World Transactions on Engineering and Technology Education
Vol.2, No.2, 2003

Teaching and quality assurance of an offshore coursework Master of Engineering Management programme

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ABSTRACT: The internationalisation of education has resulted in universities offering and teaching their courses offshore in other countries. However, offshore course administration, the organisation of teaching and learning and quality assurance are major concerns to those universities. This article presents and discusses some successfully implemented procedures for the organisation of teaching and learning and quality assurance in offshore courses at Queensland University of Technology (QUT), Brisbane, Australia. These procedures have significantly improved the course quality and student satisfaction of the courses, and may be found useful by those offering and teaching courses offshore.

INTRODUCTION

In today's rapidly changing technological environment and the globalisation of economies, engineering industry and its associated commercial sectors have to accommodate and manage changes in all aspects of their operations and functions in order to remain globally competitive. This trend has, in turn, resulted in an increase in the scope of jobs in these organisations. Companies have combined engineering and management jobs so as to flatten the organisational structure [1]. As a result, engineers are often recruited into a position that requires the skills and knowledge outside the conventional, technical domain.

Undergraduate engineering courses traditionally provide students with the technical knowledge in the utilisation and improvement of natural resources for the well being of humankind. This knowledge combines scientific method (in terms of the whys and the wherefores) and the application of technology in the natural and constructed environments with little degree of uncertainties. However, undergraduate engineering courses cover an inadequate management component for engineers to cope with the increasing management roles in an enterprise. It has been claimed that these undergraduate courses do not normally provide graduates the skills and knowledge in integrating and managing all the engineering functions of a firm [2].

It has been recognised that Australian engineers lack skills relating to organisation, leadership and strategic management [2][3]. The ability to manage technological changes and innovations was also identified as deficient. In today's increasingly globalised and competitive economy, it is even more important for small- to medium-sized engineering firms to update their management practice. Therefore, the need is evident to educate engineers in the management of engineering activities so that engineering systems and processes can function effectively and efficiently. This practice is largely placed on the continuing education of engineers in the area of management and management technologies.

A handful of universities around the globe already share this vision and offer programmes in engineering management at the postgraduate coursework level. The School of Mechanical, Manufacturing and Medical Engineering at Queensland University of Technology (QUT), Brisbane, Australia, has developed an appropriate and cost effective engineering management programme, the Master of Engineering Management (MEM) course. This course provides engineers with the advanced skills and knowledge to manage engineering activities and engineering organisations, and enables them to fast track their career in today's competitive, global market. Since its introduction in 1993, the MEM course has been very successful and its graduates are in high demand. It has attracted many international students, particularly from countries in Northern Europe, Asia and South America. The Institution of Engineers, Australia recently endorsed this course and its individual course units as a formal training programme for engineering professionals.

In order to meet the international demand in the era of internationalisation of education, the MEM course has been offered offshore in Singapore since 1994 in conjunction with Crossfields Asia Pacific P/L, and in China since 2000 in collaboration with Shanghai Jiao Tong University. A new collaborative programme will start from September 2003 through the Open University of Malaysia.

Offering a course offshore involves a number of challenges in course administration, teaching and learning, and, more importantly, quality assurance. This article presents some successful approaches implemented and experience obtained

over the years in the offshore teaching of the MEM course, particularly in the organisation of teaching and learning, as well as quality assurance. As the offshore programme in Singapore has the longest history and represents a more difficult and complicated case, the article will focus on this programme. As such, a brief overview of the MEM course is given first.

THE MEM COURSE AT QUT

The MEM course at QUT was introduced in 1993 and entitled Master of Engineering Science (Engineering Management). It was offered to graduates of all engineering disciplines, but was renamed in 2000 to the current title to reflect more explicitly its content. Over the last 11 years, through industry survey and benchmarking with other similar courses in the world, improvements have been continually made to the course and course units in order to bring in state of the art technologies and cater for industry demand and job market. The following discussion is based on the current course structure.

Course Structure

The course contains three core units that provide students with more generic knowledge and skills in engineering management, while specialisations are reflected through the elective units in manufacturing, maintenance, energy and environmental management. Table 1 lists the course units offered in this programme. In order to cater for students from different engineering disciplines, students with an area of particular interest can take up to two electives from other schools/ faculties, such as electrical engineering, civil engineering, information technology, business and construction management. Students also have the option to take some units from other institutions and get academic credits towards the MEM course, subject to the course policy and the approval of the Course Coordinator.

Table 1: The MEM course structure.

Core Units
Cost Analysis and Asset Management
Total Quality Management
Engineering Project Management
Elective Units
Systems Modelling and Simulation
Advanced Manufacturing Technology*
Energy and Environmental Management
Reliability and Maintenance Management
Enterprise Resource Planning
Engineering Knowledge Management
Project (minor thesis)

* Offered in the onshore programme only.

Due consideration has been given to offering course units in the offshore programmes with respect to the offshore resources, such as laboratories and computing facilities for class use. This issue appears to be a concern in the programme in Singapore where the partner is a private company. Fortunately, arrangements have been made to gain access to computer laboratories, as well as get help from other sources, so as to provide support like the use of SAP software for teaching in the Enterprise Resource Planning unit. However, the Advanced Manufacturing Technology unit has not been offered in the MEM course in Singapore due to a lack of laboratory resources.

Normally, a student needs to successfully complete six units and the Project for the Masters degree. Under special circumstances, a student may be allowed to take 100% coursework, ie eight units, if approved by the Course Coordinator.

An effort has been made in the design of the course and course units to give this course a distinct feature; each unit is self-contained and does not reply on other units in the course, ie there is no prerequisite associated with any course unit, except for the course entry requirements. This feature provides the flexibility for students to take any unit at any possible time, and to complete the course at their own pace within the maximum course duration allowed, ie four years, hence facilitating flexible learning practice. Students who have work commitment particularly enjoy this feature; such students constitute a large proportion of the onshore class, and about 100% in the offshore courses.

Entry Requirements

The entry requirement for the MEM course is a bachelor degree in engineering or its equivalent. Applicants will be assessed individually, based on their academic records in the undergraduate course. Applicants who do not have a Bachelor of Engineering (BE), but have relevant training (eg an engineering diploma) and at least three years of relevant work experience, can undertake a qualifying programme, Graduate Certificate in Engineering Management. This qualifying Graduate Certificate programme contains any four units from the MEM course. Upon successful completion of the Graduate Certificate programme, students who obtain a GPA≥5 on a seven-point scale are eligible to articulate with credit into the Masters course.

Subject to approval, students achieving a GPA≥5 at the end of the third year of their BE course can take up to two units from the MEM course and get credits for their BE course. After successful completion of the BE course, those students eligible to enrol in the MEM course may count the two MEM units towards the Masters degree. This articulation pathway essentially allows good BE students to take two degrees (BE and MEM) from the fourth year of their BE course.

Course Duration

The MEM course may be completed in 12 months by full-time students, or 24 months by part-time students. However, students can choose to complete the course in four years. The Graduate Certificate in Engineering Management programme may be completed in six months by full-time students, or 12 months by part-time students, while the maximum duration for the qualifying programme is 24 months.

ORGANISATION OF TEACHING AND LEARNING

The administration of offshore courses is often complex and problematic. This primarily stems from students' unawareness of university and course policies and procedures and the difficulties in communications. In his first year as the Course Coordinator and the Director of the offshore teaching programmes, the author experienced numerous problems in this regard, which undoubtedly affected the course satisfaction of students and graduate quality. In order to improve the quality of course administration, a detailed course administration

procedure from initial student enquiries and applications through to graduation has been developed and illustrated in flow charts. Both the University (or School) and offshore partners must comply with this procedure in dealing with offshore course related issues. All offshore communications are addressed to the School through the Course Coordinator (for academic related matters) and the School Administration Officer (for more administration issues). Where necessary, these two contact persons have discussions, including consulting with the other parts of the University, and reply to the offshore collaborating partners or students promptly.

In addition, an offshore student handbook has been developed and is available for each student in the offshore courses. This handbook details all the relevant course policies and procedures, contact points and the relevant University Web pages to find more information and various forms.

The organisation of the teaching in the offshore courses involves conventional classroom teaching that is assisted by the various flexible delivery approaches, including allowing students to use their own pace to complete the course in a four-year timeframe so as to suit their family and work commitments, block mode course delivery to accommodate these commitments of students and teaching staff, flexible assessments and consultations, as well as online delivery, including CD-ROMs of course materials. Some of these issues are briefly presented below.

Delivery of Teaching Materials

For the various reasons stated above, the delivery of any MEM course unit is undertaken within two weeks of intensive block-mode teaching. All classes are run in evenings and weekends in a four-hour slot over a period of 10 days to two weeks. The block teaching mode provides a flexible course entry to students and there are up to six intakes per year. To facilitate this teaching mode, the lecture materials are made available to students at least four weeks prior to the commencement of the teaching to allow students to read ahead. A mini-quiz may be conducted in the first lecture to assess students' basic understanding of the course contents and motivate this pre-class reading process. In fact, this approach educates the generic self-learning abilities of students and promotes life-long learning. In addition, all classes are a combination of different learning activities, such as lecture, tutorial, problem-based project work and computer laboratory, in order to facilitate the learning practice in the intensive teaching mode.

It has been found from previous experience that before the class teaching sessions, few students read the thick textbooks or references, only the lecture slides. As such, all of the lecture slides for the MEM course are prepared to provide sufficient details of the lecture contents, which are not excessive and take into account the cultural and language issues and learning habits of students in the country as suggested in ref. [4].

In addition, most teaching and assessment materials for the MEM course are available online. For offshore students who may experience difficulties in accessing the online materials, CD-ROMs are available for them to copy free of charge.

It is noteworthy that almost all of the QUT lecturers involved in offshore teaching have had a number of years of experience in offshore block-mode teaching. Some of them also have an extensive cultural background of the offshore countries, which has been a great asset to the course and has enhanced the quality of the course and teaching. Only experienced teaching staff are allowed to teach offshore and, where necessary, an induction may be undertaken on the various issues involved in offshore teaching.

Consultations

Because of the very nature of offshore teaching, student consultations are a concern unless a local lecturer is used. Remote, electronic means is the primary method of communications between lecturers and students. QUT's experience indicates that e-mails and telephone calls are the most common and effective ways of student consultations. With the increasing use of IC phone, the use of telephone consultations is increasing. In addition, some students used facsimiles to list a number of queries and to get a reply from the lecturer in an appropriate way.

It has been found that a prompt reply from a lecturer is critically important in order to accommodate the learning process of students. For this purpose, all lecturers involved in teaching the offshore courses not only have Internet access in their office, but are also provided with cable or ADSL Internet access at home so that lecturers can answer students' queries in the evenings or weekends if they wish. Responses from students show that this consultation process is adequate, although it is more time-consuming than that for the onshore course.

The supervision of the Project (minor thesis) is conducted through face-to-face consultations, as well as remote communications. Depending on the number of project students, one or two academic staff travel to an offshore programme site twice a year specifically for project supervisions. This supervision process is supplemented by other staff who teach the course units throughout the year. A local supervisor is also appointed by the offshore partner in order to assist project students in their daily queries. Marking of the minor theses is the responsibility of QUT academic staff.

Assessments

A course unit may include up to 50% continuous assessments and a final examination. Continuous assessments, such as assignments and project work, may be provided to students throughout the entire learning process of the unit, although it is common for a lecturer to release the assessment work during the period of intensive block-mode teaching. These assessments normally have some options or topics for students to choose according to their interest, work environment and other concerns. While a deadline for submission is normally specified, alternative arrangements are always possible under individual, special circumstances.

Students may also give a presentation on their preliminary project work at the end of the intensive teaching period. Final examination is normally conducted about one month after the intensive teaching period.

QUALITY ASSURANCE

Quality assurance for the offshore courses is carried out according to a comprehensive quality system that includes the administration procedure and flowcharts and an offshore

student handbook, as mentioned already. The School of Mechanical, Manufacturing and Medical Engineering at QUT also has a NATA ISO9001 accredited quality system in use from 1996. This article discusses only those approaches and procedures related to the teaching and assessment.

The Singapore Programme

Among the offshore courses, the one in Singapore is in its tenth year of operation. It is also the most complex and representative one. As such, this programme is used to discuss the procedures and measures of quality assurance.

The programme in Singapore is offered in conjunction with Crossfields Asia Pacific P/L. The company employs two part-time administration staff working on this programme, while its Managing Director, as the local Course Administrator, handles all major issues, including advertising and course promotion. Eight course units are offered in this programme over a period of 18 to 24 months, in addition to the Project that a student may start in March or July of each year. Of the eight units, five are taught by QUT lecturers and three by local lecturers employed by the offshore partner.

The local lecturers are either current or retired teaching staff from the two universities in Singapore, or industrial practitioners with suitable qualifications and experience. The latter has been found to be invaluable in bringing hands-on experience and real-life practice to the course. Prior to an appointment, a CV of the local lecturer is forwarded to the Course Coordinator, who assesses his/her suitability to teach a particular unit. The local partner then makes an appointment of the lecturer upon approval of the Course Coordinator. The QUT lecturers are the same as those teaching in the onshore course.

All local lecturers are provided with a copy of the unit outlines that the lecturer is to teach. The local lecturer is required to provide a copy of the lecture notes and lecture slides prior to the commencement of the teaching. These lecture materials are then assessed by the relevant Unit Coordinator in QUT with regard to the quality and content. Where necessary, the local lecturer may be required to revise the lecture materials before lectures commence.

In order to respect local issues and concerns, some flexibility is given to the local lecturer in terms of the content to be covered in a unit, at the discretion of the Course Coordinator. For instance, the Energy and Environmental Management unit has to consider local issues, as well as government regulations and standards. Similarly, all assessment materials, including examination papers, must be assessed by the relevant QUT Unit Coordinator and approved by the Course Coordinator under the recommendation of the Unit Coordinator prior to releasing to the students (or the date of examination). It is not unusual for an examination paper to be revised more than once so as to ensure that it is comparable to that used for onshore students. In this regard, the benchmarking of quality is made with the same course offered onshore.

All offshore examinations are conducted using the same procedure and standard as for onshore courses, including deferred and supplementary examinations. Student work is kept for at least six months for possible quality auditing. When the local partner forwards the results of a unit taught by a local lecturer, three sample sets of student assignments and examination scripts are also supplied. These three sets of student work are re-marked by a QUT lecturer using the same marking scheme as for the onshore course to assess its comparability to the onshore student work and grade. If a considerable discrepancy is found, the Course Coordinator will moderate the grades by lifting or lowering the pass parameters for grades.

The QUT lecturers conduct Student Evaluation of Teaching (SET) and Student Evaluation of Unit (SEU) in the same way as for onshore teaching. It is a requirement and condition at the time of appointment that the local lecturers conduct an SET at the end of each unit teaching. There is a similar requirement to conduct SEU. The SET and SEU questionnaires are specially designed for offshore courses and the evaluation results are made available to the Course Coordinator and the Head of School for possible recommendations on improving the teaching and the unit. In addition, a Course Experience Questionnaire is also sent to recent graduates following their completion of the course.

CONCLUDING REMARKS

It is apparent that the training of management skills and knowledge to engineers is becoming increasingly important and such training is largely placed on postgraduate studies. QUT's MEM course has been offered since 1993 and has proven to be very cost effective and successful. As a result, it is being offered offshore in several countries since 1994. The various successfully implemented approaches and experience obtained in the organisation of teaching and learning of the offshore MEM courses, together with the procedures for quality assurance, have been presented here.

Graduate responses to the Course Experience Questionnaire since the introduction of these course administration procedures have been very positive, with the overall course satisfaction increasing from 19.4 in 1999, to 27.2 in 2000, and 83.3 in 2001. This has been confirmed by a recent audit of offshore courses conducted by QUT. The course is in high demand and the number of enrolments in Singapore alone has been maintained at 100 to 120 since 2001 in this very competitive market with numerous courses from universities in Australia, the UK and other countries. It is believed that these course administration methodologies and experience are invaluable to those who are offering or will offer their course offshore.

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