

Quality Civil Engineering Education – The Second Link

Mohd. Zulkifli Mohd. Yunus and Fatimah Mohd. Noor

Faculty of Civil Engineering
Universiti Teknologi Malaysia
81310 UTM Skudai, Malaysia

Abstract - There is a growing recognition of this off-campus vis-à-vis part-time education as an effective means to provide mass and democratic education to all, the needy and the deprived. There is equally an increasing need to provide opportunity to these students to acquire knowledge and skills. In view of this, *SPACE* UTM has towed a line to lead smart collaborations with other institutions to harness technical and engineering personnel to meet the workforce demand of the nation. At present, *SPACE* has over 5400 students undergoing 23 part-time courses in engineering and technology. To ensure quality engineering education, all engineering programmes are monitored by the Engineering Accreditation Council of the Board of Engineers Malaysia (EAC). In addition, the Quality Assurance Standard outlined by the Ministry of Higher Learning Malaysia acts as a check. Measures to ensure quality must be considered early in the course design stage. This paper highlights the issues to be addressed by engineering education providers to safeguard the quality of their academic programmes. It relates to the experience undertaken by the Faculty of Civil Engineering (FKA) and emphasises on the importance of efficient management of students, and Faculty - *SPACE* coordination in assuring and maintaining quality engineering education.

Keywords: Quality Assurance, Part-time Education, Engineering Education, Continuing Education

1.0 INTRODUCTION

Today, there is a heavy rush for the enrolment in schools and colleges. To meet the demands of students for higher education, these students are attracted to other new modes of learning. There is increasing recognition of this distance or off-campus or part-time education as an effective means to provide mass and democratic education to all the needy and deprived sections of the society. Hence, there is equally an increasing need to provide opportunity to such students to acquire knowledge and skills. The knowledge thus imparted should not suffer, in quality.

In Malaysia, tertiary education is becoming like a commodity, but is much welcomed by the public. One sees all sorts of academic programs for off-campus students being offered through various advertising media. Distance education through various *modes operandi* such as part-time, franchise, joint

venture and co-operative basis is becoming more favourable and popular amongst the public.

2.0 THE EDUCATION CONTINUUM

There have been two contrasting forms of delivery in higher education, each with their own economics, champions and critics. On the one hand there is the 'traditional' or 'face-to-face' or 'contiguous' delivery involving course design, a high input of time-tabled lecturing, lecture rooms, seminars, assessment, administrative and academic supports, and so on. On the other hand there is the 'distance learning', be it fully off-campus, part-time, franchise etc., involving course design, a high input of materials development for self-instruction and tutoring, assessment, academic and administrative support, premises, strategic marketing and so on.

This is a challenge to the naive assumption one might make about the way learning takes place, and what are the value added by the lecture in traditional education. How much learning is taking place in the lecture halls, and how much 'at a distance' is a student from the lecturer, on a computer network, in the library or at home. Just how meaningful is it to use the term distance to distinguish one mode of education from another? Ironically in traditional higher education, the 'distance', in a significant educational sense, between lecturer and students might be far greater than that between lecturer and student on a 'distance' course. If one quality which students expect on higher education is that they should experience being part of the academic community, it is a mistake to imagine that this necessarily comes with full attendance on a campus.

3.0 THE SECOND LINK - *SPACE*

School of Professional and Continuing Education (*SPACE*) is the academic business arm of Universiti Teknologi Malaysia. It was established in 1993 with the aspiration to promote tertiary education for school-leavers. *SPACE* has a vision of becoming a centre of excellence in continuing education as it holds the philosophy that education is a lifelong process and borderless. Therefore, *SPACE* provides a platform for school leavers with relevant experience to enhance

their self-worth by offering quality tertiary education programmes, carried out on part-time mode.

To stay in line with the concept of liberal education, *SPACE* holds a mission to explore and expand the opportunities and training for continuing education through quality programmes by flexible means and with the use of optimum resources, via the following objectives;

1. to promote quality tertiary education
2. to expand and upgrade the quality of education and professionalism
3. to organise training programmes to fulfill the requirements of professional bodies
4. to promote smart partnerships
5. to promote and coordinate all external programmes conducted by UTM
6. to optimise the use of resources and physical facilities
7. to become a self-sustaining organisation

Currently, *SPACE* offers 23 part-time courses at 2 different levels, i.e. Diploma and Bachelor Degree. All faculties in the University are obliged to promote their programmes. These programmes are conducted at the centres of learning, usually premises of various institutions of higher learning in the country. *SPACE* now has 14 learning centres.

4.0 QUALITY AND QUALITY ASSURANCE GUIDELINES

Quality is a term commonly understood in the academic world as ‘standard’ and ‘excellence’ of the processes as well as the products. In turn, standard and excellence are judged in relation to the expectations both internal and external to the educational process which constantly has to respond to the changing socio-academic environment. According to UK’s Higher Education Quality Council Guidelines on quality assurance, “Quality assurance is the means through which an institution confirms that the conditions are in place for students to achieve standards set by the institutions”. In higher education in general, and in distance or open learning in particular, quality issues are becoming more prominent than before because of growing concern for accountability of educational institutions. Another reason for taking quality issues seriously is the state’s insistence on showing results by educational institutions for the fund they receive from the former.

Quality is vital to the survival of distance education programmes and will probably be the biggest issue facing higher education in years to come as institutions are now competing globally. There are probably three kinds of quality criteria that must be addressed in this mode of education, namely, quality assurance through peer review, contracted quality

based on service guarantees made to customers/students, and market-driven quality measured by customer satisfaction.

In Malaysia, to ensure quality education, all engineering programmes have to attain the minimum standard set by the Engineering Accreditation Council of the Board of Engineers Malaysia (EAC). In addition, the Quality Assurance Standard outlined by the Ministry of Higher Learning Malaysia acts as a check. Elements emphasised in the Quality Assurance documents include the following;

1. The role and governance of the institution
2. The education programme and its evaluation
3. The students and student assessment
4. The staff
5. The facilities and resources
6. The enhancement measures

It is therefore essential for academic programmes to be monitored qualitatively and quantitatively. Measures to ensure quality must be considered early in the course design stage. That includes taking into account factors such as knowing the students, student qualifications and enrolment, the degree of freedom in pace and content, and the potential marketability rate of graduates, designing for active and effective learning, maintaining the technical infrastructure and student support, confident and committed lecturers, sustaining administrative commitment, evaluation for continuous improvement. Some of these elements are discussed in the preceding paragraphs, and more specific references are made to the management of part-time programmes at the Faculty of Civil Engineering (FKA).

4.1 The Management of Part-time Programme

SPACE is a school that managed by a dean, assisted by deputy deans, managers and support staff. The Faculty offers programme(s) and holds ownership, but *SPACE* is the runner. The Faculty is thus obliged to monitor proper execution of the programme and smooth coordination with *SPACE*.

A panel of coordinators is set up at the FKA level, chaired by the Head of Department of External Programmes. They are responsible for the students at their centres and function as Academic Advisors to liaise any academic or non-academic matters. This requires them to be alert and in constant contact with the students and make regular visits to the centres

4.1.1 The University Requirements

Students registered with *SPACE* are provided with the University handbooks that contain information regarding their part-time study, or also accessible through the University Website. Students also have the privileges to use all facilities provided by the

University, including the use of the University libraries, computer facilities and the engineering laboratories. In reciprocation, students are subject to the rules and regulations of the University, including the University and College University Act (1973). They are expected to maintain good order, secure discipline and upkeep the good name of the University

4.1.2 The Faculty Requirements

All ten faculties in UTM offer their own programme(s) and are therefore responsible for their smooth execution. Each Faculty also decides on any additional requirements and policies, in line with the academic regulations and philosophy of the University. As for students of FKA, they are expected to gain access to information, news and updates on the Faculty through the dedicated homepage for the part-time students, i.e., <http://www.fka.utm.my/space>. Other elements, such as, management of student records must be closely monitored to ensure efficiency and effectiveness of programme.

4.2. The education programme

Students are also expecting value for money and benefits for the time and financial investment they make in their education such as punctual lectures, recognised programme, good lecturers and timely graduation. To cater for these needs, and with quality in mind, the part-time programme offered is similar in curricula, syllabus contents, teaching teams and semester distributions to the full-time programme. However, some of the differences are on the entry procedures, mode of instruction, time-scheduling and management of students and staff as described in the successive paragraphs.

4.2.1 Curriculum and Syllabus

The programme adheres to a recognised degree curriculum and syllabi of 167 credits, and conforms to the requirement of the Board of Engineers Malaysia on curriculum content. Emphasis is placed on the components of the various disciplines of study, such as mathematics, science and engineering principles, skills and tools, design and projects, management and professional ethics, laboratory work, industrial training, business and social environment, and communication. But of course, since the programme is categorised as part-time, students are restricted to a maximum of 10 or 6 credits for the normal and short semester respectively.. This is taking into consideration the learning time and self-study time of an average student. Lectures are conducted at the learning centres, interactively on a 100% contact time following a fixed timetable. To ensure consistent and quality teaching, a particular subject is taught by the

same lecturer for both part-time and full-time programmes.

4.2.2 Assessments and Examinations

Assessment depends on the subject type. For the normal lecture-based subjects, assessment comprises of examination and coursework. Final examinations commence upon completion of lectures at a stipulated time. As mentioned in the UTM Academic Regulation Handbook, students are required to attend no less than 80% of lecture times in order to qualify to sit for the final examinations. As part of quality control, examination papers are set, assessed and approved by assessors in FKA. Furthermore, all examination questions are common for both programmes, and printouts are done under close supervision. Regulations pertaining to examination invigilation are strictly observed during the final examinations at the learning centres. Papers are graded and normalised by the lecturers concerned before endorsement by FKA Academic Committee and the University Senate.

4.2.3 Academic Affairs and Facilities

Most privileges and facilities enjoyed by full-time students are equally made available to part-time students. This include providing an Academic Advisor for every student, management of students' records at the faculty, giving access to common facilities at the faculty, such as, lecture rooms, seminar rooms, laboratories, computers, and resource centre, and the libraries (at the University and the mini libraries). The Faculty through its Academic Committee handles all cases pertaining to academic affairs of students. The Faculty also provides common coordinators for all its academic activities for all students, without discrimination.

4.3. The students and students' assessment

Part-time students are mostly individuals who have some interest in the subject, and part-time learning is very much about matured people actively devising and applying their own methods, and articulating things for themselves. In general, part-time students want learning that is flexible, relevant to their work situation, current, personalised, portable, focussed, timely, affordable and valued. They are always looking for mentors and coaches who can help them bring out their talents in the learning process. From observation, most of our part-time students are senior individuals employed by the public and private sectors. Some of them have been in the engineering field for as long as 20 years. *SPACE* gives them the opportunity to gain knowledge without having to forgo their working privileges. They join *SPACE* to further their education for the following reasons;

- a. To gain knowledge on current technology in the engineering field,
- b. To obtain a paper qualification to fulfill requirement for a promotion, and
- c. To upgrade their professional licenses and expand their businesses

For some students, attending lectures may suffice in learning, but in general being part of the academic community that involves personal articulation and exchange between peers and lecturers is essential. That means a provision of a forum, whether in real space of a residence or the virtual space of a computer network. However, the bottom line is that there must also be a secure, fair and accurate systems of assessment.

4.3.1 Enrolment and Selection

The normal average number of student enrolment for every semester is about 120, subject to approval by the Faculty. Students, with Diploma qualifications, are directly enrolled into the third year of a 5-year Civil Engineering programme. All applications are scrutinised by the Deputy and the coordinators. Currently FKA holds about 550 registered students at the various learning centres.

As stipulated in the UTM Academic Regulation Handbook, students must fulfill the basic academic requirements of the University. For part-time students, in addition, they have to possess a minimum requirement of one-year post-Diploma working experience. Also, any credits transfers shall be of no more than 50% of the total credits for the programme. Selection is done so stringently such that the number of intake is monitored.

4.3.2. Academic Qualifications

In addition to the general qualifications imposed by the University, the students are required by the Faculty to have a minimum of one-year post-Diploma experience in the Civil Engineering field at the time of application. Normally, this average third-year entry students will follow a fixed-menu time-table and shall be able to complete the programme in 10 semesters. This is after taking into consideration the transferable credits prior to commencement of the programme.

4.4 The Staff

Staff development and training develop professionalism which in turn assures quality. Without professionalism institutions would be wasting their resources; even the best talents would end up in frustration and stagnation. Good teaching is in which lecturers make the subject relevant to students' interest, goals and experience and motivate them,

guide students enabling them to develop own understanding, clarify difficult concepts, welcome ideas and articulation of students' understanding of the subject, and give feedback to students.

The academic staff involved in this part-time education consist of the academic staff of the Faculty. They are of high qualifications with sufficient experience in the teaching and professional practice. To place more emphasis on quality teaching and excellent service, the respective heads of departments monitor every staff involvement in the part-time education. The response from the academic and technical staff in the programme has been very encouraging.

4.5 The facilities and resources

One of the success factors of an academic program is and well-organised and well-equipped support systems for students. This means that the infrastructures and facilities provided by the institution must be sufficient, easily accessible, in good condition and well-maintained. Amongst the facilities provided are described in the preceding paragraphs.

4.5.1 Learning centres

Currently, the Civil Engineering programme has eight learning centres. The final decision as to open up or close down a learning centre is done by the Faculty based on rotation and the number of applicants for that particular centre. Each centre has adequate lecture rooms and teaching facilities for the students.

Students enrolled with the programme are required to attend lectures that are conducted at the registered learning centres, following their timetables prepared by the Faculty. All lecture-based subjects, including computer-aided classes, are conducted at the learning centres during weekends. Other subjects that require laboratory, computer, seminar or other special facilities are either carried out at the main campus or at other appropriate venues. Such subjects are usually conducted during the short semesters.

4.5.2 Libraries and Resource Centres

Libraries and resource centres are essential to facilitate teaching and learning. The University library is said to be the best technical library in Malaysia for its vast collection of technical materials, in the form of books, journals, manuals, some of which are electronically accessed, films, microfilms, and disks. It also provides audio-visual, multimedia, internet and on-line facilities for all students. For part-time students, the library entertains requests on on-line basis or through correspondence. To assist further, the University has collaborated and set-up mini libraries at 7 learning centres which are accessible by the students.

At the Faculty, a resource centre is available to provide audio-visual and teaching equipment for loans to staff and students. It also has a collection of theses, manuals, guidelines, standards and reports used as references for students of the Faculty.

4.5.3 Engineering Laboratories

Engineering laboratories form an essential part of a good engineering curriculum. Students are expected to execute laboratory work to appreciate the related theories and applications and to get the feel of the ‘on-the site’ job and profession. At FKA, six laboratories are provided, namely Structures and Materials, Hydraulics and Hydrology, Geotechnical and Transportation, Environmental Engineering, Information Technology and Computer, and Engineering Surveying are accessible by students. All the laboratories are fully manned by the technical staff of FKA. It has been made mandatory for all part-time students to perform their laboratory work in the Faculty.

4.6 Improvement or enhancement measures

Eventhough the programme has obtained full recognition, support and good market and audience, the Faculty and SPACE still strive for betterment. The improvement list is never exhaustible, amongst them are listed as follows;

- a. Students’ on-line record, including personal and financial records
- b. Students’ on-line registration, including the use of SMS
- c. Upgrading of physical facilities for teaching and learning at the Faculty and the learning centres
- d. Introduction of a new and better curriculum, which is in the process of accreditation
- e. Purchase of more books and reference materials for the libraries
- f. More stringent student entry requirement.
- g. SPACE-Faculty website is updated on daily basis
- h. Academic staff training in andregogy, to cater for matured students’ needs

5.0 RECOGNITION AS A MEANS OF QUALITY ASSURANCE

5.1 Accreditation

The main objective of accreditation is to ensure that the accredited engineering programme carried out by universities in Malaysia satisfy the minimum academic requirements for registration as a good engineer with

the Board of Engineers Malayis, in line with the Registration of Engineers Act 1967 (Revised 2002) Accreditation process for this academic programme started in 2001 and in 2003 it is granted recognition by the Board of Engineers, Malaysia.

5.2 Employability and promotions

In 2002, a task-force was formed at *SPACE* to study the employability rate of the part-time engineering graduates. The respondents comprised employers of graduates from four engineering faculties in the University who had graduated between 1998 – 2002. Out of 131 respondents, 54% were employers of the Civil Engineering graduates. The working experience of graduates had the following characteristics, i.e. 10.2% with less than 6 years, 37.1% with 6 – 10 years, and 52.6% with over 10 years.

The summary of the findings on graduate skills based on disciplines, is as given in Table 1. Statistical analysis was done by the SPSS software, by the t-Test method, with a maximum score of 5.00.

Table 1 t-Test Analysis on Skills of Graduates

Item	Skills	Score
1.	Communication	4.08
2.	Linguistic	4.05
3.	ICT	3.72
4.	Leadership	3.95
5.	Problem solving	4.06
6.	Numeracy	4.05
7.	Ethics, Profession and Discipline	4.30
8.	Emotional Intelligence	4.08
	Overall mean	4.06

Other findings that relate to gender, race, working experience and the graduating years are not included in this paper due to propriety. However, from observations, majority of graduates had been promoted in their career.

6.0 CONCLUSIONS

Quality assurance must be built in the course design rather than an add on. A student sees quality in the program through outcomes (what they get from enrolling in the course) and process (how they get it and what they have to do to get it). An efficient management of the part-time students requires collaborative effort between *SPACE* and the Faculty.

Since the introduction of the programmes in 1993, *SPACE* has produced approximately 4000 part-time graduates in the various fields of engineering and sciences. The prime success factors are the quality of programmes, the efficient management, the cooperation and support from the participating faculties, the student support, good facilities and communication.

Faculty of Civil Engineering started the part-time Bachelor in Civil Engineering programme in 1995 and has since graduated 786 students. A case study conducted on our graduates in 2002 indicated that the graduates had acquired quality education, thus enabling them to gain promotion in their respective careers.

There is a scepticism that too many people are getting degrees! Of course, there is a danger of failure in our management of change – that in opening up procedures and methods in education we will not cope with the rate of expansion and fail students and other stakeholders in their expectations of higher education. But if we do succeed, the synthesis will be a new learning environment, characterised by new teaching roles, increased use of communications technology, and more flexible modes of study. Such an environment demands a unified approach to quality assurance and the guidelines described here may provide the kind of framework within which it can be developed.

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