Technical Challenges Facing New Universities Seeking ABET Accreditation for Engineering Programs in Saudi Arabia – The AlJouf University Experience

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Abstract
The paper aims to offer an overview regarding ABET (Accreditation Board for Engineering and Technology) application into Middle-Eastern and Saudi Arabian universities, with emphasis on newly born universities. The authors also share general challenges and progress facing the implementation of ABET standards into AlJouf University. AlJouf University aims to receive ABET accreditation in the near future.

Introduction
The last century has witnessed great development in science and technology which has given birth to new fields for scientific discovery and subsequent applications. Furthermore, post-secondary education has also developed significantly to cope with such scientific innovations, especially in the fields of engineering and technology. The previous statement serves to summarize the philosophy of ABET and its accreditation standards, which is a dynamic system of continuous educational development and improvement.

ABET is an accreditation institution positioned in the United States, established more than 70 years ago, with the purpose of assuring the quality of post-secondary educational programs in the US, and recently in other universities around the world. Accreditation is dedicated for applied science, computing, engineering, and technology. The ABET strategy for accreditation has significantly developed over the years, with the most recent philosophy of focusing on the objectives and outcomes of education, rather than the educational content. Currently, there are over 2800 ABET-accredited universities for over 600 US universities and colleges [1].

Engineering programs in several Middle-Eastern Universities have also been granted ABET accreditation, including those in Kuwait (Kuwait University), Qatar (University of Qatar), United Arab Emirates (United Arab Emirates University), and Saudi Arabia (King Abdulaziz University and King Fahd...
This comes as part of the policy that developing countries have recently adopted in implementing quality assurance standards to help improve their educational standards [2]. This paper is intended to highlight general challenges encountered during this process, as well as the technical evaluation and activities currently taking place in AlJouf University to help qualify soon for ABET accreditation.

**ABET Engineering Criteria**

ABET takes into consideration 8 evaluation criteria, which are summarized as follows.

1. **Students.** The nature and performance of the students are important criteria in evaluating the engineering program. As a result, the institution must establish clear, fixed, and strict strategies regarding matters such as student acceptance and advising, especially for students with poor academic performance.

2. **Objectives.** Curriculum objectives are described as the skills that the engineering graduate is expected to practice 3 to 5 years after graduation. This requires objectives that are synchronous to overall objectives of the college and university, as well as job market requirements. This information is best provided by the industrial ABET Advisory Committee (AAC) which is established by the ABET-seeking program.

3. **Outcomes.** This entails the characteristics of the graduate on the first day of the job. These can be placed according to the market demands, although ABET has listed 11 major skills for engineering, with additional skills as required by each independent specialty. The institution can confirm that each skill has been acquired by its graduates by means of a qualification exam which can be evaluated by the job market, and via course material and projects achieved by the student during the administered courses.

4. **Study Plan.** This comprises:
   a. two semesters of mathematics and basic sciences;
   b. one semester of humanities
   c. three semesters of engineering science and design
   d. two semesters of applied sciences, computer skills, applied statistics, communication skills, and ethics.
   It must be taken into consideration that math and basic sciences must comprise no less than 25% of the total credit hours. Note, AlJouf University has begun reviewing its study plans to achieve this criteria.

5. **Faculty.** This represents the heart of the educational process for any program. It essential to have a sufficient number of qualified instructors to cover every aspect of the study plan satisfactorily, as well as communicate with each student efficiently, serve the college and university administrative needs, self development, and provide service
to the community and industry through engineering consultancy services. Faculty should also provide continuous evaluation and improvement to the curriculum in terms of objectives and outcomes. In turn, the university’s administration must strive to face and work against obstacles facing the faculty and their professional development, like increasing salaries, and offering compensation and incentives distinguishing those with extra professional and academic efforts.

6. **Tools and Services.** These include lecture halls, labs, computers, the library, study halls, and all that the program requires for its success. The electronic library is an important tool for this criteria, since it facilitates acquiring knowledge whether inside or outside the campus.

7. **Institutional Support and Financial Resources.** Financial resources are essential to attract and retain qualified faculty, as well as providing opportunities for them for professional development. Resources are also important to provide academic equipment and tools, as well as operating and maintaining them, as well as providing technical support and providing assistance and other services essential for the student.

8. **Program-Specific (Special) Criteria.** These have been placed by ABET to reflect special requirements for each engineering program, including Mechanical, Electrical, Industrial, etc. in terms of how deep the program needs to dwell into Chemistry and Physics, as well as how much applied and advanced Math is required. This also involves the extent of knowledge of Statistics, Analytical Algebra, as well as technical practice into the specific field of Mechanical or Electrical Engineering, etc.

**Importance and Need for Accreditation**

Accreditation serves to confirm and assure the level of quality for any educational program represented by the study plan, educational and administrative system, as well as the educational services and infrastructure in order to achieve the required level or quality of education. People question why institutions choose the American system ABET of accreditation, and what distinguishes it from others.

1. One opinion questions the need for ABET with the presence of elite students and qualified faculty, producing professionals capable of easily adapting to the market needs. The answer to that is that ABET guarantees a dynamic educational system that adapts to the need of the market.

2. Others question ABET’s capability of coping with various institutional challenges such as limited financial resources, bad administration, lack of motivation of faculty due to low salaries. This yields an administration mentality not convinced with change and improvement as well as lack of a proper academic infrastructure. This is answered by the importance of the 8 criteria previously outlined and that there is
a need for essential resources and services and proper administration in a successful educational environment.

3. Additionally, others express that graduates from Middle-Eastern countries are qualified and have shown their competence inside and outside the Middle-East, whereby accreditation would form a redundant burden, in addition to expenses which can be as much as $50,000 for each program seeking accreditation. The simple answer to this is that within the current trend of globalization and high academic competition, ABET can form an international standard for accreditation and an important asset for employment in the job market.

It is, thus, evident that there is a global resistance to ABET accreditation, even within the United States, which can be primarily related to the following reasons: (1) additional burdens on the academic faculty; (2) lack of complete understanding of the accreditation requirements; (3) lack of trust to the outcome from implementing accreditation; and (4) lack of proper incentives to the staff responsible for implementing and assisting in the accreditation process. These obstacles can be avoided by undertaking certain procedures, including (1) recruiting an additional position in each college to facilitate ABET accreditation within each program seeking accreditation; (2) introducing a national center for training based upon the standards of accreditation.

The AlJouf Experience

AlJouf University is a newly established university in Saudi Arabia and is working intensively towards the goal of gaining ABET accreditation (in different engineering disciplines) at the end of the 2011-2012 (1431-1432H) academic year. The engineering faculty at AlJouf University is fortunate to have a dean and president with the open-minded, wise attitude that invites ideas for dynamic change and continuous improvement, as well as working firmly towards ABET accreditation.

As shown above, there are many challenges and criteria that face institutions during accreditation and AlJouf University is no exception as the team for curriculum accreditation and improvement (ABET committee), as well as the entire engineering faculty are striving hard (currently in the planning and evaluation phase) within the college towards this goal. Such challenges and changes are summarized as those concerned with faculty, administration, facilities, as well as technology needs, and are summarized in the paragraphs below.

1. Teaching Concerns. There are several teaching concerns that faculty at the engineering college within AlJouf University are striving to tackle, mainly centered at removing unnecessary bureaucracies and redundancies that are evaluated to hinder improvement, and limit faculty autonomy. Additional challenges include providing the necessary infrastructure and tools in the college. We believe that ABET accreditation will serve to remove these obstacles and dynamically increase tools and services for both faculty and students.
• Of particular importance is the credit hour distribution and instructor work-load within the college. It is important that a credit hour be equivalent to each load or contact hour. This increases the sense that the effort is fairly compensated.
• In addition, although the work load for each professor is that primarily of teaching, research and service loads should also be addressed fairly. The ABET committee at AlJouf University, thus, suggests a roughly 60% teaching -20% research -20% service (or 24-8-8 hour) work load distribution for the required 40-hr weekly load for each professor. This varies finely according to the professor level, with a slightly higher teaching load for assistant professors and a slightly higher service load for full professors. Further details and recommendations may be elaborated in future publications and progress.
• It is additionally important to involve graduate assistants in both teaching and research activities within different programs in the college. These should be well compensated to provide the proper assistantship incentive.
• As a growing university, administration should allow for interdepartmental and establishment activities within and across different engineering department, and possibly different colleges within the university. However, the financial incentive should be equivalent to the added effort upon each faculty, and such efforts should only be highly encouraged and not mandated on the faculty.
• Issues arise also such as classroom proctoring and external monitoring. These are encouraged, although should only be from within assigned personnel from within the engineering college.
• Class schedules should be also updated promptly each semester to allow for course advising and registration well ahead of time for the upcoming semester, which helps to avoid any course conflicts, and prepares the student with a well-organized, comfortable working environment.
• Non-credit courses should be avoided and replaced with additional material added to existing courses or adding new complete courses.
• Curriculum and syllabi for each program should be prepared carefully and adjusted to include all aspects of the ABET syllabus. This also serves to unify efforts among each professor, among a common course plan and schedule, and should also be prepared well ahead of time for the coming semester(s).
• Each instructor and respective students should have access to essential electronic tools. These include the AlJouf University Web Site and email, and a Web Site for each course (including updated class material), as well phone service, etc.
• The university/college should provide essential facilities such as Internet availability for each faculty and student, PCs and laptops, lab equipment, essential engineering, programming, and Math licensed/registered software, as well as full-time technical update and maintenance staff for this purpose.

2. Other Concerns. In addition to teaching concerns, ABET accreditation also targets other aspects of education which implicitly affect the teaching quality, including research and service issues. The ABET committee has stressed the need for regular, coordinated college meetings, which should be attended by the industrial ABET Advisory Committee and minutes and results shared
electronically with all attendees for future reference as well as ABET inspectors. Instructors should also allow for flexible, posted office hours, which also need to be promptly respected.

Additionally, administrative work should be minimized by the faculty, a burden that is hindering the betterment of the research and other major activities at the college, as testified by a majority of the faculty. Also, the link between the engineering college and the industrial sector should be more active, and such bridges should be built soon, in an efficient manner. Such efforts should also be well compensated, and should be treated outside the weekly load of the college faculty.

**Summary and Recommendations**

Applying ABET accreditation is certainly a positive step towards assuring educational quality in academic institutions, including new universities in the Middle East such as AlJouf University. Among many others, accreditation offers the following incentives:

1. It provides a comfortable working environment for faculty, which in turn yields a higher salary for faculty, preventing qualified faculty from leaving to foreign universities; providing financial and other incentives for faculty to excel in their respective engineering specialties; and providing professional development for faculty via vocational training or conferences.
2. An important incentive is the participation of external career-related agencies and the private sector in the national accreditation agencies, higher education, university, college and other academic-related responsibilities.
3. It also includes improving national and Arabic accreditation standards to cope with scientific and engineering advances.
4. Avoiding centralization of academic funds is another advantage through providing each program or engineering department with its independent financial resources and administrative autonomy to enable expenditure in order to improve chances of academic accreditation.
5. It is also important to remove administrative obstacles and bureaucracy that hinder accreditation.
6. Finally, it is important to establish a national center to train academic and administrative personnel for the purpose of applying and guaranteeing academic quality assurance.

**References**