Abstract: This paper highlights the confusion in interpreting the words “program objectives” and “program outcomes” in the ABET Engineering Criteria. Their differences between objectives and outcomes are discussed in relationship to the definitions that were used in the ABET International Faculty Workshop, held at the Istanbul Technical University in April 2002, are provided. Some suggestions on how to differentiate between objectives and outcomes, and how to compose the program objectives and outcomes are given.

Introduction

In 1998, the US Accreditation Board for Engineering and Technology (ABET) decided to break away from the traditional accreditation that evaluates the contents of the curriculum, the educational resources and the execution processes of the engineering programs. In its place, ABET requires the institution seeking accreditation of an engineering program to demonstrate clearly that the program meets the following 8 criteria (http://www.abet.org):

- Criterion 1: Students
- Criterion 2: Program Educational Objectives
- Criterion 3: Program Outcomes and Assessment
- Criterion 4: Professional Component
- Criterion 5: Faculty
- Criterion 6: Facilities
- Criterion 7: Institutional Support and Financial Resources
- Criterion 8: Program Criteria

What is particularly revolutionary about the above ABET Engineering Criteria (formerly referred to as EC-2000) are Criteria 2 and 3. These two criteria require clear specification of the program objectives and outcomes. More importantly, in order to satisfy the criteria, there must be in place a system of ongoing evaluation in place to demonstrate the achievement of the program objectives. Evidence must be given that the assessment process, with documented results, are applied to the further development and improvement of the program. The assessment must demonstrate that the program outcomes important to the mission of the institution and program objectives are measured. Appropriate data are collected from all constituents (i.e. the students, faculty, alumni, employers and parents) via various assessment methods such as surveys and questionnaires, archival records, focus groups, portfolios, examinations, and external examiners.

In sum, there is a paradigm shift in the ABET accreditation from a process-based assessment to an outcome-based assessment.

In the recent inaugural ABET International Faculty Workshop held in Istanbul on 16-18 April 2002, it became apparent that there was some confusion as to the definitions of the program objectives and program outcomes. This paper attempts to provide an explanation for this confusion and proceeds to give some distinguishing features of objectives and outcomes so as to facilitate their composition. Also we suggest a method that will assist the faculty in developing the program objectives and program outcomes more consistently and in a more expeditious fashion.
Confusion between the Words “Program Objectives” and “Program Outcomes”

The confusion between the words “program objectives” and “program outcomes” may be traced to the way in which one is taught on the use or definitions of the words “aims” and “objectives”. It is worth noting that these two words are often misused as well. In an educational setting, under the aims of a module (or a course or a program), we specify the knowledge and abilities we expect students to acquire. Under the objectives of a module (or a course or a program), we specify what the students will be able to do if they learn what we expect them to learn. So, statements composed for displaying objectives are, in fact, conditional statements. Objectives are expressed operationally, in terms of doing rather than knowing. For instance, the statement “This module aims to help students acquire the strategies of critical thinking in experimental biology” specifies an aim. The statement “This module will enable students to read research articles in experimental biology, and write brief critical reviews that evaluate the experiment design, instrumentation, data, findings and results” specifies an objective.

As can be seen from the above definitions of “aims” and “objectives”, one can equally be confused with the definitions of program objectives and program outcomes. In the ABET Istanbul Workshop, the following definitions of program objectives and outcomes were used:

**Program Objectives** are statements that describe the expected accomplishments of graduates during the first few years after graduation.

**Program Outcomes** are statements that describe what students are expected to know and are able to do by the time of graduation. These relate to the skills, knowledge and behaviour that students acquire in their matriculation through the program.

It appears the above definitions for both “program objectives” and “program outcomes” are tantamount to the commonly used definition of “program objectives” with a fine separation on what the graduates can do for the first few years after graduation (in the case of program objectives) and at the time of graduation (in the case of program outcomes).

One would have thought that program objectives and program outcomes could be defined as follows:

**Program Objectives** are statements that describe what the program expects the graduates to be able to do on the basis of the knowledge and abilities that they have acquired from the program.

**Program Outcomes** are statements that describe what are the outcomes (= results) of the program, that is, what the program has actually accomplished with respect to students, by the time of graduation.

One could say that the aims of the program are the intended program outcomes, as opposed to the actual program outcomes. The relationship between the program objectives may be depicted as follows:

Aims and objectives of the program → Design of the program → Implementation of the program
→ Outcomes of the program

We can determine the aims and objectives of the program from the description, materials and assessment tasks of the program. We can determine the actual outcomes only by observing how the graduates function after they leave the university (e.g. How many of them get admitted to
prestigious graduate programs? How many of them get highly paid jobs? How many of them become accomplished professionals? etc.).

The authors believe that the confusion arises due to the above different interpretations of program objectives and program outcomes.

**Distinguishing Features for Program Objective Statements and Program Outcome Statements**

For the purposes of this paper, we shall adopt the definitions of “program objectives” and “program outcomes” that were used in the ABET International Faculty Workshop 2002. To assist faculty in composing their statements for the program objectives and program outcomes, we suggest the following few distinguishing features be kept in mind:

1. Program objectives articulate what we expect the graduates to be able to do a few years after graduation on the basis of the knowledge and abilities acquired from the program. Program outcomes articulate what we expect the graduates to be able to do when they walked up on the stage to receive their diplomas/scrolls. So the distinguishing feature is the time at which the students’ accomplishments are measured. It is to be remarked that the problem is the temporal separation between the definition of the objectives and the measurement of outcomes has to be necessarily several years.

2. Program objectives may be distinguished from program outcomes by the types of constituent that are naturally approached for feedback in assessing the achievement of the program objectives and outcomes. If the constituents approached are the alumni and employers for assessment/evaluation, then the statements most likely belong to program objectives. On the other hand, if the constituents approached are the students and the faculty members, then the statements are likely to belong to program outcomes.

3. The number of statements expressing the program objectives is about 4 to 5 when compared to 11 to 15 statements for the program outcomes. In view of this, it would be logical to deduce that if the statement in the program objective list has only one associated program outcome, then that statement is best placed in the program outcome list. Note that there should generally be more than one program outcome statement associated with one program objective statement.

4. Statements for program objectives usually begin with “The program objectives are: (i) to enable… (ii) to develop…, (iii) to provide….” while statements for program outcomes may begin with “Students will have: (i) the ability to…, (ii) the understanding of …. (iii) the knowledge of ….”

For example, here are two program objectives (http://www.ece.uiuc.edu/abet/peo&po.html)

1. To provide students with the understanding of the fundamental knowledge of prerequisite for the practice of, or for advanced study in, electrical engineering, including its scientific principles, rigorous analysis and creative design.
2. To develop skills for clear communication and responsible teamwork, and to inculcate professional attitudes and ethics, so that the students are prepared for the complex modern work environment and for lifelong learning.
In contrast, one may have the ABET’s list of program outcomes

(a) Ability to apply knowledge of mathematics, science and electrical engineering
(b) Ability to design and conduct experiments as well as analyze and interpret data
(c) Ability to design a system to meet desired needs
(d) Ability to function on multidisciplinary teams
(e) Ability to identify, formulate and solve engineering problems
(f) Understanding of professional and ethical responsibility
(g) Ability to communicate effectively
(h) Broad education necessary to understand impact of engineering solutions in a global/societal context
(i) Recognition of the need for and ability to engage in lifelong learning
(j) Knowledge of contemporary issues
(k) Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

Program Outcomes (a), (b), (c), (e) and (k) are linked to Program Objective (1) while Program Outcomes (d), (f), (g) and (i) are linked to Program Objective (2). Note that there are always a few Program Outcomes that are linked to one Program Objective.

Simple Strategy to Compose Statements for Program Objectives and Program Outcomes

In composing statements for program objectives and program outcomes, most faculty members would begin by writing statements for program objectives. Then based on the objectives, the statements for program outcomes are composed. We suggest that it is easier to reverse the approach. First we ask the constituents and ourselves what are the desired attributes for our graduates. Having listed these desired attributes, we compose the statements for the program outcomes. Next we summarize and generalize these program outcome statements for the program objective statements keeping in mind the mission of the institution. Use the suggested opening words like “The program objectives are: (i) to enable… (ii) to develop…, (iii) to provide…” for composing Program Objective statements and “Students will have: (i) the ability to…, (ii) the understanding of …,” (iii) the knowledge of …” for composing Program Outcome statements. These words help the faculty to focus more clearly these two sets of statements.

It is important to note the following attributes of well-stated program educational objectives: (i) be assessable; (ii) meet the needs of the constituents; (iii) consistent with the University’s and Department’s mission and goals; (iv) be realistic and achievable given the available resources; (v) be concise and understandable; and (vi) be flexible enough for revision if necessary. As for the program outcomes, the attributes are (i) satisfaction of ABET program outcomes (a) to (k); (ii) consistent with the program educational objectives and institution mission; (iii) should be measurable by the time of graduation; (iv) should be flexible for revision; (v) should be realistic outcomes given the resources, (vi) should be clear and concise and (vii) should reflect the unique features of the program.
Summary and Concluding Remarks

The composition of program objectives and outcomes is very important as the statements shape the nature of the program and inform all constituents the clear target to achieve. In this paper, the confusion between the words “program objectives” and “program outcomes” has been discussed and their definitions are articulated based on what were the definitions used in the ABET International Faculty Workshop 2002 held in Istanbul. We have provided some distinguishing features for these two sets of statements as well as a simply strategy to assist faculty members when composing their program objectives and outcomes. It is hoped that this paper will be useful to faculty members who are involved in an ABET accreditation exercise.

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