

Engineering Education – The Hidden Agenda

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Abstract - The demand for engineering education is growing rapidly especially in a developing country, such as ours. The engineering profession is still a respectable profession. The growth in engineering education covers both the physical count and the varieties of specialisations and fields of engineering. Taking advantage of this situation, institutions of higher learning are marketing engineering programmes to look as if they are highly sought-after commodities. In pursuing their ambitious strategies to promote programmes, these institutions have to adapt to the market needs and implement several changes and modifications, such as, on entry qualifications, academic systems and modes of instruction, just to mention a few.

Although providing new opportunities to the public, these modifications may affect, on the other hand, quality, effectiveness and integrity of the programme, thus the profession. Some of the education providers that offer engineering programmes are just giving degrees, but not education. On paper, depending on the type of institution, these programmes seem to meet the requirements of either EAC or LAN. However, under closer scrutiny, there are too many weaknesses and loopholes especially at the implementation stage.

This paper highlights the problems and possible consequences on the current practice of the institutions of higher learning in imparting their engineering programmes. It relates to personal experience and findings from accreditation process done for LAN and EAC on some engineering programmes of public and private institutions of higher learning. The issues mentioned here may provide a kind of framework within which it can be developed to control the quality of engineering education in Malaysia.

Keywords: Engineering Education, Effectiveness

1.0 INTRODUCTION

Nowadays, there is a heavy rush for enrolment in institutions of higher learning. This is to meet the thirst of the public for higher education and as a means to provide the nation with knowledgeable and qualified workforce that it requires for development.

Consequently, various engineering programmes are offered by public and private institutions of higher learning at various education levels. There are now over 500 schools that offer engineering diplomas and degrees. One of the most creative developments of these engineering programmes is on how they are conducted. There are the full-time, prime or in-campus programmes, or the distance programmes which cover various modes, such as, the part-time, the franchise, the joint-venture, the co-operative, the virtual, just to name a few.

Depending on the types of institutions of higher learning, be it public (IPTA) or private (IPTs), the Engineering Accreditation Council (EAC) of the Board of Engineers Malaysia, or *Lembaga Akreditasi Negara* (LAN) will be the respective regulatory bodies that monitor and accredit all engineering programmes. There is a minimum requirement to be met in the various aspects of quality, all stated down in the relevant documents by these bodies in due process of accreditation and subsequently recognition of the programmes.

2.0 COMMERCIALISATION OF EDUCATION

As our nation goes towards industrialisation, more engineering and technical-based personnels would be required. In Germany, the level is measured by the number of engineering or technical graduates per 10,000 citizen, as it would serve as a support towards industrialisation. So in this light, engineering and technical training has to take the front row, thus the simplest way is to offer it to the masses, of course, with flexibilities and bends in several places to tailor-suit these quests. These actions may downgrade the prestige of engineers. More so, of late engineering courses had to face with competition in getting good applicants, compared to medical courses. Applicants that are wealth-conscious would not opt for engineering, instead would choose Law, Accountancy, Business and the like.

For most IPTs the baseline in running any programmes is profit. This is to ensure sustainability of the programmes, and directly the survival of the IPTs themselves. The balance statement should be in black.

Facilities for quality teaching and learning including laboratories, student support systems, and libraries provided by some IPTS are of bare minimum. In most cases the computer or IT laboratories may be well-equipped, but the hard engineering workshops or laboratories are in a bad state, with non-functioning equipment.

Most IPTAs would not want to be left out in this business ventures. Many IPTAs are also offering non-prime or distance engineering programmes, alongside their prime. Names such as part-time, franchise, joint-venture, off-shore, distance learning, virtual and the like begin to sprout up. The institutions would reached out to the students. Again, financial gain is the baseline. In order to enrol sufficient number of students, entry qualifications are manipulated.

3.0 INNOVATIONS

3.1 Curriculum of Programme

A rough guideline on curriculum requirement is provided by EAC and LAN in their accreditation manuals. Basically, one of the most essential parameters in assessing any curriculum is the total credit hours of the programme. The number of credits is thus used as a measurement of curriculum content. Most engineering schools try to fit to this guidelines.

For some schools, the credit number has become a basis to market programmes, as the smaller it is, the more appealing it will be for the end-users. Sometimes, schools are more concerned with the numbers not contents. Therefore, contents are compressed and lack the depth and breadth of the subject matter. This is manifested especially in math-based subjects whereby teaching will be done by using 'short-cuts' in a form of plotted diagrams, charts, nomographs, softwares and catalogues, while skipping some of the basic essential fundamentals, and this happens with the abundance of these items in the market.

Credit transfer can be a very tedious and difficult matter. Very few IPTs actually sit down to assess and come out with credit transfer matrices for their various feeder or 'regular client' colleges. Sometimes credit transfers are done on case-by-case basis such that two candidates from the same programme of the same institution end up with different credit transferrable.

Curriculum is designed to cater for mass but actually adopted from some foreign institutions, on a pretext of benchmarking, or to attain some world standards. This is a short-sighted approach. Curriculum should be made more dynamic, infusing local values and needs, with global foresight. To make things worse, some subject syllabi are directly taken from favourite textbooks with certain adaptations.

3.2 Mode of Instruction

Mode of instruction covers aspects of language and methods of delivery. Most public institutions have Bahasa Malaysia as their medium, whereas the private institutions favour English to secure a wider market. Teaching in Bahasa will be more favourable to students as it is the language used during their primary and secondary education. However, this will be less trendy and unwelcome to the lecturers or expatriates, most of whom had graduated or are from overseas institutions. Bahasa is only favourable to lecturers who had graduated from local institutions. On the other hand, teaching in English can create difficulties as students are not trained to understand the language at lower education levels though this may change in future as schools are conducting mathematics and science-based subjects in English. As a compromise, to get the students to clearly understand subject matter, a Malay-English 'mixed' language or Manglish is used by both lecturers and students. From observations, this practice is very rampant in many institutions, especially the IPTAs.

With respect to the requirement of the National Education Policy (*Dasar Pendidikan Negara*), an institution may declare to the ministry that it is using Bahasa Malaysia as its instruction medium, but instead uses English, or vice-versa. This is done for several reasons, may be to expedite approval from the ministry to start the programmes, secondly due to shortage of locally-trained lecturers and reference materials, and thirdly in the interest of foreign expatriates in the institutions.

In non-prime programmes, the issue of effective teaching and learning process is very much questionable. The mode of some of these non-prime programmes that is of great concern is the gestation period or the students' learning time. No doubt, a particular subject is partly described by the indication of credits based on contact time or lecture hours. However, in fulfilment of this requirement, sometimes lecturing a subject can be stretched from morning to late afternoon, as this is the most cost-effective way. Lecturers are sometimes insensitive to the learning outcomes expected of the subject, their main concern being delivery has been made.

Lately, computer-based teaching (CBT) and computer-based learning (CBL) and e-learning seem to be favourable delivery or learning alternatives. This may be suitable for certain descriptive social-sciences subjects, but most engineering subjects still require the interactive face-to-face mode of instruction.

Some schools even claim to offer hands-on engineering skills. Actually practice-based subjects are more expensive and time-consuming, thus normally what students may end up with computer keyboard or word processing skills only.

3.3 Teaching staff

Performance of teaching staff are annually assessed. Included in the assessment are other activities such as, research, consultancy, publication, community service, etc. Assessment of staff from students can be deceiving as their measurement of how good a lecturer is depends on how comprehensive his/her notes are. Students need not expand their knowledge beyond the notes, or rather the syllabus coverage, what more reading journal papers as the notes are sufficient. This indirectly discourages students from doing their own self-search on the subject matter.

Young and newly-appointed staff may have the necessary academic qualifications but lack experience in their field of engineering, may set too academic a coursework. Examination considers how much the students are able to reproduce the lecturer's notes.

Students learn by induction, while lecturers teach by deduction. Nowadays, lecturers seem to be over-inducing students with their specialisation more than the basic knowledge required by the subject. This has become so overwhelming as the lecturer is actually grooming some students to be their future research assistants or officers (RA or RO). In project supervision, a different scenario prevails – very popular or lenient lecturers end up with too many students, while the unpopular ones hardly have any students. This also affects the actual load of academic staff.

3.4 Student-staff ratio

A school usually lists down the number of students and staff for each programme. This figure conforms to the requirement of the accreditation body. However, what is not revealed is that the same staff is also involved with teaching the subject at other branches of the institution and is being declared separately. So the declared student-staff ratio is inaccurate and very much underdeclared.

3.5 Student learning styles and attitudes

As an advantage, prime students are able to work in groups and welcome various learning techniques, such as Co-operative learning, Problem-based learning, Student-centred learning, etc. But distance students have very limited opportunities as they have only evenings or weekends to study. To minimise this problem, interactive video-conferencing should be introduced, but this will blow up the fees. Accessibility to lecturers for supervision and tutoring by prime students is higher compared to distance students may pose as a handicap. There is an obvious difficulty of conducting research projects for distance students, as they are far from lecturers and deprived of laboratory facilities. Except for a few, these students end up doing literature review or soft-skills type of projects.

A problem existing amongst some prime students is their lack of motivation and low self-esteem. They fail to plan for their study and depend too much on the advice of Academic Advisors. They need to be told what to do and be spoonfed during lectures and laboratory works. Another malice which is rampant amongst students is plagiarism and downloading materials from internet. A piece of assignment is produced as a result of 'copy & paste' process, with references quoted as from some www. dot. Another adversity is the influence of mobile phone-mania whereby students use short abbreviated languages of the SMS (Short Message Systems) in their examination answer scripts.

However, irrespective of programme modes, students have no reservation in going around looking for hints on exam questions and pleads for marks and leniency after the examinations.

4.0 SOME PRECAUTIONS

4.1 Training the brain to drain

The curriculum should not be too high above the local market needs. This may force students to seek employment and migrate to developed nations. For example, one particular nation in South East Asia that does not recognise any of the Malaysian engineering degree but to our surprise, is taking in a certain group of our graduates for employment or research activities. In the end the Malaysian government, in particular the PTPTN, the main loan provider to students in institutions of higher learning, may not be able to recover the sum as the graduates are now working abroad.

4.2 The 'East Asia Syndrome'

Up till now, engineering curriculum is biased to the West but one should realise that the fast emerging manufacturing giant is China and other East Asian nations due to the abundant resources there. In future, if this trend continues, it will create employment opportunities for some groups of students proficient in certain language. Only graduates with values that conform with those nations' norms would serve or represent their interest in Malaysia. Therefore, institutions of higher learning must be sensitive to the needs of the principal manufacturers from those countries.

4.3 Twinning Programmes

There have been some private colleges or IPTS that are taking opportunities in offering various programmes, majority of which are at Diploma level. Some of these programmes are offered on twinning basis, or of some

sort of 'bridging' which actually form the first part of some foreign programmes awarded by a foreign institution. An IPTS would flash around a list of memoranda or agreements that has been signed with foreign institutions as a testimony of their quality engineering programmes. The irony is, some of these degrees are only valid in Malaysia, and worthless in the country of the foreign institution.

Adversely, as twinning programmes are supposed to be identical, some IPTSs are not able to provide fully-equipped engineering facilities as found in well established IPTAs. To make matters worse, sometimes the twin IPTA itself are not fully-equipped to run the programme either.

4.4 Entry Qualifications

As engineering is offered to a wider population, entry qualification will have to be less stringent so as to admit many more. The current practice is to enrol students from either STPM, Matriculation, Diploma or their equivalents. There is some difficulties in determining the equivalent status of some foreign diplomas especially if they are from countries with low transparency index. This affect the placement and number of credits transferable.

4.5 English Competency

English language competency is another classic case that can create ambiguity. Proficiency of local students are measured by their SPM English results and MUET (Malaysian Universities English Test). However, the function, role and requirement of MUET is still very unclear and thus insignificant in our education system. Is MUET, in any way equivalent to TOEFL or IELTS?

4.6 Requirements of SKT

Staff are very particular about their normal workloads from teaching and other activities. Since teaching can sometimes mean an added income to some, other activities such as community services or charity do not get their preference. As a result, it is difficult to get people to work for charitable organisations. Except for probably IEM, the number of engineering professionals who participate in NGOs and non-profitable organisations, such as NKF, MAPTB, PEMADAM and many others, is really disappointing. Nowadays staff request for official testimony on anything that require their services

4.7 Course\$, Seminar\$ and Conference\$

Nowadays, in a move by most IPTAs to be self-sustainable, they have to include in their business plans some income-generating activities, including the off-campus programmes as have been elaborately

mentioned, training workshops, professional courses, seminars, and conferences. Prior to the commencement of each of these activities, the organising committee will have to present to the Board as to the 'worthiness' of having it, in Ringgit and Sen term, to ensure some prescribed profit margin. Educational programmes and courses mentioned have therefore been deviated from its true spirit of knowledge dissemination and intellectualism. To ensure that these seminars or conferences bring in profit, donations or sponsors are sought. Then, staff have to turn themselves into academically qualified beggars.

4.8 Engineering Awards

Recently, we were taken aback by the number of Datukship awards to 'unqualified' persons. In this aspect, University should also take up measures to grant Honorary Degree only to well-deserved personalities who have excelled or contributed significantly to the engineering profession. Politics have to be kept aside

5.0 CONCLUSIONS

Engineering schools should avoid becoming 'degree mills' as mentioned by our previous Prime Minister Tun Dr Mahathir Mohamad. Perhaps advice from Professor Fred Baker Akema from Texas A&M 'Some American universities give degrees, some give education' should be heeded. Engineering accreditation bodies should monitor engineering education providers more stringently to ensure the quality of education and maintain engineering as a prestigious profession in Malaysia.

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