central repository supporting a faculty member's ongoing involvement in data collection efforts over multiple years.
- A file storage location for the department head and assessment committee will immediately house assessment meeting minutes, industrial advisory minutes, and other outcome-based achievements or actions.
- Provides a central location of up-to-date material for inclusion into future Self-Study Reports or readily available format for display material for the team.
- Historically kept archive of material for prosperity purposes and future reference.

After considering all the conditions, the authors committed to online data storage to archive all display material. The materials would be provided to the visiting team in two organizational structures. They display course material supporting adherence to curricular and program criteria requirements. This shows the depth and breadth of student work in courses to assess student success. Examples of student work from all courses in the curriculum were available to the reviewer. Secondly, display materials would be arranged by student outcomes and performance indicators. This would demonstrate conformity to the criterion correlating to the achievement of student outcomes by providing direct and indirect assessment instruments, tools, and supporting documentation.

Digital Display Material

ABET neither mandates nor offers suggestions for the platform a program should employ to establish its electronic materials repository [7]. The chosen platform, however, needs to facilitate team access through widely accessible technology. The authors, in this case, selected the cloud product Dropbox. Dropbox is a widely accepted platform for cloud-based storage retrieval and storage, allowing for multiple-user access across multiple platforms [10]. The product met the needs outlined by the authors and the security restraints placed by the campus Information Technology Department for access by non-campus employees.

The structure implemented within Dropbox resembled the Self-Study Report, highlighting each criterion. This intuitive structure, recognizable by all PEVs, is an entry point accessing the

display material supporting the achievement or adherence to each. The subfolders contained pertinent material, often arranged chronologically to provide a longitudinal view and associated processes. Set in this format, the following folder structure was the tree's root that led to additional distinctive branches (subfolders) and leaves (documents).

Criterion 1 – Student <folder>
This pointed the PEV back to the Self-Study Report for information since nothing new was added since submission. This also provided a link to the online academic regulations.

Criterion 2 – Program Educational Objectives <folder>
This contained faculty meeting minutes, discussions, and PEOS's applicable approval. It also included additional documentation of the constituencies' review of PEOs.

Program 3 – Student Outcomes <folder>
This contained meeting minutes of the faculty, assessment, and industrial advisory committees' discussions on SOs.

Criterion 4 – Continuous Improvement <folder>

- Assessment Folder <folder> holding folders by academic years with the content:
  - Direct Assessment <folder>
    - Examples of student work (assessment tools) based on the corresponding SO and performance indicator pairs.
  - Indirect Assessment <folder>
    - Course Learning Outcome Assessment (CLOA) survey results through student self-assessment measuring their perceived attainment of the SO by course.
  - Indirect assessment data from graduation and alumni surveys.
- Evaluation <folder> holding folders by academic years with the content:
  - Student Outcome Assessment (SOA) form is a direct assessment of student outcome achievement covered in a course by the instructor.
- Annual program assessment and unit reports encapsulating yearly assessment and continuous improvement actions.
- Meeting minutes containing student outcome assessment achievement and decisions on needed actions.

Criterion 5 – Curriculum <folder>

- Meeting minutes of discussion on curriculum.
- Student examples and syllabi of all technical course materials.
- Student examples and syllabi of all supporting course materials.
- Links to the campus catalog on the program and plan of study.
- Support documentation to obtain program criteria.

Criterion 6 – Faculty <folder>
This pointed the PEV back to the Self-Study Report for information since nothing new was added since submission.

Criterion 8 – Institutional Support <folder>
This pointed the PEV back to the Self-Study Report for information since nothing new was added since submission.

Self-Study <folder>
This contained a copy of the Self-Study report for reference.

Welcome to Purdue University Fort Wayne <folder>
This contained maps of PFW and the campus and other visitor information.

Examining the file structure reveals a couple of items. The authors included evidence of meeting curricula requirements and program-specific criteria within the Criterion 5 - Curriculum folder. Material arranged based on student outcomes and performance indicators is in the Criterion 4 – Continuous Improvement folder. Most subfolders and data files (materials) reside within Criterion 4. This would be expected based on the six years of direct and indirect assessment information gathered for display purposes. The authors were pleased with the cloud system and the file structure for digitizing display material.

Conclusion and Lessons Learned

The following paper outlined the use of a continuous repository for assessment-related material available to all stakeholders through online cloud service. This constant collection of artifacts demonstrates an ongoing, maturing assessment process. The file structure is set intrinsically using ABET harmonized general criteria, allowing easy adaptation to any commission and easy readability to the user. This method supports a faculty member's ongoing involvement in data collection, such as grading examples, within the assessment process by providing a structure where information can be plugged.

While this approach far exceeds the old display room where piles of binders contain years of information for the PEVs to dig through, the authors recognize lessons learned to continue strengthening this method. This would include providing the PEVs with a simple information sheet explaining the file structure on the root drive and implementing a cloud storage system managed by campus IT for long-term data stability. The authors are also considering switching from a year-to-SO structure to an SO-to-year one. These final decisions will occur early in the next accreditation cycle.

The three programs (Electrical Engineering Technology, Mechanical Engineering Technology, and Industrial Engineering Technology) were up for ABET/ETAC re-accreditation in fall 2022. Based on this novel digital technique, they received full accreditation.

References

[1]   "By the Numbers," Purdue Fort Wayne, 2024. [Online]. Available:
       https://www.pfw.edu/about-pfw/numbers. [Accessed 15 January 2024].

[2]   "History Purdue Fort Wayne," Purdue Fort Wayne, 2024. [Online]. Available:
       https://www.pfw.edu/about-pfw/history. [Accessed 15 January 2024].

[3]   C. McInerny, "Report: Purdue Should Solely Run IPFW, Split With IU," Indiana Public
       Media, 15 January 2026. [Online]. Available: https://indianapublicmedia.org/news/report-
       recommends-ipfw-split-92360.php. [Accessed 10 January 2024].

[4]   "School of Polytechnic," Purdue Fort Wayne, 2024. [Online]. Available:
       https://www.pfw.edu/etcs/polytechnic. [Accessed 10 January 2024].

[5]   "Accreditation Policy and Procedure Manual (APPM), 2023-2024," ABET, Inc., 2023.
       [Online]. Available: https://www.abet.org/accreditation/accreditation-criteria/accreditation-
       policy-and-procedure-manual-appm-2023-2024/. [Accessed 22 November 2023].

[6]   "Glossary," ABET, Inc., 2021. [Online]. Available: https://www.abet.org/program-
       evaluators/training/glossary/. [Accessed 10 January 2024].

[7]   "Guidance on Materials," 7 August 2021. [Online]. Available: https://www.abet.org/wp-
       content/uploads/2021/09/Guidance-on-Materials-07-12-21.pdf. [Accessed 19 October
       2023].

[8]   W. Hussain, W. Spady, M. T. Naqash, S. Z. Khan, B. A. Khawaja and L. Conner, "ABET
       Accreditation During and After COVID19 - Navigating the Digital Age," *IEEE Access,*
       vol. 8, pp. 218997-219046, 2020.

[9]   M. G. Green and C. L. File, "PreparingforanOnlineABETVisit," in *2021 ASEE Gulf-
       Southwest Annual Conference* , Waco, TX , 2021.

[10]   I. Drago, M. Mellia, M. M. Munafo, A. Sperotto, R. Sadre and A. Pras, "Inside dropbox:
       understanding personal cloud storage services," in *IMC '12: Proceedings of the 2012
       Internet Measurement Conference*, New York, NY, 2012.