

UTM - International Networking in Open Learning Unit Development

Normah Mohd. Ghazali*, Sanjayan Velautham, Azhar Aziz, Mohsin Sies

Department of Thermofluids
Faculty of Mechanical Engineering, UTM Skudai

*normah@fkm.utm.my

Abstract

In view of the identifiable need to provide focused support for education and training in sustainable development, Universiti Teknologi Malaysia (UTM) is collaborating with four other international institutions of higher learning on a project entitled Open Learning Provision for Postgraduate and Industrial training in Sustainable Technology. In Malaysia published policies for education and training on sustainability are still weak with most attention given to school curricula. The Dow Jones Sustainability Group index in 2004 gave a value of 5 for Malaysia as compared to 68 for the UK and 57 for Sweden. UTM is collaborating with institutions from the UK, Sweden, and the North and South of Philippines to address the lack of engineering curriculum development in sustainable technology. Funded by the European Commission under the Asia-Link Program, three open learning units are being developed which can support post-graduate courses in the engineering discipline as well as industrial training. This paper reports the planning and implementation involved, strengths and weaknesses, needs and constraints within the UTM systems.

Keywords: engineering curriculum development; distance learning; sustainable technology

1. Introduction

Global environmental awareness in the last century has brought about two broad waves of institutionalization of environmental policies which Jänicke et al. [1] identified as occurring for the period of 1960s to 1970s, and then in 1987 after the Brundtland Report [2]. The first was led by the developed countries and driven by domestic policies of the countries, was more concerned with “bulk” water and air quality pollutants. The second wave came as a direct response to the global ecological threat associated with the hazardous and toxic emissions from the industries [3].

Following the first wave of ecological awareness, Malaysia has initiated the set-up of the national environmental agency and ministry for the environment. The comprehensive policies support sustainable development, addressing areas of renewable energy, forestry management, clean technology and environmental assessment [4]. The creation of more environmental agencies and the inclusion of environmental considerations in the Malaysia Plans (starting from the third) to address related issues on the environment has shown to the world the commitments of Malaysia to embrace sustainable development. The Dow Jones Sustainability Group index which provides a measure of the economic, environmental and social factors applied to the world’s top companies in seeking progress towards sustainable development objectives in 2004 gave the value of 5 for Malaysia as compared to 68 for the UK and 57 for Sweden [5]. Hezri et al. may have the answer to this performance in his review paper of the evolution of the piecemeal environmental policy in Malaysia. He had concluded that Malaysia’s efforts towards sustainable development so far are insignificant [6] with the absence of an integrated policy to address separate environmental issues and sustainability. And since the United Nations declaration of The Decade of Education for Sustainable

Development (DESD: 2005 - 2014) at the World Summit for Sustainable Development (WSSD) in 2002, Malaysia have yet to have an explicit sustainability education program at the secondary and tertiary level.

This paper discussed the joint development of open learning units (OLU) on sustainable technology to support the current postgraduate courses and industrial training in partner countries. The collaborative effort involves five universities from four countries and is funded by the European Commission Grant under the Asia-Link project.

2. Project objectives

Maintaining sustainable environment development is stated as one of the aims of the Education Development Plan for Malaysia (2001- 2010). However, published policies for education and training in sustainable development by the government are still weak. Environmental education as it is called, is actively promoted as an outdoor learning with curriculum mainly concentrated on the preservation of the natural environment i.e. flora and fauna [7]. There is a distinctive lack in curriculum development and delivery of sustainable technology education that takes into consideration the differences in technology and management. In view of this deficiency, Universiti Teknologi Malaysia (UTM) is collaborating with University of Portsmouth, UK (UOP), Royal Institute of Technology, Sweden (KTH), De La Salle University (DLSU) and Xavier University (XU), Philippines for the period of three years to develop OLU in sustainable technology for postgraduate and industrial training purposes.

The broad objectives of this collaboration are to:

- Develop and test three open learning units in areas of Energy Engineering, Life Cycle Analysis and Environmental Management Systems.
- Embed units in partner postgraduate programmes
- Develop units as stand alone short courses for industry in partner countries

However, UTM's involvement was initiated by these specific objectives:

- to strengthen understanding of sustainable development problems
- to enhance the skills of UTM academic staffs involved in curriculum development and delivery of sustainable technology education
- to generate new areas of pedagogic and business activities in sustainable development in UTM through distance /elearning
- to apply distance learning with the help from experts (> 15 years) from KTH to encourage participation from industries and government agencies.

The indirect benefits of this collaborative project will help to;

- promote knowledge among postgraduates on sustainable technology
- deliver information to government officials and industries on sustainable development
- interact and cooperate with participating institutions and industries in capacity building with respect to sustainable business awareness and educational opportunities

The countries like UK and Sweden have made huge progress in sustainable technologies curricula at the tertiary level addressing renewable energy, forestry management, clean technology, and environmental assessment. Thus Energy Engineering, Clean Technology

and Life Cycle Analysis, and Environmental Management Systems have been identified as 3 key areas of a sustainable curriculum. Each of these units will comprise three learning strands; firstly the core material, secondly, problem solving and thirdly, comparative studies. Each unit will be led by a centre of expertise in a partner university but contributions will be made by other partners in the areas of problem solving and comparative studies. The latter will require students to investigate the application of sustainable technologies to a particular problem in Europe and Asia. UTM is responsible in preparing Unit 1 and the case study for Unit 2.

3. Implementation process

The official contract for collaboration was supposed to start on the first January of 2006. Funding, however, came about 3 months later and at 80% of the year's budget. Similar funding mode applies for the duration of the project. Initially, the Research Management Center (RMC) of UTM has allocated money for the Kick-Off Meeting in Manila to discuss content, formulation mode and schedule of deliverables. The functions and implementation of each participating institution is shown in Fig. 1.

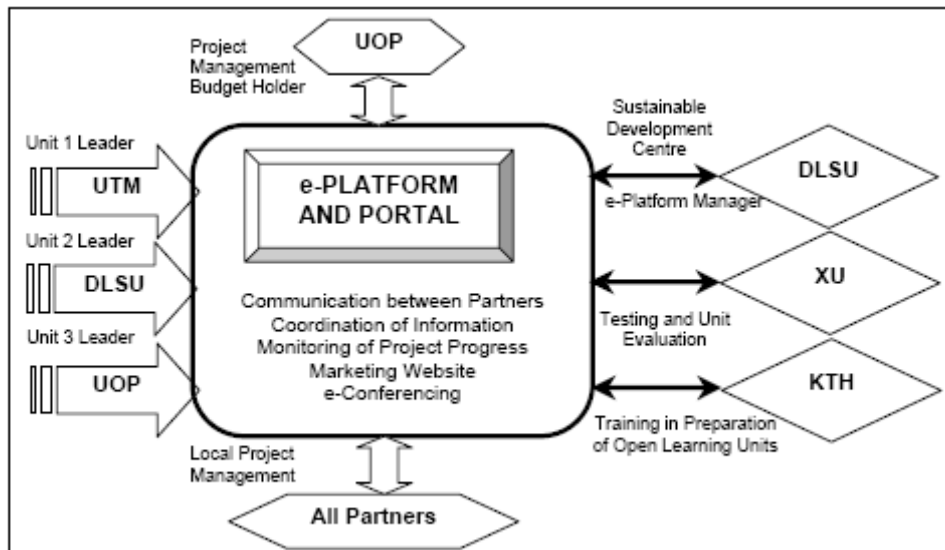


Fig. 1. Schedule of activities

The UTM team which comprised of six members and a research assistant began unit 1 preparation in March of 2006 after the kick-off meeting between all partners at DLSU. It had been agreed that unit 1 entitled Energy Engineering would consist of the following 6 topics:

- Introduction
 - o World Energy
 - o Sustainable Energy
 - o Environment & Economics

- Characteristic of Energy Sources
 - o Non-Renewable
 - o Renewable
 - o Fuel Substitution

Assessment of Energy Use

- o Data and Indicator
- o Benchmarking and Best Practice

Energy System Design and Analysis

- o Energy Management
- o Legislation Concerning Rational Energy Use
- o Energy System and Analysis

Way Forward

- o Opportunities & Big picture

Case Studies

- o Combustion and Biomass
- o Microhydro

Each member on the team was assigned a particular section to come up with the relevant materials. A two-week training at KTH had demonstrated 'state-of-the-art' CompEdu e-library platform with OLU capability that has been developed and practiced in the KTH education system. KTH has had large corporations involved in their virtual resource centre as well as students from all corners of the world for the last two decades. The case study preparation followed in August and in November of 2006 with a slight delay in the action plan because of various commitments of members and the differences in the partner university academic calendars. During the discussions activities, some departure from the structure of the units had been agreed upon. The new features were admirable but without the presence of the much experienced KTH representatives, agreements were reached without considering the consequences on the added responsibilities. This issue will be further discussed in the next section.

A nine-day annual internal evaluation, budget monitoring and thematic workshop scheduled for February of 2007 in Xavier had to be shortened and forwarded to DLSU due to the lack of security clearance for the UOP and KTH participants. Fortunately, a request for an additional workshop to discuss quality assurance and industrial liaison using the under spent amount from year 1 of the project was approved by the EC. This event was scheduled at the University of San Carlos in Cebu City with the presence of representatives from all partners. The University of San Carlos is not directly involved in the project but has been interested in the activities since the beginning following its close relationship to XU. Agreement on the structure and format of all the OLU was finally achieved with the consensus from all partners to prepare units according to the present format used by CompEdu e-platform at KTH. The structure following that of the CompEdu at KTH provides flexibility to the OLU applications. Each prepared units subdivided into small comprehensive sub-topics may be used as a whole or portions of it can be selected for specific purposes. And together with the extensive e-library available in the CompEdu, the units may be applied in an academic syllabus or industrial short courses.

4. Discussions

As the project proceeds, shortcomings and inadequacies have surfaced which if not dealt with will hinder future, similar international collaborations. Two levels of difficulties have been identified;

- o At the administrative level and
- o The end-use level.

Issues pertinent to the success of the project and the driver for future collaborations very much depend upon the issues stated in each triangular block as shown here in Fig. 2.

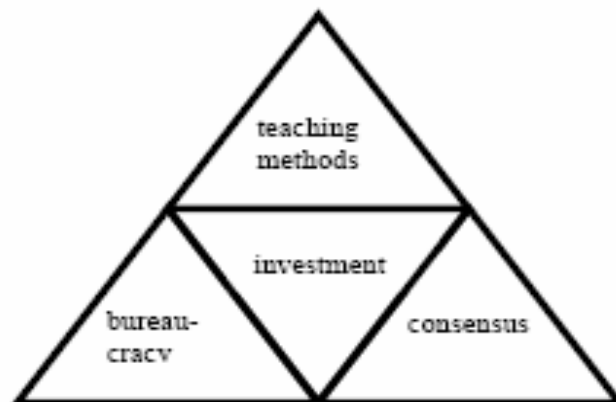


Fig. 2. Barriers to project success

A missing consensus among the partners on the configuration of the module prepared had very much contributed to delayed scheduled completion of the module. There have been differences in what had been resolved during meetings on the module structure and adaptation procedure in relations to the expectations of the e-platform coordinator. The different concepts of learning hours, teaching hours and credit points also contributed to the differences within the participating partners. However, it was agreed that the partner institutions would work towards the European Credit Transfer System (ECTS) for ascertaining the credit points for each unit.

Although the e-module structure had prompted innovations among some partners, away from the standard format that has been established by KTH for over fifteen years, the operations involved such tedious procedural steps that the reformation had to be shelved. Final agreement on the format and structure of the OLU was only finalized late into the second year of the project. Late comments on the structure and late updated subsequent corrected version – both internally and among partner universities – that came after consecutive discussions have been completed had also hampered the editing process of the module. The result is the delay of the final polished and platform ready module for the real market testing.

Although members participating in the project have had much experience with local projects under the University and the Malaysian Ministry of Higher Education (MOHE) funding, the international monitoring of the collaboration was still unknown territory. RMC is inclined to be as strict in its approval for activities whilst the other partners are alien to the

layers of screening policies and red tape involved. While the objective may be acceptable to all, the time involved to pass through each administrative screening is unpredictable, official approval takes between two weeks to two months prior to the commencement of the said activity. The former is achieved at the expense of time and energy in continuous pursuit of relevant officials. Furthermore, bearing the financial cost of international mobility may be affordable by the UTM staffs involved but the claims had taken as long as eight months to be honored. This problem is related to the reluctance of the management to invest due to past experience with failed projects, failures recorded only with locally-funded projects. The refusal is understandable but it may lead to hindrances in the university's vision towards a world class entity in the near future.

Another important type of investment crucial to the success of the project is the accessibility from UTM's portal to the KTH's own e-platform that will also host the three OLU. Access via a home network, however, has been successful and this issue if not addressed by the administrators may be the stumbling block that may make or break the use of the prepared OLU by the UTM academic community.

The University's contribution can be simply represented schematically in Fig. 3, as a cycle that will continue to revolve in pursuit of more international partnerships.

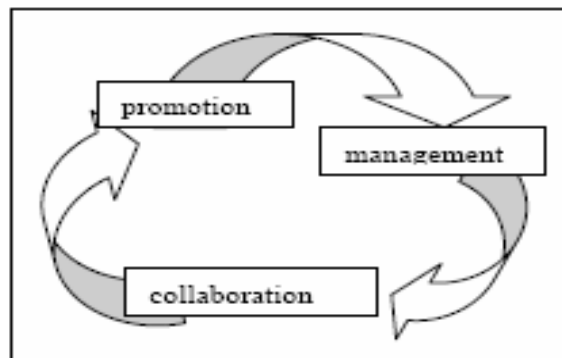


Fig. 3. International collaborations cycle

Although the University has always encouraged its academicians to procure grants other than those offered by MOHE and local organizations, promotions of the complex and systematic procedure of actually applying for these grants were not formally delivered. Academicians discovered about the EU grants either through their own networking, friends, or while surfing the net for other than MOHE grants. This in itself is not an attractive factor to most staffs. And as discussed in the preceding paragraphs, the university needs to effectively and efficiently help manage the procured projects before and during the project activities which include financial investment. The Asialink project for example, requires UTM to invest 20% for each year that the project runs. This is because the EU will only disburse the 20% after the full report on the completion of the project has been accepted. Currently, UTM project members have to carry this financial burden, some to the end when the full payment from EU is finally received. Clearly, a deficiency in any of the stages will weaken the link and may even terminate the flow which may make it more difficult to restart the cycle.

The last stumbling block to the implementation of project is the teaching approach that is brought about by the OLU. Whether it is Bloom's taxonomy or William Spady's outcome-based learning applied in education philosophies, a paradigm shift away from the conventional

teaching methods of face-to-face lectures is required from the staffs and the students. The European countries (over fifteen years for KTH) have much advanced in this respect, moving towards e-learning/distance learning/self-learning capable of reaching students from any parts of the world with access to internet connections. The flexibility of learning period is very much in demand for the working students and a catalyst for a continuing education culture. In today's generation of information and communication technology (ICT), elearning should no longer limited to on-line notes and lectures but should involve interactive quizzes, helpdesk, video clips, animations etc. Thus compared to the standard classroom lecture, e-learning differs only by the method of delivery. The objective, content, structure, and support material have to be similarly prepared.

The collaboration has indeed open up the perspective for e-learning but the UTM team has had no comprehensive experience in this affair. The center of teaching and learning (CTL) at UTM does conduct workshops on how to set-up and maintain eplatforms used by the university lecturers for their respective subjects regularly but the strain on the time and commitments required for the exercise is unacceptable to most academia. This is very much due to the fact that although very strong encouragements are given for it, the time and energy invested into the matter are not recognized as a work load. A semester's work load still accounts only the time spent in a classroom and that which is associated with the preparation of the lectures is not the same as that of preparing the e-learning materials. Note that e-learning materials as understood from the very experienced players like KTH involve thousands of short quizzes and open-ended activities that may be tried repeatedly by students up to a point that they have succeeded at least 95% of them before they can be considered for the next level/module.

The massive commitments and efforts, and the lack of consensus (discussed earlier) have further delayed a platform ready module for the unit assigned to UTM. Assignments of members to other posts have further aggravated the preparation process of the unit. Left with only 50% of the original members, the responsibilities have increased tremendously. Training of new members take time and constrained by time and other commitments, the enormous potential for expanding the structure to other subjects within the faculty could not be realized anytime soon.

Beside the obstacles discussed in the preceding paragraphs, the UTM team has managed to test the OLU developed as a subject offered in the MEng by Taught Course Program, both in the main and off campus programs. Unit 1 of the OLU which is called Energy Engineering was offered as MMJ 1453, Sustainable Energy Technology. This is a three-credit option subject. As a start, only six of the face-to-face lectures were removed and students were given access to the contents of the unit. Two quizzes and a test were given "on-line". Although the students registered for the subject have had no experience with a "remote" kind of self-learning results from a survey completed by the students on the unit have been encouraging. The flexible mode of learning experience may encourage more working students to commit to continuing education.

The use of the OLU may be further extended into short courses for the industries and modules towards an academic certificate or diploma. Fig. 4 describes the paths that can be followed to fully integrate the OLU in the university's programs.

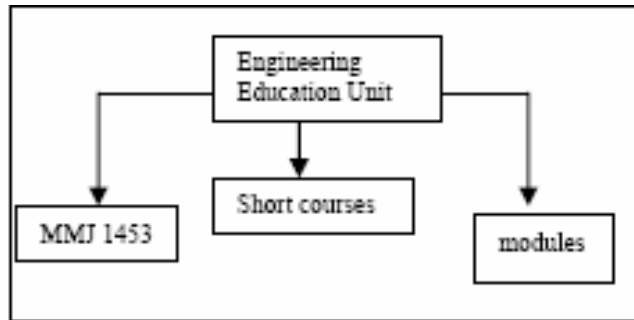


Fig. 4. Potential paths for unit application

The short courses will involve utilizing relevant portions of the unit and may even be combined with related parts available on the CompEdu. Team members who have contributed to the unit preparation will have access to the e-library at KTH and the resources and experience gained will help in the career development of the staffs involved. Similarly, short courses may be offered sequentially as modules with assessments to be later accumulated and accredited as part of an academic program deserving of a certificate or diploma. Beneficiaries of the unit will be those who take up the subjects, short courses or modules where they will have the resources that have been prepared by expertise in the field and used by multi-national corporations delivered to them. UTM has already the established School of Professional and Continuing Education (SPACE) to handle these possibilities. And whilst the project outcome is the setting up of an accredited international MSc in Sustainable Technology, the European partners are going on a similar path at the international level through their existing platforms. The unit from UTM will be made available to the international community.

Although the structure and applications have been clearly defined into the second year of the project, the mechanisms involved are not yet resolved. These issues need to be addressed before the project term is concluded in March of 2009.

5. Conclusion

The challenge of applying OLU in sustainable technology requires partnership among project partners, local administrators and academics. With the onset of rapid expansion in the usage of the internet these types of non-traditional and flexible learning programme may become the favoured method of study especially among the mature students. These distance learners often have to juggle their work and family commitments with their studies, and professional/continuing education is often the last thing desired on their agenda. The availability of learning materials prepared by expertise of the field in a flexible learning environment will be welcomed by students and professionals looking at an advancement of knowledge and career development. However, for the open learning modules to be effective, a proper system at the university level needs to be in place, especially the delivery and management system in terms of communication between the university and students. The other aspect is the proper separation of responsibilities between the administrative and the academia. Thus, potentials of the OLU can be realized, potentials that are realities for the developed countries for the past two decades.

Acknowledgements

The authors and UTM would like to thank the European Commission for the Asia-Link funding of the Open Learning Unit Development (ASIE/2005/109-629)

References

1. Jänicke, M., Weidner, H., 1997. Summary: Global Environmental Policy Learning. In: Jänicke, M., Weidner, H. (Eds), National Environmental Policies: A Comparative Study of Capacity Building. Springer, Berlin, 299-313.
2. Brundtland Report, UN General Assmebly document A/42/427 available at http://en.wikisource.org/wiki/Brundtland_Report.
3. Kraft, M.E., Vig, N.J., 1994. Environmental Policy from the 1970s to the 1990s: Continuity and Change. In: Vig, N.J., Kraft, M.E. (Eds.), Environmental Policy in the 1990s: Toward a New Agenda. CQ Press, Washington, D.C., 3-30.
4. Environmental Quality Act 1974, Act 127 at www.elaw.org/assets/pdf/MalaysiaEQA1974.pdf (12.27 pm 6thAug07)
5. <http://indexes.dowjones.com/djsg/index.htm>
6. Hezri, A.A., Nordin H.M., 2006. Towards Sustainable Development? The Evolution of Environmental Policy in Malaysia. In Journal Compilation @2006 United Nations, Blackwell Publishing Ltd.
7. Noor Azlin, Y., Chong, M.I., Azyyati, A.K., Roslina, M., and Azahari, M.Y., 2006. To Assess Needs, Benefits and Effectiveness of Environmental Education for Plant Conservation. In [www.info.frim.gov.my/cfdocs/infocenter/highlight/N ONIRPA_2006](http://www.info.frim.gov.my/cfdocs/infocenter/highlight/N_ONIRPA_2006) (3.46Aug07)