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ABET's Global Engagement*

ABET (Accreditation Board for Engineering and Technology), USA
M.K.J. Milligan, D. Iacona, J.L. Sussman

This paper will discuss ABET's global activities in detail, with an emphasis on the accreditation of programs outside the US and the Washington Accord, and how these activities contribute to the quality improvement of engineering education around the world, and its impact on engineering education, and the profession.

Key words: *ABET, engineering education, technical education, international education, accreditation, Washington Accord.*

Introduction

Over its 80-year history, ABET, a federation of 32 professional and technical societies, has been the recognized accreditor of applied science, computing, engineering, and engineering technology programs in the United States. ABET's global engagement through its mutual recognition agreements (MRAs), memoranda of understanding (MOUs), and in the last five years, through direct accreditation of programs outside the US, has solidified ABET's vision to be "recognized as the worldwide leader in assuring quality and stimulating innovation in applied science, computing, engineering, and engineering technology education" [1].

It is especially important for engineering educators to understand the global engagement of ABET, and the impact it may have on the engineering profession, and education. As the world economy becomes more integrated, graduates from accredited programs (both ABET and MRA partner organizations) will enter the workforce, and work in a very dynamic global environment. Engineers will cross geographic borders frequently, seeking professional licensure, graduate education and employment in a number of countries. ABET's global presence will significantly help them be successful.

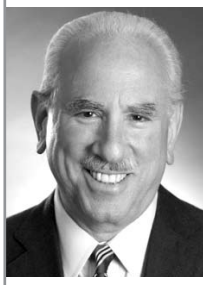
This paper aims to educate the reader on ABET's various global activities and how they contribute to the advancement of technical education.

Mutual Recognition Agreements (MRAs)

MRAs are international agreements signed amongst accrediting bodies responsible for the accreditation of technical education in their respective jurisdictions. These MRAs recognize the substantial equivalence of accreditation systems, and in turn, recognize the substantial equivalence of programs accredited by the signatories of the agreement. Substantial equivalence implies that the accreditation systems have comparable-although not identical-processes, criteria, and outcomes. Substantial equivalence serves as an indicator of the graduates' preparedness to begin

M.K.J. Milligan

D. Iacona



J.L. Sussman

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practice in the professions. Currently, ABET is engaged in four MRAs.

Signed between ABET and the Canadian Council of Professional Engineers (now Engineers Canada) in 1980, this first bi-lateral MRA for engineering set the precedent for the establishment of the Washington Accord, the multi-lateral MRA for engineering, nine years later.

The Sydney Accord, the MRA for engineering technologists, was established in 2001 and ABET was admitted as a full signatory in 2009. Today, the Washington & Sydney Accords fall under an umbrella organization known as the International Engineering Alliance (IEA), which also includes the Dublin Accord (MRA for two-year technician programs), the International Professional Engineers Agreement (IntPE), the International Engineering Technologist Agreement (IntET), and the Asia Pacific Economic Cooperation (APEC Engineer). It is important to note that the three Accords relate to the educational base of engineers, engineering technologists, and engineering technicians, respectively. The IntPE, IntET, and APEC Engineers focus on the professional competence and mobility of technical professionals in the fields of engineering and engineering technology. ABET, however, is not a member of any of the mobility agreements. The US representative to the IntPE is the National Council of Examiners for Engineering and Surveying (NCEES).

The Seoul Accord, established in 2009 with ABET as a founding signatory, is the multi-lateral MRA for computing. Current members include ABET, Accreditation Board for Engineering Education of Korea (ABEEK), Australian Computer Society (ACS), British Computer Society (BCS), Canadian Information Processing Society (CIPS), Honk Kong Institute of Engineers (HKIE), Institution of Engineering Education Taiwan (IEET) and Japan Accreditation Board for Engineering Education (JABEE).

The multi-lateral Washington Accord was signed in 1989 by six founding signatories representing the US (ABET), UK, Canada, Australia, Ireland, and New Zealand. Its membership has since grown to include 15 full signatories and five members under provisional status:

Full Signatories

1. Engineers Australia [1989].
2. Engineers Canada [1989].
3. Institute of Engineering Education Taiwan (IEET) [2007].
4. Hong Kong Institution of Engineers (HKIE) [1995].
5. Engineers Ireland [1989].
6. Japan Accreditation Board for Engineering Education (JABEE) [2005].
7. Accreditation Board for Engineering Education of Korea (ABEEK) [2007].
8. Board of Engineers Malaysia (BEM) [2009].
9. Institution of Professional Engineers New Zealand (IPENZ) [1989].
10. Association for Engineering Education of Russia (AEER) [2012].
11. Institution of Engineers Singapore (IES) [2006].
12. Engineering Council of South Africa (ECSA) [1999].
13. MUDEK – Turkey [2011].
14. Engineering Council UK (ECUK) [1989].
15. ABET – US [1989].

Members under Provisional Status

1. Board of Accreditation for Engineering and Technical Education – Bangladesh (BAETE).
2. German Accreditation Agency for Study Programs in Engineering and Informatics (ASIIN).
3. National Board of Accreditation of the All India Council for Technical Education (NBA).
4. Pakistan Engineering Council (PEC).
5. Institution of Engineers Sri Lanka (IESL).

Members under provisional status are accrediting organizations that are interested in obtaining full signatory status, but whose accreditation systems are not yet considered to be substantially equivalent to that of full signatories. During the period of provisional status, the accreditation system and programs accredited by that system are not recog-

nized as substantially equivalent. Recognition begins once an organization has been admitted as a full signatory.

Engineering Criteria 2000 (EC2000), the outcomes-based accreditation model adopted by ABET in 1996 was introduced to the Washington Accord in 2001. Since then, many signatories have adopted an outcomes-based accreditation model. The outcome-based accreditation model focuses on outputs (what students learn) rather than input (what they are taught) [2]. Commissioned by ABET in 2002, the Center for the Study of Higher Education at Pennsylvania State University conducted a study to determine the impact EC2000. The study, which was conducted over a three-and-a-half-year period, resulted in several key findings:

- Greater emphasis is placed on professional skills and active learning; there is high level of faculty support for continuous improvement.
- 2004 graduates are better prepared to enter the profession than their 1994 counterparts.
- Graduates have gained professional skills while maintaining their technical skills.
- Changes in program and student experiences are empirically linked to higher performance [3].

The Washington Accord has since developed a set of graduate attributes exemplars. As defined in the IEA's Graduate Attribute and Professional Competencies document, "Graduate Attributes form a set of individually assessable outcomes that are the components indicative of the graduate's potential to acquire competence to practise at the appropriate level. The graduate attributes are exemplars of the attributes expected of graduates from an accredited programme. Graduate attributes are clear, succinct statements of the expected capability, qualified if necessary by a range indication appropriate to the type of programme" [4].

In addition to identifying and defining attributes expected of graduates of accredited programs, the graduate attributes are also intended to help signatories and provisional members develop outcomes-based accreditation systems and criteria. Outcomes-based accreditation focuses on what the students learn as a result of matriculating through the program, as opposed to focusing on what they are being taught. Some of the signatories of the Washington Accord, including ABET, have already adopted an outcomes-based accreditation system.

In the United States, the accreditation of engineering programs and the licensing of professional engineers are conducted by separate bodies. ABET accredits engineering programs while each of the 54 state licensing boards for professional engineers are responsible for licensure within their respective jurisdictions. ABET recognizes engineering programs accredited by other Washington Accord signatories as being substantially equivalent to ABET accredited engineering programs, and encourages state licensing boards to do the same, however, results are mixed: some state licensing boards recognize the Washington Accord, some do not recognize the Washington Accord at all, while others will only accept programs accredited by the six founding signatories. ABET will remain committed to educating the state licensing boards in an effort to increase Washington Accord recognition.

ABET's participation in these MRAs assures employers that the educational base of graduates of Accord recognized programs has adequately prepared them to begin practice in the profession. Similarly, it assures educators/administrators that graduates of Accord recognized programs wishing to further their education have the appropriate educational base.

Memoranda of Understanding (MOU)

While MRAs focus on the recognition of accreditation systems, MOUs are designed to facilitate collaboration between and among accrediting organizations. Approval from the ABET Board of Directors is necessary prior to

engaging in a MOU. ABET is currently engaged in 16 MOUs with national and regional accreditors/organizations of technical education in the following countries/regions: Argentina, Portugal, Spain, Germany, Japan, Taiwan, Greater Caribbean, Central America, Western Hemisphere (Mexico and Canada), Egypt, Chile, Peru, UNESCO (Latin America and Caribbean), Israel, South Korea, and France.

In addition to exchanging information on best practices, most organizations sign a MOU with ABET with the intent of seeking assistance in further developing their accreditation systems. This is accomplished in a number of ways, depending on the specific maturity and needs of the accreditation system. Services provided by ABET typically include "sharing of its experience in the field of accreditation, general information on its policies and procedures, criteria development seminars, evaluator training, observer visits, and other related activities" [5].

MOUs are also beneficial to ABET in that they provide valuable information regarding the local accreditation practices and current state of technical education in other countries and regions of the world. ABET will continue to work with other quality assurance organizations with the intent of improving the quality of technical education worldwide.

Accreditation outside the US

Until 2007, ABET did not accredit programs outside of the U.S., but rather performed "substantial equivalency evaluations". These evaluations were conducted in much the same manner as accreditation evaluations, but did not confer the same status as an accredited program. In response to a significant increased demand for ABET accreditation outside the US, and to support a broader goal of increasing the quality of global technical education, the ABET Board of Directors approved accreditation outside of the U.S. in 2006. With the introduction of global accreditation activities, ABET began to phase out its substantial equivalency evaluations, but will continue to confer recognition of those programs already deemed substantially equivalent. ABET's extensive experience with substantial equivalency reviews over a 25-year period has adequately prepared it for accreditation of programs outside the US.

To qualify for ABET accreditation, "programs outside of the U.S. seeking accreditation must have each appropriate education authority, recognition, or accreditation agency complete a Request for Approval form to be submitted with the formal Request for Evaluation. ABET will conduct an accreditation review outside the U.S. only with explicit permission from all applicable national education authorities in that program's country or region" [6].

Within the past five years, ABET has accredited 324 programs at 64 institutions in 23 countries outside the US: Bahrain, Egypt, Jordan, Saudi Arabia, Kuwait, Lebanon, Oman, Qatar, Turkey, United Arab Emirates, Kazakhstan, Morocco, Mexico, Chile, Colombia, Peru, India, Indonesia, Philippines, Singapore, Germany, Spain, and South Africa. The demand for ABET accreditation remains high, as the value of ABET accreditation to the program is seen to be multidimensional. Not only does ABET accreditation assure the quality of the program and its quality improvement system, it also allows programs to be viewed as competitive with local and international institutions, and provides industry a global source of qualified graduates from which to hire. In addition, programs often use their accredited status to recruit students, and to seek international recognition of their programs and graduates.

Academic programs outside the US are reviewed using the same accreditation policies, procedures, and outcomes-based criteria used to review programs within the U.S. In 2000, ABET adopted outcomes-based accreditation criteria, divided into two sets: general criteria and program-specific criteria. The general criteria apply to all programs, and contain the

ENGINEERING EDUCATION
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majority of requirements that must be met. Program criteria apply only to specific programs, and contain areas of additional knowledge and skills critical to the particular program of study. For example, a Civil Engineering program will be reviewed against the general criteria and the Civil Engineering program criteria. In cases where program criteria for a specific program do not exist, the program is reviewed against the general criteria only. To receive ABET accreditation programs must demonstrate that they meet all general and all applicable program criteria.

As a means to educate university faculty and administrators on the assessment process, ABET offers several resources. One-day Program Assessment Workshops (PAWs), are designed to broaden the participants' "understanding of the continuous improvement of student learning through the design of assessment processes, development of measurable learning outcomes, and application of data collection and data reporting methods" [7]. PAWs benefit faculty members and administrators and can be offered outside the US upon request.

The four-day Institute for the Development of Excellence in Assessment Leadership (IDEAL) is designed for individuals responsible for leading their faculty in the development and implementation of a program assessment plan. IDEAL equips its participants with the skills and knowledge needed to become an effective assessment leader. Typically, IDEAL is offered in the US. However, upon request, a slightly modified and shortened version of IDEAL can be offered internationally.

The annual ABET Symposium, featuring over 70 sessions, is the leading event for assessment, accreditation, and innovation of technical education. The ABET Symposium is only held in the US, however, we encourage participation of our international constituents and peers. ABET also offers a series of free webinars focusing on a range of topics. These can be found on the official ABET website.

With globalization and the expansion of multinational corporations, ABET accreditation provides employers, licensing bodies, and universities with "proof that a collegiate program has met certain standards necessary to produce graduates who are ready to enter their professions." [8]. It also ensures that "students who graduate from accredited programs have access to enhanced opportunities in employment; licensure, registration and certification; graduate education and global mobility" [8].

Other International Activities

As a means to become further engaged in the global community of engineering education, ABET became a member of both the Global Engineering Deans Council (GEDC) and the International Federation of Engineering Education Societies (IFEES) in 2011.

The GEDC, modeled after the ASEE Engineering Deans Council, was established in 2008 with the mission "to serve as a global network of engineering deans, and to leverage on the collective strengths, for the advancement of engineering education and research"[9]. The GEDC membership currently consists of approximately 75 deans representing 25 countries.

IFEES was founded in 2006 with the mission to "provide a global network of engineering education stakeholders which leverages the collective resources of its members to fulfill their missions by identifying, discussing, and advancing common objectives of the engineering education community to meet the global challenges" [10].

Membership to these global organizations has provided a platform for ABET to communicate directly with representatives of its global constituencies and learn more about their needs, challenges, and successes with respect to quality assurance, innovation, and engineering education. This platform provides ABET another mechanism to promote and contribute to engineering education.

Conclusion

The global activities described in this paper serve as mechanisms in fulfilling ABET's mission of serving "...the public globally through the promotion and advancement of education in applied science, computing, engineering, and engineering technology" [1]. To further advance its mission, ABET will continue to actively engage in global activities focused on improving the quality of technical education.

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