Extended Abstract with Poster

Obtaining ABET Accreditation: Identifying Challenges, Problem and Prospects for BUET: A Case Study

Tanvir Manzur, Md. Kabirul Islam

Civil Engineering Department
University of Engineering and Technology Dhaka, Bangladesh

Nur Yazdani

Civil Engineering Department
University of Texas at Arlington Texas, USA

Extended Abstract

Bangladesh University of Engineering and Technology (BUET) is the premier engineering and technology university of Bangladesh. It has a strong undergraduate program with highly competitive entrance requirements. As the top ranked engineering university of the country, BUET attracts the best and brightest of the country. Eventually, a small number get the opportunity to be admitted to BUET due to limitation of available places. For example, the total number of students admitted in the undergraduate level in BUET was 855, from about 70,000 eligible students, who successfully completed higher secondary level of education in science group in 2007 (Ahmed, 2008). Graduates from BUET are working in all sectors of Bangladesh as faculty members, government officials, policy makers, entrepreneurs and so on. BUET graduates have spread all over the world and have been employed in various countries in the public and private sectors as well as in education and research. Every year a good number of BUET graduates seek opportunities in countries in North America, particularly in the United States for graduate education and research. Though the course curricula of BUET was developed following the US system with the active help and assistance of a US University, BUET till now did not apply for nor seek formal ABET accreditation.

According to Rugarcia et al. (2000), future engineers will have to face and cope with seven particular challenges: information expansion, diminishing boundaries between the disciplines, globalization of the economy, endangered environment, resource constraints, emerging social responsibilities and rapid changes in technology. These changes are already taking place, and with the rapidly changing global scenario, including its political and socio-economic structures, the role of engineers is changing rapidly in this highly competitive environment. Therefore, the quality and standard of education of any engineering institution is important for their students to

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enter either in the job market directly as professionals or to go for further higher studies around the world. To accommodate these requirements for future engineers, all the departments of BUET have been updating and modifying their respective curricula. Moreover, there has been an increasing concern among the majority of faculty members at BUET that ABET accreditation should be sought to enhance and streamline its academic curricula, educational administration and management processes.

In view of this, The Civil Engineering Department of BUET had recently taken several steps through a program called Higher Education Quality Enhancement Program (HEQEP) funded by the University Grant Commission (UGC) of Bangladesh. As a first step of the program, several courses are being evaluated according to the criteria used for ABET accreditation. The objective of this paper is to identify the obstacles to achieving ABET accreditation and various ways to overcome these problems. The summary of a particular case study is presented which was conducted by one of the authors. The findings of the case study provide necessary data which may assist BUET policy makers in focusing on the appropriate problem areas and opportunities for Civil Engineering Department with regard to ABET accreditation processes and requirements.

The undergraduate curricula at BUET are based on the course system. There are two terms in an academic year and the duration of each term is eighteen weeks. Thirteen weeks are assigned for classes and five weeks are allowed for preparation and study for an intensive end of semester exam for each course. In addition to the professional courses pertaining to each discipline, emphasis is also given on acquiring knowledge in the basic and social sciences. A student needs to complete a total of 160 credit hours to obtain an undergraduate degree in Civil Engineering degree. The total credit requirement is higher than the standard requirement for a University in North America. The grading system and marks distribution are as follows. Distribution of marks is fixed irrespective of course, instructor and needs of students. 10 % marks is assigned to class attendance, 20% is assigned to home works and quizzes, and the remaining 70% is for the term final exam. Course offerings and planning are decided by Board of Undergraduate Studies (BUGS). There is also provision for employing teaching assistants (TAs) depending on the number of registered students.

One of the major drawbacks of the current undergraduate teaching method in BUET is the widespread use of the deductive method by a significant majority. In this approach, students are taught theories and governing laws with the assumption that once the principles are well understood, students will be able to apply them to particular situations and cases as needed. Induction is the natural way of learning and most engineering students are inductive learners (Felder et al., 1988). Classroom evaluation is important to assess and eventually to bring out the best of the students potential abilities. The evaluation method should be carefully designed to enhance the learning capacity of students. As has been already mentioned, most engineering students learn more naturally by the inductive process; therefore, class tests and assignments need to be compatible with this learning style of students. The classroom assessment process

needs to improve students' understanding of engineering tools and concepts, as well as his/her ability to apply his understanding to practical problems. In many cases, classroom evaluation methods commonly followed in BUET fail to significantly and appropriately address these issues.

Failure to provide regular feedback to students about their progress in the course due to the grading scheme (end-of-term exam only, rather than periodic exams) is another major drawback of the BUET undergraduate education system.

It is also observed that a good number of engineering students in BUET gradually lose interest in engineering courses. This is due to inability or inherent weakness of the course design which fails to communicate to the students effectively the overall mission, vision, objective of the engineering profession and the means by which these objectives are to be actually realized by a practicing engineer. It is a struggle for most students to correlate theories taught in the classroom to real-life engineering. In such cases, courses or seminars may be structured within the curricula to achieve such an understanding. These seminars or courses if offered by an experienced engineer from the industry could be of great help. Various workshops may be arranged where experienced engineers and professionals from industry can share real-life experience and practical and challenging situations and problems with the students. Such workshops are generally absent in BUET, particularly in the undergraduate program.

Lack of availability of modern teaching equipment and logistic support is another area of major concern. Due to budget constraints, it is not possible to provide computing facilities for all students.

Multidimensional competition among students is generally not common in BUET. These types of competition ensure participation of students having different skills in a team environment which allows quick and easy exchange of skills and concepts. The current practice among undergraduate students of BUET is to focus primarily on course work and chase hard for a better grade. There are limited opportunities for undergraduate research in BUET. Research experience is useful and helpful for undergraduate students to become independent, interdependent and lifelong learners.

A survey was conducted among students of the course titled "Structural Analysis and Design Sessional III" under the HEQEP project. It is a final year design-based course in which students have the opportunity to utilize commercially available structural analysis and design software packages to analyze and design various types of structures, including reinforced concrete buildings, water tanks, and folded plates. The course was designed and conducted following the ABET general criteria for baccalaureate level programs. Students were updated on a regular basis about their progress. Well defined course objectives were set following ABET student outcomes criterion (Criterion 3). A term project based on real-life data was introduced for the first time to address course outcome and students were encouraged to go beyond the classroom

for successful completion of the project.

Feedback from students was collected through various surveys. Survey data were compiled and provided a more objective view of current problems associated with the existing undergraduate program in Civil Engineering. In one query of the survey, students were asked to evaluate the inclusion of term project in the course. There were six ratings with highly appreciated or vital being the highest and negative impact being the lowest. More than 50% of students highly appreciated the inclusion of the term project. About 25% of students found introduction of a term project to be very important (the second highest rating) in context of the course. From another response it has been found that 65% of students found hands-on training on software to be important, very important or vital. Inadequacy of computing facilities was considered by most students as one of the major constraints of the program. The pilot study under HEQEP thus provided important initial data regarding the approaches that may be considered for improvement of the course curriculum and related facilities that are necessary for future ABET accreditation.

Rapid economic changes are continuously increasing and broadening the scope of work, responsibility and role of engineers in their respective communities. The new generation of engineers needs to be globally competitive with strong communication skills to perform effectively in a multidisciplinary working environment. Redesigning and improving engineering education to achieve accreditation of professional associations like ABET is a necessary first step in that direction. The Department of Civil Engineering of BUET is now re-evaluating its courses and implementing policies and processes with the objective of seeking ABET accreditation. The outcome of the pilot study is expected to assist the Department ing clearly identifying the areas that need to be improved to achieve that objective.

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TANVIR MANZUR

Dr. Tanvir Manzur earned his Ph.D. in Civil Engineering from the University of Texas at Arlington in 2011. He earned his M.Sc. and B.Sc. in Civil Engineering from Bangladesh University of Engineering and Technology (BUET) in 2003 and 2006, respectively. He has almost 10 years of teaching experience at university level. Dr. Manzur is now working as an assistant professor in the Department of Civil Engineering, University of Engineering and Technology, Dhaka, Bangladesh.

MD. KABIRUL ISLAM

Dr. Islam currently serves as Professor of the Civil Engineering Department at the University of Engineering and Technology, Dhaka, Bangladesh. His research interests are in numerical and mathematical modeling of soil,

elastoplasticity, finite element modeling, behavior of cemented soils and soft rocks, engineering and public policy, project management, and engineering education.

NUR YAZDANI
Dr. Nur Yazdani currently serves as Professor of the Civil Engineering Department at the University of Texas at Arlington. His research interests are in bridge engineering, cement and concrete properties, fiber reinforced concrete, disaster mitigation, and engineering education. Prof. Yazdani is a registered engineer in the state of Texas.