

Coupled BSc. and Associate Diploma Programs: the Experience of the College of Engineering, University of Bahrain

Hussain Al-Madani*, Nader Al-Bastaki

College of Engineering, University of Bahrain, P O Box 32038 BAHRAIN.

Abstract

In order to fulfill the job market's requirements in the Kingdom of Bahrain for both engineers and technicians, the college of engineering at the University of Bahrain has been offering both BSc and Associate Diploma programs. The method of distributing the students between these two routes has been lately modified. Up to the academic year 1999/2000, a single track system was followed, in which all the new students admitted initially to the associate diploma program, and only the graduates from this program who achieved a GPA of 2.5 or more were allowed to join the BSc program. Starting from the second semester of the academic year 1999/2000 a new "two track system" has been adopted, in which all of the new students are admitted to the BSc program. After completing one academic year, the students who do not achieve a satisfactory performance are transferred to the associate diploma program. Satisfactory performance was strictly defined as: successfully completing 27 credit hours, passing two mathematics courses (Calculus I and II) and passing two other science courses. The objective of this paper is to present the experience of the college of engineering at the University of Bahrain with respect to these two systems. The paper discusses the advantages and disadvantages of these two systems with respect to the length of the programs, the rates of dismissals and meeting the job market requirements.

Keywords: BSc; Associate Diploma; College of Engineering; Experience

1. Introduction

The effectiveness of engineering education imposes on the engineering colleges to have the flexibility of adapting to the changes that take place in the market demand for graduates, the developments in knowledge and technology, the developments in the teaching styles and teaching aids as well the changes in the social and economical situations. Many studies have been performed explaining the various experiences in developing engineering education [1-6]. At the University of Bahrain, the Engineering College has adopted a specific which is unique and not often practiced at other universities. This scheme has adopted a coupling between the BSc and Associate diploma tracks. The main reason for this choice has been to meet the local needs for both engineers and technicians. The academic programs in the college of engineering at the University of Bahrain have gone through different phases since its establishment in 1980. The college of engineering at its early stages was part of the Gulf Technical College which was later converted to the Gulf

Polytechnic. The engineering programs in the Gulf Polytechnic aimed at supplying the private and public sectors with their requirements of engineers and technicians. The ratio of technicians to engineers required by the local markets was estimated at that time to be 4 to 1. In 1986, the Gulf Polytechnic was merged with another college called the University College of Bahrain to establish the University of Bahrain. The students admitted to the various engineering departments had to follow what was referred to as "the single track system". Starting from the second semester of the academic year 1999/2000 a new system was implemented, which was referred to as "the two track system". The differences between these two systems are described in the next section. The objective of this paper is to present the experience of the college of engineering at the University of Bahrain with respect to offering these two systems for achieving associate diplomas and BSc degrees.

* Corresponding author. Tel: +973 876601; Fax: +973 684844; Email: halmadani@eng.uob.bh

2. Single-and Two-Track Routes

In the single track route which had been followed in the College of Engineering at the University of Bahrain since its establishment and up to the academic year 1999/2000, all students admitted to the College had to join the associate diploma program after completing an orientation program for a period of one academic semester. In the associate diploma program, students were required to complete 75 credit hours of science and engineering courses. The science courses mainly consisted of first year BSc (100 level) courses while the engineering courses were of diploma level. This was normally covered in four to five semesters. After completing the associate diploma program, those students who scored a GPA of 2.5 or more (out of 4.0) were allowed to continue in the BSc program which required an additional five semesters of course work. One of the disadvantages of this method was that some of the courses covered in the diploma level had to be repeated at a BSc level, which resulted in an unnecessary longer duration for students to graduate (a total of 157 credit hours). On the other hand, some of the diploma courses were considered as a prerequisite for the BSc level courses. This necessitated handling these diploma level courses at a level which was higher than what is normally required for the preparation of technicians. The laboratory and practical contents of these courses were not considered to be sufficient.

In the two-track system, which was practically launched in the academic year 2000/2001, all students who are accepted in the engineering college join the BSc program. After completing a full academic year (two semesters and an optional summer semester), students who achieve satisfactory performances continue along the BSc track, while those with lower performance are re-routed to the associate diploma program. The criteria for the satisfactory performance are specified as successful completion of 27 credit hours with a GPA of 2.0 or more. A compulsory requirement of the 27 credit hours is that the courses successfully completed should include two mathematics courses and two other basic science courses. Starting from the academic year 2002/2003 a new associate diploma program was adopted. The main feature of the new programs is that they are technically oriented. The graduates of the new associate diploma programs are not allowed to transfer to the BSc program. The advantage of the two-track system is the decoupling between the BSc and diploma level courses and, hence, avoiding the shortcomings of the old single-track systems mentioned above. Moreover, students who face difficulties in continuing the BSc programs are allowed to transfer to a diploma program at an early stage and would obtain an associate diploma

certificate to join the job market as technicians. If those weaker students were allowed to stay in the BSc program without a diploma option then they would waste several semesters before realizing that they cannot obtain a BSc degree and they would end-up with no certificate at all.

Figure 1 shows flowcharts of the different phases of the BSc/Diploma relationships discussed above.

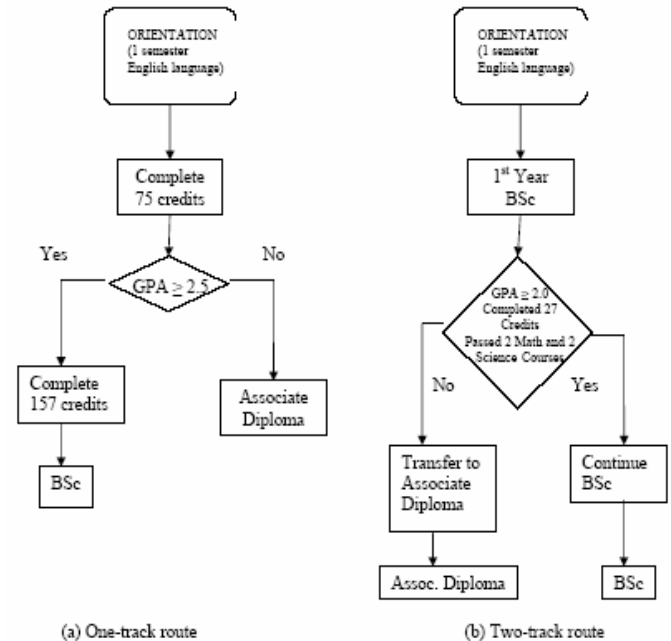


Figure 1. Past and current systems of screening engineering students to BSc and Associate Diploma programs at the University of Bahrain.

3. Data about Student Transfers and Admissions

As an indicator of the general performance of the coupled BSc-Diploma programs in the engineering college, data for the numbers of students graduated, dismissed and transferred to other colleges were studied for the period from the academic years 1996/1997 to 2002/2003. Figure 2 shows the numbers of students accepted in the college of engineering for this period. It can be observed that the number of students accepted annually has jumped from an average of about 300 students prior to the academic year 1999/2000 to about 500 students starting that year i.e. an increase of 60%. This sudden rise was due to a new University policy to accept more students in all programs and colleges. The implementation of the new two-track system was practically started in the academic year 2000/2001, although a few students were admitted in the second semester of 1999/2000. Most of the students from that batch will graduate at the end of the academic year 2003/2004.

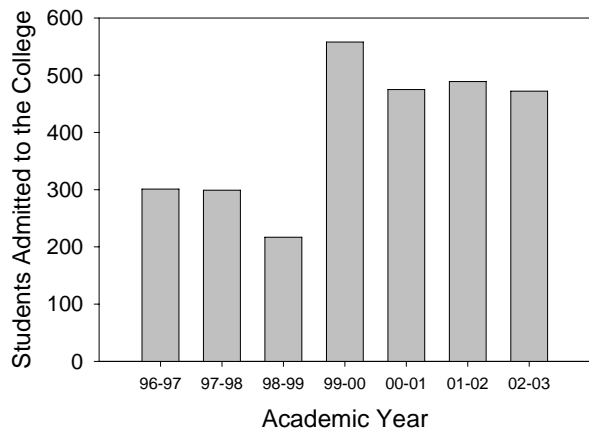


Figure 2. Numbers of students accepted in the college of engineering.

Figure 3 and Figure 4 show the numbers of BSc and associate diploma graduates, respectively, for the academic years 1996/1997 up to 2002/2003. It can be seen that the numbers of BSc graduates have steadily risen from about 60 in 1996/1997 to more than 100 in the years beyond 2000/2001. On the other hand, the number of associate diploma graduates have declined from about 200 in 1996/1997 to about 150 in 2002/2003. About one third of the diploma graduates each year joined the BSc programs (those students with GPAs of 2.5 or more). The remaining associate diploma graduates joined the job markets to be trained as technicians and operators. The data presented in Figure 4 includes the students from the old single-track system which has been almost completely phased out by the year 2002/2003.

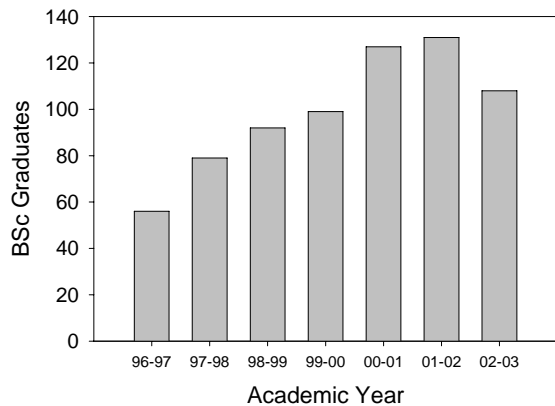


Figure 3. Numbers of BSc graduates from the college of engineering in various years.

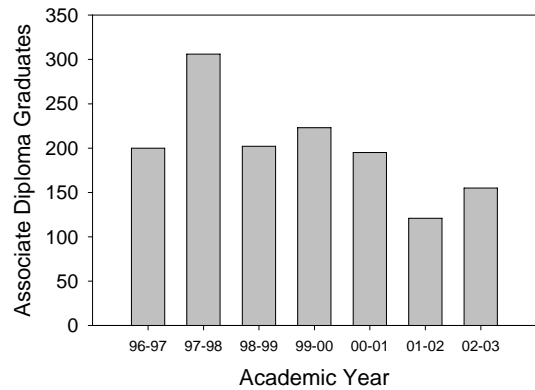


Figure 4. Numbers of students graduated from the associate diploma programs.

The numbers of students transferred from the college of engineering to other colleges are shown in Figure 5. One of the main drives for students to transfer to other colleges is the poor performance in the engineering programs. In addition, the sharp rise in the number of transfers in the year 2001/2002 may be due to the start of the implementation of the new associate diploma which leads to no BSc. Many students who were re-routed to the associate diploma program chose to transfer to other colleges. However, according to the University's regulations, if these students don't score a GPA of 2.33 in the subsequent semester, then they are returned to their original college. As a result, many of these students end up returning to the engineering college after one semester. Figure 6 shows a sharp rise in the number of students dismissed from engineering programs in the academic year 2002/2003. This is thought to be mainly due to the lower levels of the students accepted in the engineering college. Normally, the dismissed students are allowed to transfer to other departments within the college of engineering. Most of the dismissed students are from the associate diploma programs. Due to the re-routing of the lower performers to the associate diploma programs at the end of the first BSc year in the new two-track system, the numbers of students dismissed from BSc programs are usually small. For a similar reason, in the old single-track associate diploma-BSc system the associate diploma graduates with a GPA of 2.5 or more were allowed to join the BSc. This resulted in a relatively low dismissal rates.

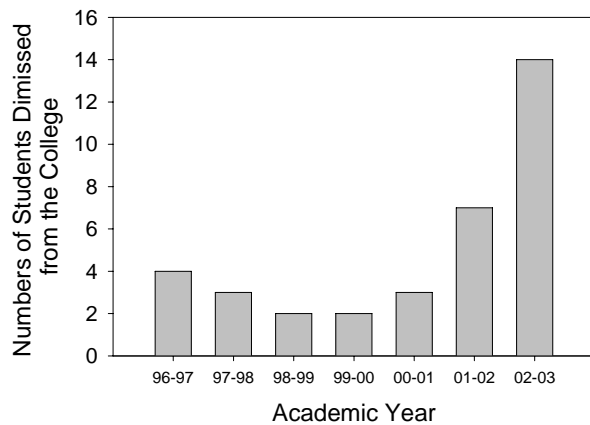


Figure 5. Numbers of students dismissed from the BSc program in the college of engineering

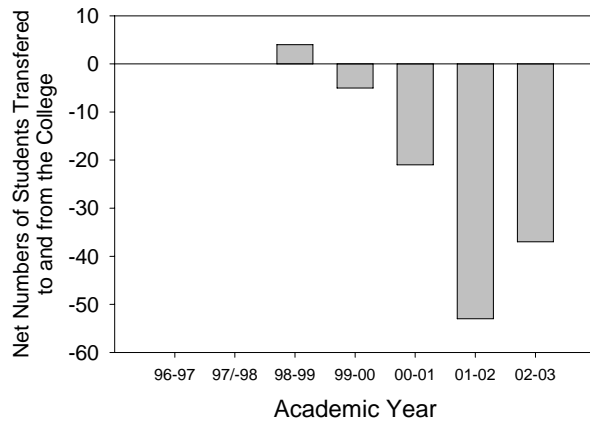


Figure 6. Net numbers of students transferred to/from the BSc program in the college of engineering to other colleges.

4. Conclusions

The provision of associate diploma in the college of engineering serves several purposes, particularly the supply of the job market with technicians and operators. Moreover, the availability of a non-degree program provides a substitute for students who are not able to cope with the requirements of a BSc program. The implementation of the single-track system, which continued for more than fifteen years, resulted in a coupling between the associate diploma and BSc programs. This situation resulted in several disadvantages, particularly, a longer period to complete the BSc program (typically 4 1/2 to 5 years) and diploma courses which are more theoretical to prepare students to join a BSc program. The two-track system adopted recently has decoupled the diploma and BSc programs. This has led to a shorter graduation period for the BSc (four years after the orientation) and resulted in a clearer

definition of the objectives and contents for the courses in each program.

References

1. Stephen E. Silliman, Comparison of education models for increasing student exposure to engineering in developing countries , ASEE Annual Conference Proceedings, 2003 ASEE Annual Conference and Exposition: Staying in Tune with Engineering Education, 2003, p 11793-11811
2. D.L. Babcock, B.E. Lloyd, Educating engineers to manage technology: an international comparison 1992 International Engineering Management Conference: Managing in a Global Environment, 1992, p 248-52
3. S.J. Culley, C.A. McMahon, ; D. Brisaud, ; S. Vajna, Engineering projects in design teaching: An international comparison, Proceedings of the ASME Design Engineering Technical Conference, v 3, Proc. of the ASME Des. Eng. Tech. Conf. and Comput. and Inf. in Eng. Conf. 2004: Vol. 3: 16th Int. Conf. on Des. Theory and Methodol.: 2nd Symp. on Int. Issues in Eng. Des.: Integr. of Materials Micro, 2004, p 589-594
4. Atherton, D. , Engineering education and future industrial needs, Measurement and Control, v 23, n 6, July-Aug. 1990, p 164-73, 77
5. Ingham, J.; Meza, R.M.P.; Price, G. A comparison of the learning style and creative talents of Mexican and American undergraduate engineering students, FIE '98. 28th Annual Frontiers in Education Conference. Moving from 'Teacher-Centered' to 'Learner-Centered' Education. Conference Proceedings (Cat. No.98CH36214), 1998, pt. 2, p 605-10 vol.2
6. De Haag, Maarten Uijt; Rompelman, Otto; De Haag, Jos Uy; Manhire, Brian Engineering education in the Netherlands, ASEE Annual Conference Proceedings, 2002 ASEE Annual Conference and Exposition: Vive L'ingenieur, 2002, p 8667-8676