The Impact of CEAB Accreditation Requirements Changes on Engineering Curricula Design and Development

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Abstract

The Canadian Engineering Accreditation Board (CEAB) has recently made some changes to the accreditation criteria for engineering programs, effective fall 2009. The major changes include an attribute-based outcome assessment, increased minimum accreditation units for the entire program, and engineering design and engineering science curriculum components taught by registered professional engineers.

The engineering programs at the University of Victoria were among the first programs to be evaluated by the CEAB using the new accreditation criteria. As the directors of the computer and electrical engineering programs respectively, the authors were involved in the preparation of the accreditation documents and the site visit in winter 2010. In this paper, the authors share their recent accreditation experience and also provide some thoughts on the new accreditation criteria's impact on curriculum design and development, and program delivery.

1 Introduction and Background

The Canadian Engineering Accreditation Board (CEAB) has recently modified the accreditation criteria for engineering programs, effective fall 2009. The substantial changes include an attribute-based outcome assessment of the graduates, an increased minimum accreditation unit (AU) requirement of the entire program, and the emphasis of engineering design and engineering science content as “qualified” AUs in the curriculum being taught by registered professional engineers [1].

The engineering programs at the University of Victoria (UVic), namely: computer, electrical,

mechanical, and software, were among the first programs in the country to be evaluated by the CEAB using the new accreditation criteria. As the directors of the computer and electrical engineering programs respectively, the authors were involved in the preparation of the accreditation documents and the site visit in winter 2010. During the course of preparing the questionnaire, it was evident that there were substantial changes in the required documentation as compared to that in previous accreditation visits. Issues regarding the interpretation of various new or modified criteria have provided some insights on the content of our current curricula, and on the operation and logistics aspects of program delivery. The twelve newly introduced graduate attributes have necessitated planning in statistics collection, fact finding and information tracking procedures for the future.

A major concern is how the changes in accreditation criteria and the attribute-based outcome assessment affect our curricula. The new criteria seem to be restrictive though CEAB claims their flexibility in students' learning experience. In this paper, the authors share their recent accreditation experience and also provide some thoughts on the new accreditation criteria's impact on curriculum design and development, and program delivery. The five changes in the accreditation criteria that affect our programs the most are discussed in subsequent sections.

2 Total Number of AUs in a Program

The total number of minimum AUs required in the entire program has increased to 1950 from the previous 1800 (section 3.3.2 of the Questionnaire for Evaluation of an Engineering Program) [2]. At UVic, as well as in many other engineering programs across the country, each 3-hour ('50-minute' sessions) weekly course without tutorial or laboratory in a typical term of thirteen weeks or so contributes about

40 AUs to the total count. In this case, 150 AUs can be roughly translated into four courses.

This is a significant increase considering that there is a general consensus that engineering students are already overloaded with six courses per term. In order to lighten the work load and provide quality learning, many programs have strived to decrease the number of courses taken per term to five.

To offset this increase of 150 AUs, the most appropriate way seems to be increasing the tutorial and laboratory hours, and other out-side-of-the-classroom learning activities related to a course, without sacrificing the learning experience of students.

3 “Qualified” AUs in Engineering Design and Engineering Science

The term “Qualified” AU has been introduced: *“are earned only for courses for which the instructor is qualified using the definitions provided in the Statement of interpretation on licensure expectations and requirements.”* (Section 3.3.4 of the Questionnaire [2]). Section 3.3.4.4 further elaborates on significant design experience: *“The engineering curriculum must culminate in a significant design experience conducted under the professional responsibility of faculty licensed to practice engineering in Canada, preferably in the jurisdiction in which the institution is located”* [2]. The CEAB minimum for “Qualified” AUs for engineering design is 225, while the minimum “Qualified” AUs for engineering science and engineering design combined is 600.

The “Qualified” AU concept poses some difficulties for engineering programs that do not have sufficient number of professional engineers on staff. This situation may arise because:

- The program is a newly established program and may not have a full complement of professional faculty.
- The program has a large number of young faculties who are just starting their academic career and still having their professional application in progress.
- The program has a large number of faculties who were educated overseas and/or lack an official bachelor’s degree in engineering.
- The program requires junior-year teaching support from other non-professional departments such as computer science and physics. Faculties from these departments may not have the necessary credential for professional registration.

An immediate remedy for such situations is to shuffle teaching assignment. Courses with heavy engineering design and/or engineering science components are to be taught by registered professional engineers. However, the drawback of this quick fix is that the faculty with the best expertise in a particular subject area is not teaching the associated course due to his/her non-professional status.

At UVic, we have initiated a professional registration campaign that encourages junior faculties, regular sessional lecturers, and qualified members in other departments to begin and fast-track their professional engineer application process.

4 Attribute-based Outcome Assessment

As stated in Section 3.1 Graduate attributes of the Questionnaire, a new accreditation criterion requires that *“The institution must demonstrate that the graduates of a program possess the attributes under the following headings. The attributes will be interpreted in the context of candidates at the time of graduation. It is recognized that graduates will continue to build on the foundations that their engineering education has provided. Engineering programs are expected to continually improve. There must be processes in place that demonstrate that program outcomes are being assessed in the context of these attributes, and that the results are applied to the further development of the program.”* [2].

It is clear that this new criterion requires initiatives from the institution to collect statistics, monitor progress, and track information. Sufficient time is given, though, to have mechanisms in place for accreditation documentation after June 2014.

At UVic, a committee has been struck, with the assistance of the alumni office to investigate measurement techniques for each of the twelve attributes. A particularly useful resource for undergraduate engineering assessment is the work done at Queen’s University [3].

5 Prior Studies and Transfer Credits

There seems to be an increasing attention paid to *“admission involving advanced standing, prior studies, transfer credits and/or exchange studies...”* as stated in Section 3.2.1 Admission of the Questionnaire [2]. Many engineering faculties in Canada have formal agreement with regional colleges for students to transfer into their second year of the program. In many instances, formal bridging programs are set up to facilitate admission of technology students into the third year of studies.

It becomes very important for the engineering programs to liaise with their college counterparts on a regular and continual basis. Proper procedure and documentation must be established formally and rigorously. One of the major issues in such programs is the “qualified AU”. In order to account for prior studies credits, professional registration must be considered by the transferring institutions at the college level.

6 Co-op Education

Several engineering schools in Canada offer mandatory or elective co-op education. There has not been a formal policy by the CEAB regarding co-op experience. In the 2009 Questionnaire, it is stated in Section 3.3 that *“AU can be claimed for co-op placements, so long as a school is prepared to recognize the co-op term for academic credit and it can be demonstrated that each student has met the minimum path.”* However, how one would assign AUs to the co-op work term is not specified.

We have surveyed Canadian engineering programs that have a co-op education component, but have not been able to find a consistent pattern of co-op AU assignment. The use of K-factor may be the most appropriate means for this purpose. We hope to clarify this issue with CEAB in the very near future.

7 Conclusion

It was an interesting learning experience but at the same time somewhat tedious exercise in the preparation of our 2010 accreditation document due to the newly introduced criteria. It also provides us with some insights on how to structure and improve our program offering and delivery.

Our current focus is to establish measurement metrics for the twelve graduate attributes that must be documented by June 2014.

References

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