

Assessment of the Engineering Programs by Senior Exit Surveys at the University of Bahrain

Nader Al-Bastaki*

College of Engineering, University of Bahrain, POBox 32038, Kingdom of BAHRAIN.

Abstract

Continuous program improvement is an essential factor in ensuring the high quality of the graduates of the engineering colleges. The continuous changes in the job market demands and requirements and the rapid developments of new technologies and computer softwares have made it vital for the engineering educators to adopt a strategy of continuous assessment and development of their programs. At the College of Engineering, University of Bahrain several tools have been adopted to achieve this goal. Among these tools is a survey during which the senior students, who are about to graduate, are requested to fill on-line questionnaires. The questionnaire seeks to explore the assessment of the graduating students of the engineering education they have attained at the University of Bahrain. The survey covers several areas, including students' assessment of the advising process, curriculum and instruction, facilities and laboratories, professional preparation and program overall rating. The objective of this paper is to present the outcomes of this assessment process and to discuss how it can be of help to improve the engineering programs. The survey was conducted during the last academic semester (second semester of the year 2004/2005). The results have highlighted several points that require improvement.

Keywords: Assessment; Senior; Exit; Survey, Engineering

1. Introduction

Reforming and developing engineering programs has been taken as a major concern that has been dealt with by many universities [1-3]. There have been rapid changes in the technologies and consequently the needs and expectations of the industrial sectors of graduates from engineering colleges during the past two decades. In addition to the industrial sector requirements, the drive for continuous program improvement comes from a number of sources, including the various parties or, in ABET's terminology, constituencies who are interested in, or are influenced by the engineering education at the university. Among these parties are the students themselves, particularly those who are about to graduate. Assessment of the engineering programs by these various parties is an essential activity in the process of continuous program development. Improving the methods for assessment is also an important concern that has been the focus of several workers [4,5]. The assessment of the programs by senior students immediately prior to their graduation, by means of senior exit surveys, is one of the key tools for the development process. These students have lived through the

educational process and social environment of the program and the academic department which has offered it and are expected to have mature views of the positive and negative points that need to be considered. Several publications in the literature have described the experiences of various universities in implementing senior exit surveys [6-8].

This paper presents the results of a senior exit survey conducted for the various engineering programs for the college of engineering, University of Bahrain, towards the end of the second semester of the academic year 2004/2005. The survey has been particularly useful in determining the areas that need improvement in the college programs as conceived by the senior graduating students.

2. Methodology

The methodology used for determining the students' assessment of the engineering programs was to request the senior students that were in their final semester before graduation to fill in online questionnaires right

* Corresponding author. Email: naderbsk@eng.uob.bh

after completing their final examinations. Only computer technicians were present during the online questionnaire filling. This measure was taken in order to prevent the influence of the presence of the academic members on the outcomes of the students' response. The questions were grouped into five areas, namely, advising, curriculum and instruction, facilities and laboratory equipment, professional preparation and program overall rating. The questions are shown in Appendix 1.

The first group of questions targets the degree of satisfaction of the student with the academic advising process that he had received during his study in addition to his choice of the program and involvement with professional societies. The second group of questions explores the degree of satisfaction of the students with the curricula, including service courses, general study (GS) courses, core courses and electives. Also in this group are questions about the faculty and the use of computers in courses. The third group of questions focus on the facilities including laboratory facilities and equipment, computer facilities and equipment, software, technicians and knowledge obtained in the lab. The fourth group of questions concentrates on professional preparation of the student in the areas of design, experiments, oral and written communication, IT, and competency to join the job market. The fifth group of question tackles the confidence of the student in the application of the knowledge he has obtained during his study to solve engineering problems, design and conduct experiments, analyze and interpret data, function in interdisciplinary process for real design projects, understand professional and ethical responsibility, use techniques, skills and modern engineering/IT tools for engineering practice, develop sufficient skills to design, develop and test new products, participation in non-academic activities and teamwork experiences.

3. Results and Discussion

The results for the first group of questions (Advising) are shown in Table 1 for the students of mechanical engineering (ME), civil engineering (CE), electrical engineering (EE), electronics engineering (ELE), and chemical engineering (CHE). The values shown are average values ranging from a maximum of 4 for high satisfaction to 1 for unsatisfactory. It is very obvious that students from all engineering disciplines gave a very low grade to the participation in professional societies (a score of 1.5 to 1.7). The reason for this is that no student professional societies exist within the university. The students are obviously expressing their dissatisfaction with this situation. As a result there is an urgent need to fulfill this requirement by establishing such societies

within the university. Another question which has score relatively a lower grade (2.75 and 2.83) is the assistance obtained from the faculty at times outside the office hours (question 6). Also students from the chemical engineering program have given similar grades to two other questions 3 and 4 related to advising, namely, the availability of the academic advisors and the advisor's knowledge of the program's requirements. Obviously, more has to be done to ensure the availability of the staff members for students' assistance and advice and some staff members apparently need to work harder on comprehending all the rules and regulations and program requirements. This can be achieved by conducting a workshop for these staff members to train them on such issues.

Students' responses to curricula and instruction are shown in Table 2. An intriguing outcome is noticed in the results of question 23, whether the student would choose the same major if could start over again. Three of the programs scored averages between 2.6 and 2.8. Perhaps this is related to pre-university preparation of the students and their knowledge of the various programs. Service courses, as expressed by question 11, have not been rated high by the ME, CE and ELE students. It is believed that the handling of mathematics courses may have resulted in this situation, as they are taught without relating the topics to actual engineering problems. Also, ME, CE and EE students do not seem very happy with the availability of elective courses, as expressed by question (15). Table 2 also contains other questions with scores of slightly less than but for specific programs.

Table 3 shows that the students in more than one program are not very satisfied with the classroom and laboratory facilities and equipment, as expressed by questions 24, 25 and 26. This is obviously related to the relatively lower grades for the knowledge obtained in the laboratory sessions, as expressed by some of the programs students in question 31.

The preparedness for the professional life, as expressed by Table 4, seems to have generally received satisfactory grades for most of the questions, except for the CE program in questions 33 and 37, related to communications skills and competency for the job market.

The overall rating, as shown in Table 5, varies depending on the program. While the students of CHE and ELE programs gave generally high marks for all questions, the other three programs results were not always high. All of the three programs, namely ME, CE and EE, results to question 45 were low. This question was about participation in non-academic activities. It is

well known that such activities reflect positively on the student's personality. Moreover, ME and CE results for question 38 were relatively low. This question was about the ability of the student to apply his knowledge in mathematics, science and engineering to solve engineering problems. This may reflect the need to include more mathematics courses in the curricula of these two programs. For these two programs, the scores in question 42 are relatively low. This question is about the understanding of the ethical responsibilities. At the moment, no course on ethics is available to the engineering students. There is obviously a strong need for such a course.

4. Concluding remarks

The survey conducted on exiting senior students from the various engineering programs at the end of the second academic year 2004/2005 has revealed many points that require improvements in the various aspects included in the survey. Some of the key issues are the need for establishing professional societies in the university for the students, the need to improve some of the service courses, particularly the mathematics and the necessity to improve the laboratory facilities and equipment. As whole, the survey was found to be an essential tool which can be for continuous course improvements.

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Appendix 1 Senior Exit Survey Questions

A. Advising

01. Rate the advising you received by the College (both formal and informal)?
02. Rate the advising you received by the department in general (both formal and informal)?
03. Your academic advisor is available whenever you need help.
04. Your academic advisor was knowledgeable about your curricular requirements
05. Your academic advisor seemed genuinely interested in helping you.
06. You are satisfied with "out of office hours" faculty assistance in your courses?
07. You are satisfied with your choice of this Department.
08. You are satisfied with your major in this program
09. While an undergraduate student, you were a student member and participated actively in professional society

B. Curriculum and Instruction

10. You are satisfied with the curricula
11. The service courses (math, physics, and chemistry) were adequate
12. The faculty teaching the service courses are knowledgeable well and prepared
13. The general study courses (GS) were very useful
14. The program core (major) courses were adequate
15. Availability of elective courses in the program was adequate
16. Use of computer technology in the curriculum met your expectations
17. Degree of academic challenge was excellent
18. Faculty in my department are outstanding in their professional fields
19. The faculty in my department are knowledgeable and well prepared
20. Faculty in my department are concerned about student learning and development
21. The teaching in the department was effective
22. The total numbers of credit hours offered by the program were adequate
23. If I could start over again, I would select the same major

C. Facilities and Laboratory Equipments

24. The class room facilities were adequate for class instruction
25. The laboratory facilities were adequate to conduct experiments
26. The laboratory equipment in laboratories was adequately prepared to conduct experiments
27. The computer facilities were adequate
28. The computer equipment in computer laboratories was adequate
29. The computer software used in the major courses was adequate
30. The laboratory technicians are knowledgeable and helpful
31. The knowledge and skills learned in the laboratory are sufficient to complement the theoretical course content

D. Professional Preparation

32. As a graduating senior, I feel adequately prepared to independently design and conduct experiments
33. I am confident that my undergraduate instruction in oral and written communication skills, have prepared me to perform capably on the job
34. The senior project and design experiences have prepared me to start my profession.
35. My total undergraduate instruction and guidance at UOB has adequately prepared me to become a successful engineering/IT professional
36. I am very satisfied with the opportunities the College offers for training experience in the industry
37. My UOB education has prepared me enough to compete in the job market

E. Program Overall Rating

As a result of my program of study, I am now confident in my abilities to

38. Apply my knowledge of mathematics, science, and engineering to solve engineering problems
39. Design and conduct experiments
40. Analyze and interpret data
41. Function in the multi-disciplinary process of design and qualification for a real time design job
42. Understand my professional and ethical responsibility
43. Use the techniques, skills, and modern engineering tools necessary for engineering practice
44. Develop sufficient skills needed to design, construct, and test new products
45. Have participated in non-academic activities while an undergraduate student on campus
46. In general, teamwork experiences in all of my undergraduate courses were positive

Table 1. Results for the questions on advising

No	ME	CE	EE	ELE	CHE
1	3.33	2.85	3.0	3.86	3.75
2	3.5	3.17	3.14	3.86	3.50
3	3.83	3.83	3.00	3.29	2.25
4	3.5	3.67	3.43	3.43	2.75
5	4.0	3.33	3.57	3.57	3.00
6	2.83	3.00	3.43	4.00	2.75
7	3.83	3.00	3.57	3.57	4.00
8	4.17	3.33	3.71	4.29	3.50
9	1.50	1.50	1.43	1.71	1.52

Table 2. Results for the questions on Curriculum and Instruction

No	ME	CE	EE	ELE	CHE
10	3.33	3.5	2.86	3.57	3.00
11	2.83	3.0	3.43	3.14	4.00
12	3.17	3.17	3.43	3.86	3.50
13	3.33	2.67	3.43	2.86	4.00
14	3.17	2.5	3.43	4.00	3.75
15	2.83	3.17	3.00	3.86	4.00
16	3.67	2.67	3.71	4.00	3.25
17	3.67	2.83	3.71	4.00	4.00
18	3.50	3.50	3.71	3.29	3.25
19	2.83	3.33	3.57	3.86	3.75
20	2.83	3.17	3.43	3.71	3.75
21	3.50	2.33	3.00	3.86	4.00
22	3.83	3.17	3.71	3.71	3.75
23	2.83	3.17	2.71	2.86	3.25

Table 3. Results for the questions on facilities and laboratory equipment.

No.	ME	CE	EE	ELE	CHE
24	3.17	2.5	3.43	3.57	3.00
25	2.83	2.67	3.43	3.29	2.75
26	3.17	2.83	2.71	3.00	3.00
27	3.83	3.00	3.29	3.71	3.75
28	3.67	3.17	3.14	3.29	3.75
29	3.33	3.33	3.29	4.14	3.75
30	3.67	3.00	3.57	4.43	3.50
31	2.83	3.00	3.43	3.86	3.25

Table 4. Results for the questions on professional preparation

No.	ME	CE	EE	ELE	CHE
32	3.67	3.33	3.14	3.43	3.25
33	3.83	2.67	3.57	4.00	3.25
34	3.83	3.17	4.14	4.29	4.00
35	3.50	3.50	3.43	4.14	3.75
36	3.33	3.00	3.43	3.43	3.75
37	3.67	2.17	3.14	3.71	3.75

Table 5. Results for the questions on overall rating

No.	ME	CE	EE	ELE	CHE
38	2.83	3.00	3.57	4.14	3.75
39	3.00	3.33	3.14	3.86	3.75
40	3.67	3.17	3.43	4.00	4.00
41	3.17	3.00	3.14	4.29	3.75
42	3.17	2.83	3.71	4.00	4.25
43	3.33	3.00	3.71	4.00	4.00
44	2.83	3.33	3.71	3.71	4.00
45	2.83	2.33	2.86	3.86	3.50
46	3.17	3.17	3.71	3.86	4.25