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Embracing "OBE" in Engineering Education

Accreditation Exercise: The Big Test

Implementation of OBE in Teaching and Learning

Peer Evaluation as Assessment Tool

Research Development and Innovation: CORE^3

Engineering Students Activities and Achievements

UNIVERSITI MALAYSIA SARAWAK

UNIMAS

COVER STORY

VICE CHANCELLOR'S MESSAGE

UNIMAS was formed to spearhead ideas and efforts and also to explore and expand knowledge to the fullest potential while at the same time develop skills and talents such as communication and entrepreneurship skills that will prepare students before they experience the real working world.

To accomplish that, the Faculty of Engineering has put the emphasis on the Outcome-Based Education (OBE) as a mean for the engineering students to excel in their study and later on in their career. In order to support this concept, UNIMAS offers state-of-the-art research and academic facilities for the benefit of both the academicians and the students.

The theme chosen for this issue of FENG Magazine that is "Embracing Outcome-Based Education (OBE) in Engineering Education" will help to introduce to the students and the public to the approach taken by the faculty to better improve its teaching and learning processes.

Lastly, I would like to congratulate the Faculty of Engineering on the publication of this latest issue of FENG Magazine, especially the editorial group for their effort. I hope that with this publication, the public will be better informed of the faculty and its strategy in producing quality graduates that would be able to proactively adapt to the fast changing environment.

Professor Dr. Khairuddin Bin Ab Hamid
Vice Chancellor
Universiti Malaysia Sarawak

السلام عليكمورحمةالله وبركاته

الحمدالله.....

I would like to congratulate the entire FENG Magazine Editorial Team members for successfully contributed to the publication of Vol. 2, Faculty of Engineering (FENG) magazine. The Faculty is also indebted to all the contributors of either papers, materials, information, etc. which has become part of the year FENG Magazine.

This is the second FENG Magazine published by the Faculty of Engineering. The theme of this year's magazine is about the adoption of Outcome-Based Education (OBE) in the teaching of students in the Faculty of Engineering. Almost all of the papers in this issue discuss about the experiences of our academic staff in embracing the OBE in engineering education. Hopefully, the experiences and suggestions published in this magazine will be invaluable for the successful implementation of OBE in the Faculty of Engineering in the future.

I sincerely hope that the materials presented in this issue of FENG Magazine will be useful to for our staff to improve the preparation of their teaching and learning activities. This particular issue will certainly be useful to our new academic staff in their effort to better understand the concept of OBE and can be used as a guideline for improving further the implementation of OBE in the Faculty of Engineering.

Professor Dr. Wan Hashim Wan Ibrahim
Dean
Faculty of Engineering

السلام عليكمورحمةالله وبركاته

الحمدالله.....

I am very delighted at the opportunity to write this editorial note for the second volume of FENG Magazine.

"Embracing Outcome-Based Education (OBE) in Engineering Education" was chosen as the theme for this issue to highlight the past and recent activities as well as achievements in the 2007/2008 session by the Faculty of Engineering (FENG), UNIMAS. It is important to note that many of the activities and articles highlighted in this issue are on the faculty's successes in OBE implementations that gave considerable focus on continuous quality improvements of the instructional delivery system among the faculty's lecturers.

Acceptable level of accomplishment in OBE implementation is vital to ensure unconditional accreditation for all three (3) engineering programmes involved; among these are Mechanical and Manufacturing, Civil as well as Electronic Engineering that shall take place somewhere in August this year. These activities and achievements are concisely discussed in the 'Reports' section.

Our readers will find many interesting teaching and learning (T&L) articles in the features column pertinent to OBE that aims to foster innovative and effective educational practices and technologies in engineering education. In addition, 'Research and Development' section reveals the successes of FENG faculty members in their research endeavours as well as tonnes of journal and proceedings publications published that significantly demonstrate the quality of research development and innovation activities in the Faculty of Engineering. This issue also includes the students' development and achievements reports by Students Association of Faculty of Engineering (SAFE). Significant achievements by faculty members in various competitions participated are available in the miscellaneous column.

On behalf of FENG Magazine Editorial Team, I would like to express our sincere gratitude to our magazine production teammates as well as the authors of articles in this issue and we look forward to your continuous collaboration with FENG Magazine. I strongly believe that this particular issue will stimulate further interest, and will become a useful source of information on new and noteworthy teaching and learning as well as research development activities.

With best regards
and Wassalam.

Mohamad
Raduan bin
Kabit
Chief Editor

FENG VISION & MISSION

In the process of producing quality graduates, the Faculty of Engineering has determined its mission and vision for guiding the Faculty in handling the strategic plans and in defining the Faculty's performance. These would serve to inspire the Faculty to be more productive by providing focus and common goals; as well as to assist them in making appropriate decision and to establish a framework for ethical behavior.

The mission statement defines the Faculty's business, its objectives and its approach to reach the objectives; while the vision statement describes the desired future position of the Faculty. These important statements are as follows:

VISION

TO BE EXCELLENT IN PROVIDING QUALITY ENGINEERING PROGRAMMES THROUGH DYNAMIC AND INNOVATIVE EDUCATION SYSTEM, SPECIALIZING IN ITS NICHE RESEARCH AREAS FOR THE BENEFITS OF THE NATION.

MISSION

TO PROVIDE INNOVATIVE AND SYSTEMATIC ENGINEERING EDUCATION TOWARDS PRODUCING ETHICAL ENGINEERS WITH GOOD TECHNICAL AND INTERPERSONAL SKILLS BY FACULTY MEMBERS RENOWNED IN THEIR RESPECTIVE NICHE AREAS, THUS, ADDRESSING THE INSPIRATIONS OF THE STAKEHOLDERS THROUGH EXCELLENT NETWORKING.

PROGRAMME EDUCATIONAL OBJECTIVES
&
PROGRAMME OUTCOMES

Introduction

Programme Educational Objectives (PEOs) are specific goals which are consistent with the mission and vision of the Institution of Higher Learning. These goals are responsive to the expressed interest of programme stakeholders where the expected achievements for graduates in their career and professional life, are described. The PEOs for each programme in the Faculty of Engineering were set by the departmental members in consultation with the Faculty, and in response to feedbacks from industry and alumni.

Programme Outcomes (POs) are statements that describe what the students are expected to know and are able to perform or attain upon their graduation. The statements include the skills, knowledge and behaviour that the students should acquire through their learning process, and throughout their campus life in general.

The followings are the PEOs and POs for all the programmes offered in the Faculty of Engineering according to the respective department:

Department of Civil Engineering:
Civil Engineering Programme

To be consistent with the Faculty's mission and vision, the Civil Engineering programme must prepare the students for professional practice as civil engineers and groom them to be future leaders for a global workplace through undergraduate cooperative education. These desired attributes are expressed in the PEOs of the department.

Consistent with the PEOs, the department has developed its POs. These POs were designed in such a way that students graduating with the bachelor degree in Civil Engineering are able to demonstrate 11 abilities.

Programme Educational Objectives (PEOs)

PEO1	Uphold the professionalism, ethics and responsibility of the Civil Engineering profession.
PEO2	Possess a general education and an understanding of the global demand of Civil Engineering markets and hence able to promote themselves in the international arena.
PEO3	Extend their knowledge by independent learning and continuing education and contribute to the advancement of the profession through involvement in research and development (R&D) activities.
PEO4	Promote multicultural harmony and unity amongst different races and cultures by involvement in the technical or non-technical societies.

Programme Outcomes (POs)

a.	Ability to acquire and apply knowledge of mathematics and sciences related to Civil Engineering fundamental.
b.	Acquire in-depth technical competence in Civil Engineering discipline.
c.	Ability to identify, formulate and solve Civil Engineering problems.
d.	Ability to utilize systems approach to design and evaluate operational performance.
e.	Understanding of the principles of sustainable development for Civil Engineering design.
f.	Understanding and committed to the professional and ethical responsibilities.
g.	Ability to communicate effectively with engineers and community at large.
h.	Ability to function effectively as a member or a team leader in a group.
i.	Understanding of social, cultural, global and environmental responsibilities of a professional engineer
j.	Recognizing the need to undertake life-long learning for individual capacity development.
k.	Ability to use the techniques, skills and modern engineering tools necessary for Civil Engineering practice.

Department of Electronics Engineering:
Electronics & Telecommunication Engineering Programme

The PEOs for both programmes under Department of Electronic Engineering have been set by the departmental members in consultation with the stakeholders from industry, students, parents, alumni and also through discussion with faculty members. The PEOs of the programmes are to educate undergraduate students to enable them to demonstrate the abilities listed in the PEOs. These objectives are linked to the POs of the programme.

Programme Educational Objectives (PEOs)

PEO1	Applying Electronics Engineering knowledge based on a solid foundation in Telecommunication Engineering areas for the needs of the stakeholders.
PEO2	Upholding the importance of professionalism and ethics Electronics Engineering profession to form a cultured and more developed society.
PEO3	Possessing communication and interpersonal skills, to meet the nation's and stakeholders' aspiration.
PEO4	Developing skills in research in Electronics Engineering particularly in the areas of Telecommunication Engineering to generate new knowledge to satisfy the needs of the stakeholders.

Programme Outcomes (POs)

a.	Ability to apply knowledge of mathematics, science related to Electronics Engineering fundamental.
b.	Ability to design and conduct experiments, as well as to analyze and interpret data.
c.	Ability to design a system, components and process to meet desired needs.
d.	Ability to function in multi-disciplinary teams.
e.	Ability to identify, formulate and solve Electronics Engineering problems.
f.	Understanding of professional and ethical responsibility.
g.	Ability to communicate effectively with engineers and community at large.
h.	Broad education necessary to understand the impact of engineering solutions in a global and societal context.
i.	Recognition of the need for and an ability to engage in life-long learning.
j.	Knowledge of contemporary issues and sustainability.
k.	Ability to use the techniques, skills and modern engineering tools necessary for Electronics Engineering.

Electronics & Computer Engineering Programme

Programme Educational Objectives (PEOs)

PEO1	Applying Electronics Engineering knowledge based on a solid foundation in Computer Engineering areas for the needs of the stakeholders.
PEO2	Upholding the importance of professionalism and ethics Electronics Engineering profession to form a cultured and more developed society.
PEO3	Possessing communication and interpersonal skills, to meet the nation's and stakeholders' aspiration.
PEO4	Developing skills in research in Electronics Engineering particularly in the areas of Computer Engineering to generate new knowledge to satisfy the needs of the stakeholders.

Programme Outcomes (POs)

a.	Ability to apply knowledge of mathematics, science related to Electronics Engineering fundamental.
b.	Ability to design and conduct experiments, as well as to analyze and interpret data.
c.	Ability to design a system, components and process to meet desired needs.
d.	Ability to function in multi-disciplinary teams.
e.	Ability to identify, formulate and solve Electronics Engineering problems.
f.	Understanding of professional and ethical responsibility.
g.	Ability to communicate effectively with engineers and community at large.
h.	Broad education necessary to understand the impact of engineering solutions in a global and societal context.
i.	Recognition of the need for and an ability to engage in life-long learning.
j.	Knowledge of contemporary issues and sustainability.
k.	Ability to use the techniques, skills and modern engineering tools necessary for Electronics Engineering.

Department of Mechanical & Manufacturing Engineering:
Mechanical & Manufacturing Engineering Programme

The Mechanical and Manufacturing Engineering programme is designed to provide its graduates with a solid educational foundation on which they can build successful and sustainable careers in mechanical and/or manufacturing engineering or related fields. Department of Mechanical and Manufacturing Engineering adopts the notion that PEOs are the desired attributes or achievements of its graduates in their professional life. The PEOs of Mechanical and Manufacturing Engineering programme are listed below. These PEOs are consistent with both the mission and vision of the Faculty and the Engineering Accreditation Council (EAC) accreditation criteria.

Programme Educational Objectives (PEOs)

PEO1	Uphold the professionalism and ethics of the Mechanical and Manufacturing Engineering profession in national or international arena.
PEO2	Enhance knowledge by practicing independence and life-long learning in order to contribute to the advancement of the profession through involvement in research and development activities.
PEO3	Promote multicultural harmony and unity amongst different races and cultures through involvement in the technical or non-technical societies.

Having adopted the PEOs, the department established eleven POs consistent with the PEOs and the guidelines of EAC. The POs are divided into two categories which are Technical Knowledge & Competency and Generic Skills. These POs were designed in such a way that students graduating with the Bachelor degree in Mechanical and Manufacturing Engineering must demonstrate the outcomes as listed below.

Programme Outcomes (POs)

Technical Knowledge & Competency

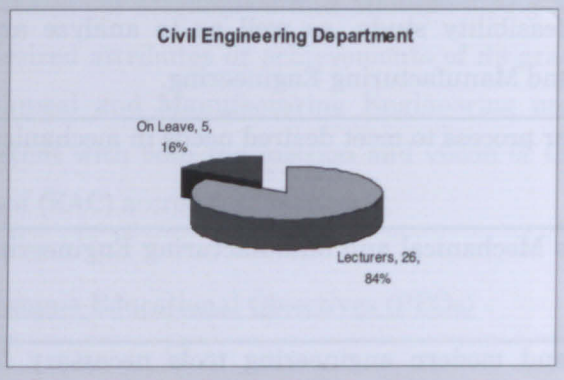
a.	Ability to acquire and apply knowledge of mathematics, science and engineering relevant to Mechanical and Manufacturing Engineering.
b.	Ability to conduct experiments and feasibility study, as well as to analyze and interpret data relevant to Mechanical and Manufacturing Engineering.
c.	Ability to design a system, component or process to meet desired needs in mechanical and/or manufacturing environment.
d.	Ability to identify, formulate and solve Mechanical and Manufacturing Engineering problems.
e.	Ability to utilize techniques, skills and modern engineering tools necessary for Mechanical and Manufacturing Engineering practice.

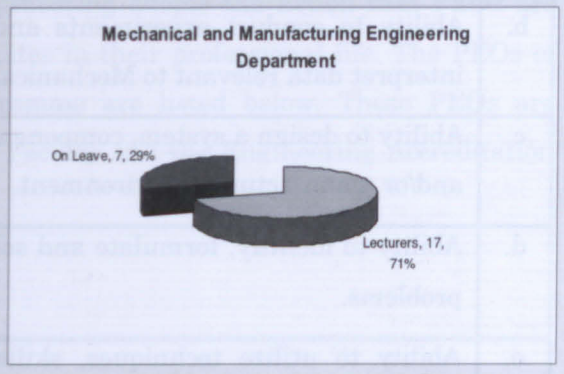
Generic Skills

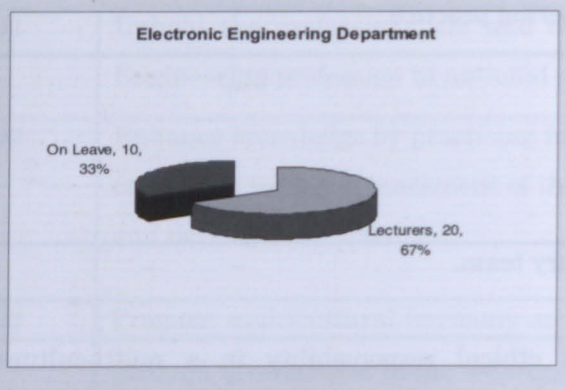
f.	Ability to function on a multi-disciplinary team.
g.	Ability to exercise professional and ethical responsibility in a multi-cultural environment.
h.	Ability to communicate effectively as an engineer.
i.	Ability to gather broad education necessary to recognize the impact of engineering solutions in global and social context.
j.	Ability to recognize the need and engage in life-long learning.
k.	Ability to acquire knowledge of contemporary issues.

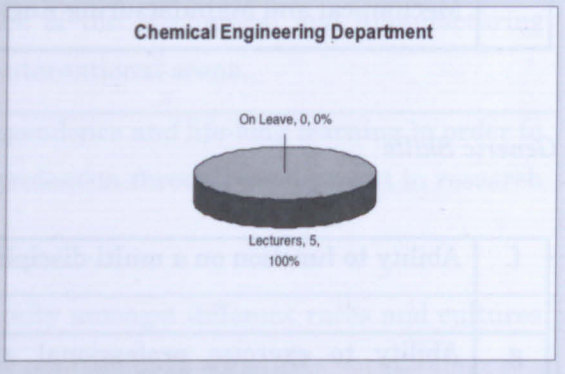
Statistic of Academic/Supporting Staff 2007/2008

Since 1993, Faculty of Engineering had acquired knowledgeable, experience and quality academic staff that can offer quality education in the field of engineering. In 2007/2008 session, the Faculty had hired 13 new academic staff. Based on the pie charts for the respective departments below, there are currently 90 academic staff in the Faculty. These include lecturers and tutors that are on study leave.

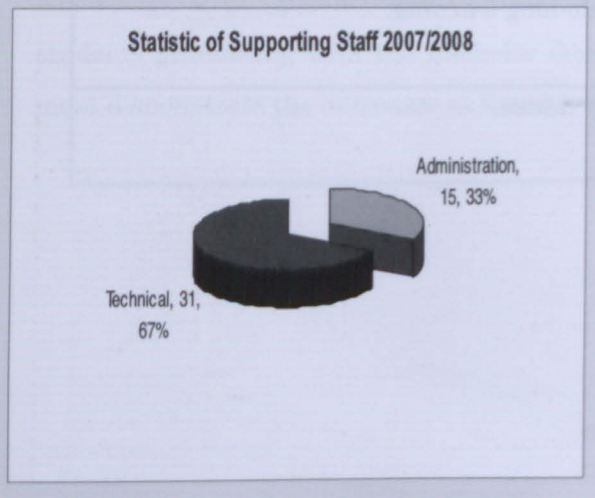








The role of supporting staff (administration and technical) also influence the learning process in the Faculty of Engineering. In 2008, the Faculty had hired 8 new supporting staff (1 Customer Services Officer and 7 technicians) and currently have 46 of them in total. Administrative staff usually help in the day to day running of the Faculty management while technicians generally assist laboratory coordinators during laboratory sessions.



Staff Achievements

Four academic staff and four supporting staff have was awarded "Anugerah Pekerja Cemerlang 2007". They are Dr. Mohamad Omar Abdullah, Dr. Siti Halipah Ibrahim, Mdm. Siti Kudnie Sahari and Mdm. Ervina Junaidi for academic staff; while for supporting staff, they are Mr. Abu Bakar Ibrahim, Mdm. Ismawati Razali, Mdm. Etah Maharup and Mdm. Hasmiza Kontet. The recipients received their awards during the "Anugerah Pekerja Cemerlang UNIMAS 2007" ceremony that was held at Merdeka Palace on 27 June 2008.

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DEPARTMENT OF E LECTRONICS ENGINEERING

ADMINISTRATIVE STAFF

TECHNICAL STAFF

DEPARTMENT OF C IVIL TECHNICAL S TAFF

DEPARTMENT OF E LECTRONICS TECH NICAL S TAFF

DEPARTMENT OF M ECHANICAL AND MANUFACTURING
TECHNICAL S TAFF

Accreditation of Engineering Programmes – The Big Test

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1. Introduction

In Malaysia, all engineering programmes must be accredited by an accreditation council called the Engineering Accreditation Council (EAC). The EAC comprises of representatives from four main agencies. They are the Malaysian Qualification Agency (MQA), the Public Services Department (PSD), the Board of Engineers (BEM) and the Institution of Engineers Malaysia (IEM). In the past, the accreditation cycle used to be once in every five years and the entire process was more of a formality to ensure quality engineering education is offered to students.

As Malaysia is trying to be a signatory of the Washington Accord, the process of accreditation has recently become more stringent with some programmes even failing to meet the minimum expectation while others were given accreditation for only two years with some corrections imposed. There are four engineering programmes in UNIMAS and all went through the scrutiny of the Accreditation Panel on 18-19 August 2008. This paper aims to share some interesting points experienced by the Faculty in our preparation for the recently concluded accreditation exercise.

2. Action from Previous Accreditation

After every accreditation process, the Panel normally inform the institution of their strengths and weaknesses. They will highlight the items that need attention and probable action if necessary. The first point to note is that it is imperative that programme owners, the respective department, take immediate actions on the issues raised by the Panel. Once the department received the accreditation report, swift action must be taken to review and execute any necessary changes. For example, in 2004 the Accreditation Panels deemed that having 8 and 9 credit hours for Industrial Training and Final Year Project courses respectively are too high. Therefore, in the curriculum review of 2005, the Faculty proposed to change both courses to 6 credit hours.

The second point to observe is that it is vital that the department understood fully what has been written in the accreditation report so that appropriate action can be taken. It is favourable if a special committee is given the task to interpret and clarify all the issues in the list. Based on our own previous experience, the issues raised on our curriculum were not very well understood and it resulted in changes being done in three to four sequences. It would have been more appropriate that changes to the curriculum be done once and for all. Without mentioning any specific details, slow action on issues raised from previous accreditation had resulted in some difficulties to the department in the subsequent accreditation.

A third point to observe is that the process involved in undertaking the changes may require endorsement of various meetings from the department, Faculty, the "Jawatankuasa

Pembangunan Program Akademik (JPPA)" till the University Senate, Board of Directors of UNIMAS and even the Ministry of Higher Education. As such, a quick and efficient action is necessary as the whole process could take a long time and tedious bureaucratic steps.

Presently, the Faculty has formed a Quality Assurance Unit to assist the Dean's office. The Quality Assurance Unit consist of the Accreditation coordinator, OBE Implementation coordinator, and "Unit Peperiksaan Fakulti Kejuruteraan (UPFK)". The Accreditation coordinator is responsible for the execution and monitoring of necessary actions that need to be taken after each accreditation exercise.

3. The PEO and PO

As part of the accreditation criteria, each engineering programme must have a well developed and assessed Programme Educational Objectives (PEOs) and Programme Outcomes (POs). In simple terms, PEOs refer to the career path attained by our alumni throughout their working life, presumably five years after graduation, and POs refer to the skills attained by graduates by the end of their studies in UNIMAS.

PEOs are necessary to ensure that the programmes are offer the required engineers to the job market, capable of undertaking contemporary engineering problems and fulfilling the aspirations of stakeholders. Stakeholders could be the various government agencies linked to engineering works, engineering practitioners, employers of engineering graduates, alumni, parents, and the institution and Faculty members.

The development of PEOs require extensive consultations with these stakeholders to ensure its formation is thorough and exhaustive. The PEOs have to be assessed and continually improved. A fourth point to highlight is that the Faculty had spent much energy and financial resources in developing the PEOs. It is fair to compliment the vital support accorded by the institution during those times when we were developing our PEOs.

Having developed and published the PEOs alone was not the end but the beginning. There was much work needed to assess the PEOs. The timely formation of the UNIMAS Alumni Committee assisted much in this respect. It was through this committee that the Faculty started tracking our alumni, their work place, and career development. In the next few years, the expectations will be higher on this committee to continue building the database of UNIMAS alumni and constantly keeping in contact with them. This is indispensable because the Faculty will need to conduct consultations, distribute survey forms, and other assessment tools in order to determine the achievement of the PEOs.

For the recently concluded accreditation exercise, little attention was given by the panels on the assessment aspect. Probably, they were satisfied with the mechanisms by which the PEOs had been developed. It is envisaged that future accreditation will emphasize more on issues related to assessment of the PEOs. The Faculty representative in the UNIMAS Alumni Committee is assisted by the Faculty's own Alumni committee. These will be the groups of people expected to compile our database with respect to PEOs assessment.

The POs is another difficult factor in the accreditation process. Its development required similar rigorous exercise as the PEOs. Each programme was required to exhibit substantial evidence of its assessment.

The Accreditation Panels covered quite extensively the issues related to assessment of POs. It is well-known that EAC had adopted OBE approach as an excellent system of delivery for engineering education and their manual requires presentation of evidences of OBE implementation. The evidence of OBE implementation strongly hinges on our success in assessing the POs. It is commonly accepted that in implementing OBE, the means are not as important as the end; course curriculum, course assessment and delivery methods are considered as means and the PO as the end.

The fifth point to note is the fact that it was not easy for the Faculty to grasps the exact meaning of OBE, to pass down the information to all its staff, motivate their interest in OBE, train staff to adopt OBE teaching delivery methods and assessment; and finally, to encourage staff to make time for the sake of this paradigm shift. During the 2005 to 2008 period, the Faculty sent staff to seven national workshops, organized four internal workshops/ symposiums; presented twelve OBE/ Accreditation related seminars to all staff and invited nine notable speakers throughout Malaysia to the Faculty. We are fortunate that most of our staff, who attended the Postgraduate Diploma (PGD) course run by the Centre of Applied Learning and Multimedia (CALM) UNIMAS, understood the education philosophy well; and this had made our task easier. All those efforts bore testimony to EAC that OBE is being implemented by the Faculty.

The sixth point to highlight is the fact that all Faculty staff, both the young and senior ones, cooperated closely, attended patiently all seminars and were excellent in attitude throughout the entire process. This was equally significant because their positive attitude had impact on all our efforts. Engineering programmes must present evidence of how much the students have achieved the PO.

The whole affair was alien to the Faculty as we are mostly engineers and not educationist. It is fair to mention that the Accreditation Manual does not stipulate how the task can be accomplished other than mentioning the need to assess the POs. The Faculty tried to show many graphs or tables but these were merely broad assessment and our main problem was in showing direct assessment of the POs. The closest we could endeavour was to come up with a broad assessment of the POs.

For the seventh point, the Faculty's successful effort in preparing evidence for the POs assessment is best described in an anecdote. Up till 2008, the POs assessment remained as the poorly covered aspect in our accreditation preparation. No one have the right solution on how best to show evidence of POs achievements.

As the turn of event happened, on 5th August 2008, just few days before the accreditation exercise, the Dean's office came up with the brilliant idea of inviting the EAC Associate Director, Assoc. Prof. Dr. Mohd Salleh, to present some important aspects that need to be considered in preparing for the imminent accreditation. When he dwelled on the issue of POs assessment, he made some mere suggestions on which type of graphs that can be used as evidence.

Taking cue from his suggestions, the Faculty realized that we already have the necessary processes in place and it was just a matter of re-formatting tables and amending some analysis formats to contrive the graph Assoc. Prof. Dr. Mohd Salleh was referring to. Apparently we have everything under our nose. Within the next few days the whole Faculty

members gave their fullest cooperation, rushing through the new formats, processing their data, and finalizing the graphs needed as proof for direct assessment of our POs. That was a momentous achievement as all programmes passed the Panel's scrutiny of direct evidences of POs assessments.

For future accreditation, it is hoped that the Faculty's Quality Assurance unit will be working closely with the respective departments in matters related to the assessment of POs. More efforts and ideas on this aspect are needed so that future accreditation exercise will be well prepared.

4. The QMS and CQI

There is a serious need in the Faculty, or UNIMAS as a whole, to compile all the important inherent processes. QMS refers to the Quality Management System and CQI refers to the Continual Quality Improvements. The compilation of these processes can serve multiple objectives such as introducing new staff to existing system, making transparent all processes they are involved in and many others.

For the eighth point, the Faculty will share our experience particularly in establishing our QMS. Although the Faculty had published few manuals such as the FYP manual, UPFK manual, Student Advisory Guide manual, and Credit Transfer manual, the Accreditation Panel still deemed it as insufficient. With respect to the efforts done, the Faculty did well in revising the FYP and UPFK manuals in 2007, introducing the Credit Transfer manual in 2006 and Student Advisory Guide manual in 2008. Similarly, formations of committees like Laboratory Management, Alumni, Quality Assurance, Technical Specification, Procurement and Safety and Health committees were all contributing steps towards ensuring our success in the aspect of QMS.

Also, the recent Fire Drill by the Faculty, the various industrial surveys and many other surveys executed, the recently concluded MoHE Laboratory Audit, stakeholders consultative sessions, the proposed implementation of *e-markah* system, and online student registration and many more events have contributed much towards our success in maintaining a high quality education system. At the same time, the process of examination preparation, conduct of examination, moderation of examination papers, and compilation of examination results had long been established in the Faculty since late 1990's. It was further revised and improved to meet the present conditions and situations.

All the above events carried positive marks for the Faculty in the Panel's assessment. All of it should be and was part of our quality management system except that it was not systematically compiled into a coherent document. The Panel was right in highlighting that aspect during their visit.

Figure 1: Fire Fighting Demonstration

For the ninth point, CQI was in fact another critical aspect scrutinized by the Panel. One fundamental requirement of CQI is the existence of "closing the loop" culture. The "closing the loop" culture warrants four processes to be in place and these are plan, do, check and act (commonly known as "pdca"). It needs to be mentioned that CQI is not easy to present unless it is already an embedded culture. Since 2005, the Faculty had always prepared extensively in this aspect because many accreditation failures were due to the lack of the "pdca" cycle.

CQI is basically about bringing improvements to our present system. There were many areas that could be covered for improvements but the Faculty opted to work on few major ones. Amongst them, the following were given particular interest, namely, the curriculum, the FYP course, student advisory and laboratory management. As an example, student advisory CQI processes involved identifying weak students, planning for their improvement, acting on remedial courses for them and finally reporting their progress. Another example of CQI processes on our FYP course involved getting input on students' problems, planning for its solution in Faculty meetings, acting on the solution by introducing new assessment formats and supervisory logbook; and finally providing feedback on whether problem was solved or still previals.

Time is an inevitable factor in proving the existence of CQI because the whole process needs time to execute. Thus, since 2005, the Faculty had been planning and working out the "pdca" cycle in various aspects of its management so that it is ready for presentation to the accreditation panels. Another issue with respect to CQI was the method of presenting it to the panel. The Faculty's approach was to highlight the fact that there are secretariats in charge of each "pdca" cycle and highlighted the roles they played. In the recently concluded accreditation process, there was no pressing issue raised by the Panels on CQI, either they acknowledged its existence or they missed it.

5. Conclusion

There are more to the above composition but we would like to avoid readers getting irritated with reading long paragraphs. Other aspects assessed were staff development, students, and facilities. The Faculty prepared hard on those aspects and tried to ensure that all weaknesses are remedied. A four years account is not easily compressed in four pages. There are two keywords that could define the Faculty's ability to prepare extensively for this round of accreditation and those are "teamwork" and "unity". Overall, the Faculty is satisfied with the outcome of the accreditation exercise and the Panel acknowledged that we have fulfilled the requirement for an engineering programme. The main concern now is the number of years EAC will award us for the accreditation.

University-Industry Partnership in Education

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There are many University-Industry collaborations between Universiti Malaysia Sarawak (UNIMAS) and partners from private industries as well as government agencies. Advantages gained from having these collaborations are stated below:

i. Add resources especially human resources to some of the technical courses. There will be pool of people with relevant industry exposure that could help the university in terms of exposing the students to the industries.
ii. Multi-research discipline could be well developed in the universities.
iii. Good relation with industries.

UNIMAS through the Faculty of Engineering and X-FAB Sarawak Sdn. Bhd. (X-FAB Sarawak) had signed memorandum of agreement (MoA) on Graduate Diploma in Microelectronics on 24 August 2007. The memorandum was signed on behalf of UNIMAS by its Vice Chancellor, Professor Datuk Dr. Abdul Rashid Abdullah and on behalf of X-FAB Sarawak Sdn. Bhd., by its Chief Financial Officer, Mr. Stephen Chin Yuen Chien. Before having Graduate Diploma in Microelectronics, the Department of Electronics Engineering, Faculty of Engineering UNIMAS had conducted several joint-ventures with X-FAB Sarawak such as through the offering of Certificate Programme and short courses in 2004.

The Graduate Diploma programme aims to provide an opportunity for X-FAB staff to broaden their knowledge and skills in microelectronics. It is also to encourage collaboration in research between UNIMAS and X-FAB Sarawak in the field of microelectronics. The programme started on 11 August 2007 with 17 X-FAB Sarawak's staff registered for the programme. The curriculum structure of the Graduate Diploma Programme consists of nine modules which need to be completed within four semesters. The total duration of the Graduate Diploma Programme is 17 months. The modules offered are:

PGM 5012: Semiconductor Physics
PGM 5022: Advance Microelectronics
PGM 5032: Device Physics
PGM 5043: Digital IC Design
PGM 5053: Analogue IC Design
PGM 5063: Semiconductor Fabrication (I)
PGM 5073: Semiconductor Fabrication (II)
PGM 5083: Reliability and Packaging
PGM 5093: Final Year Project

Figure 1: Discussion with X-FAB Sarawak Staff

Under the MoA, the Faculty of Engineering provides qualified lecturers, adequate educational facilities, and materials required to conduct the programme smoothly and effectively, while X-FAB Sarawak provides candidates (employees of X-FAB Sarawak Sdn. Bhd.) for the programme. The signing of the MoA formalized the Graduate Diploma programme and graduates from this programme will receive the Graduate Diploma in Microelectronics awarded by the UNIMAS.

The Faculty had implemented Outcome Based Education (OBE) in all its undergraduate programmes. Graduate Diploma also follows similar system where all of the courseworks had OBE components embedded in the courses. For every module, the assessments are in the form of:

i. Assignments/Problem Based Learning (PBL)/ Cooperative Learning (CL)
ii. Test/Final Exam

The students are expected to achieve all of the Learning Outcome (LO) as stipulated in the syllabus. Minimum grade of "B-" are required to pass the modules. The assignments, PBL and CL are based on their daily task at the workplace. They are expected to solve problems and able to present their works. The awarded marks will be based on their ability to present their findings. The lecturers who conducted the programs are both from UNIMAS and X-FAB Sarawak as it involves hand-on skills as well as theories. There are few challenges in teaching X-FAB Sarawak staff:

i. They are interested in topics that are related to the developmental stage of their life.
ii. They are interested in information that can be immediately applied to their current jobs.
iii. They are interested in information and ideas that can solve problems that they faced in their present working environment.

The success of the University-Industry Partnerships can be achieved through these kind of challenges which will benefits both sides in terms of improving the teaching and learning skills of the lecturers and experience the real world knowledge of industrial environments from the X-FAB Sarawak staff.

As for research activities, in 2004, the Faculty of Engineering had conducted research collaboration with Integrated Circuit Design Services (ICDS) which is a subsidiary company under 1st Silicon Malaysia Sdn. Bhd. (currently known as X-FAB Sarawak Sdn. Bhd.) in the area of Integrated Circuit (IC) design. Under the research collaboration, the Faculty of Engineering was responsible to design Monolithic IC Transformer whereas the ICDS fabricate the transformer. One postgraduate student is currently working under this research collaboration.

Currently, few research activities especially in the area of semiconductor fabrication and Integrated Circuit (IC) design are being planned with X-FAB Sarawak. The Faculty of Engineering had received a courtesy visit from its group Chief Executive Officer, Mr. Han Jurgen Straub and also by its group Chief Technology Officer, Dr Jens Kosh.

During their visit, many possibilities were discussed to further strengthen the university-industry partnership between UNIMAS and X-FAB Sarawak. Among the proposed collaboration is to carry out research activities in the area of Opto-Electronics. Also, under the proposed collaboration, several of UNIMAS staff could be sent to few German universities to carry out research in the area of microelectronics.

Figure 2: X-FAB Group CEO Receiving Souvenir from the Dean

Embracing Constructivism Learning Theory through Problem-based Learning (PBL) for Engineering Education

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ABSTRACT In the country's efforts to be a member of Washington Accord, the engineering education system is shifting towards outcome-based approach. In outcome-based approach, emphasize is on the outcomes where the product (students) must be able to fulfill the required educational objectives of the programme. In order to achieve the desired outcomes, more effective and innovative teaching and learning methods, e.g. cooperative learning, problem-based learning, etc., is required. This paper aims to explain the concept of constructivism learning theory through the application in Problem-Based Learning (PBL) and how it could contribute towards fulfilling the programme educational objectives (PEOs) for engineering education. Result from a study on Index of Learning Styles (ILS) for randomly chosen academically-challenged Civil Engineering students (CGPA < 2.5) is discussed and recommendation on how PBL could be implemented in order to improve their result is provided.

1. Introduction

Engineering education has been going through a paradigm shift during the recent years in the country's effort to be a full member of Washington Accord. For engineering education, students are trained by exposing them to poorly defined problem and they are required to tackle problem that they have never encountered rather than training education where the students are taught/ guided step by step in solving problems.

Thus, the method used in delivering engineering education has to be changed from the old conventional method where students learn by repetition of behaviours (behaviourism theory) and are not trained to be creative in solving problems, to a more contemporary approach where students learned actively by creating meaning of his/her experience (constructivism theory). Classroom environment must also changed from teacher/ lecturer-centered classroom to student-centered classroom where teacher/lecturer acts more as a facilitator.

One of the delivery methods for constructivism approach is Problem-Based Learning (PBL). PBL can be defined as a student-centered instructional strategy in which students collaboratively solve problems and reflect on their experiences. PBL is typically organized within small groups of learners where a series of problems are provided to learners with guidance at the beginning of the process and the guidance later fades as learners gain expertise [1].

This paper aims to provide the general idea on constructivism theory and PBL and why it is feasible to adopt this approach in engineering education based on the result from a survey on learning styles. The survey was carried out by the author on randomly chosen academically-challenged Civil Engineering students.

2. Constructivism Learning Theory

According to Jean Piaget [2], constructivism may be considered an epistemology (a philosophical framework or theory of learning) which argues humans construct meaning from current knowledge structures. Constructivism theory was developed based on the premise that we all construct our own perspective of the world based on individual experiences and internal knowledge structure. According to this theory, learning is based on how the individual interprets and creates the meaning of his/her experiences. Learners are actively involved in the learning process. This theory is used to focus on preparing the learner to adjust his mental model to incorporate new experiences and problem solving in ambiguous situations.

In this theory, the role of teacher/lecturer is to design instruction so that the learner has opportunities to solve realistic and meaningful problems. This can be done through group learning activities to allow learners to interact and solve problems and the teacher/lecturer helps by guiding and coaching. According to Lawson, the sequence of learning for this theory is through *exploration*, *terms introduction* and finally *concept application* [3].

Exploration is the first step where the learners are given the chance to explore on their own the issues regarding the topic to be learned. After which the teacher/lecturer will introduce the terms and concepts to be learned from the topic. After terms introduction, the learners will be given the chance to apply the concepts learned to a new situation. When the learners are able to apply the concept, the cycle is repeated for the next topic. Figure 1 shows the learning cycle for constructivism theory according to Lawson.

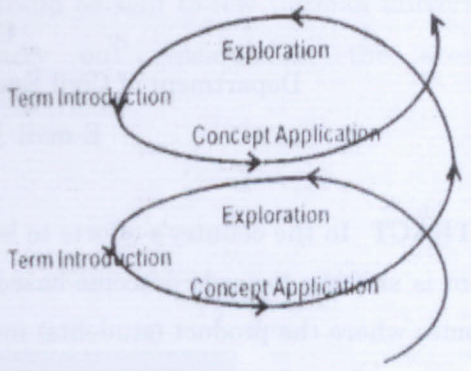

Figure 1: Lawson's Learning Cycle (1995) [3]

Among the instructional methods that could be used are Problem-based Learning (PBL), guided reflection, apprenticeships, collaborative learning, discovery learning and simulators. Constructivism will effectively contributes to learning under the conditions of when instruction will occur as an interactive process; when learner will incorporate current knowledge to gain insight and understanding of new situations; when diverse resources to aid discovery are available; and when there is adequate time for the learner to discover and process the knowledge.

In considering to apply the method in this theory, however, teacher/lecturer must make sure that the learners have significant knowledge base of the topic that they planned to introduce. The outcomes of instruction are not always predictable because learners construct their own knowledge; thus this theory is not suitable when the end results of the learners need to be the same each time.

3. Problem Based Learning (PBL)

Problem-based Learning (PBL) was first developed and used extensively at McMaster University, Hamilton, Ontario, Canada. PBL is

based on small group learning and it uses problem as the trigger to guide learning. The role of the teacher/lecturer is as facilitator and the students are the active participant/problem solver. By being the active participant, students tend to remember up to 90% of what they learned even after 2 weeks of instruction as depicted by Dale [4] through his cone of experience as shown in Figure 2.

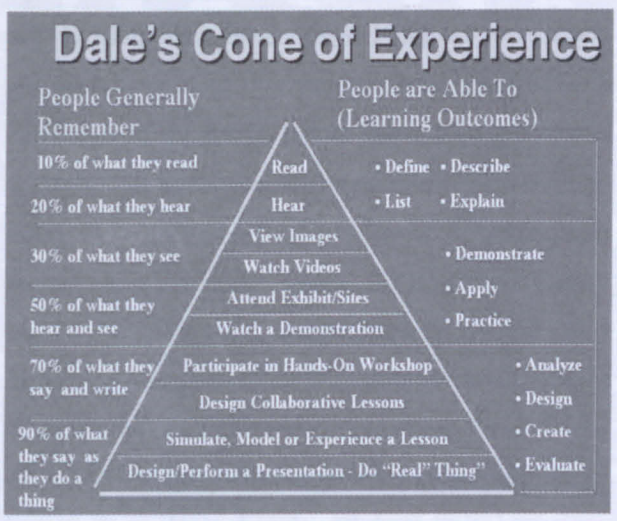

Figure 2: Dale's Cone of Experience [4]

According to Figure 2, in order to achieve higher learning outcomes such as analyze, design, create, and evaluate (which are also the expected outcomes for most engineering courses), active participation is required from the students. Constructivism Learning Theory, through PBL, will be able to provide active learning to students. By simulating real-life experience, PBL will be able to train the students to be more independent and to work as a team while at the same time more creative in problem-solving, traits which are required as an engineer. The steps involves in a PBL session is as shown in Figure 3.

4. Feasibility of PBL

In order to test the feasibility of applying PBL in engineering courses, the author have conducted an Index of Learning Styles (ILS) study on randomly chosen academically-challenged students. They are the second and third year Civil Engineering students and the study was based on the material developed by Felder and Silverman [5].

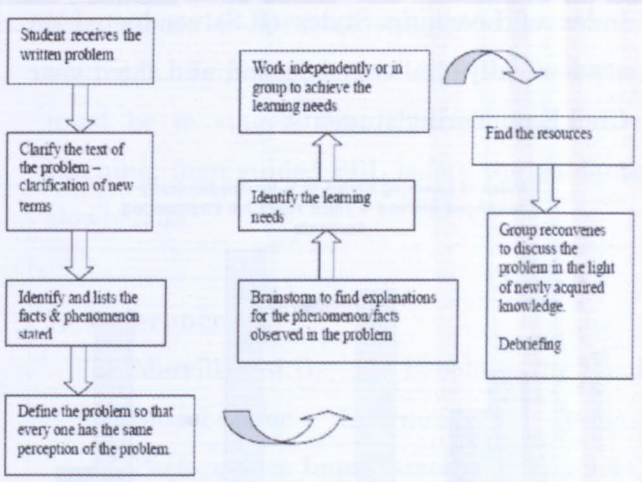

Figure 3: Steps in a PBL session

Academically-challenged here is defined as student who at the time when the study was conducted carries a CGPA of less than 2.5. The author purposely chosed academically-challenged students for the study with the hypothesis that these students perform poorly due to their learning styles that did not suit the current delivery method in engineering courses that is mostly conventional and teacher/ lecturer oriented.

Felder and Silverman classified learning styles into four categories, i.e. either active (ACT) or reflective (REF), sensing (SEN) or intuitive (INT), visual (VIS) or verbal (VRB) and sequential (SEQ) or global (GLO).

Active learners tend to retain and understand best by doing something active while reflective learners prefer to think about it quietly first. Sensing learners tend to like facts while intuitive learners often prefer discovering possibilities and relationship. Visual learners

remember best on what they see while verbal learners get more out of words. Sequential learners tend to gain understanding in linear steps while global learners tend to learn in large jumps.

Figure 4 shows the findings in the study on Index of Learning Styles (ILS) conducted on academically-challenged second and third year Civil Engineering students.

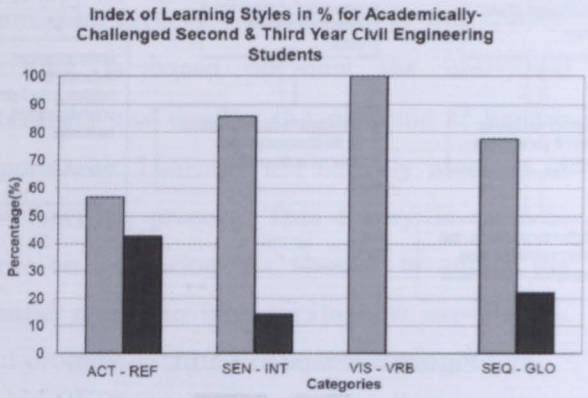

Figure 4: Findings of the Index of ILS Study by the Author

From Figure 4, it could be seen that 57% of the students are active learner compared to 43% who are reflective learner. This shows that these academically-challenged students might learn and understand better in a class that involves active participation like PBL. Active learners also work well in a group through discussion and topic sharing session, suggesting that cooperative learning may be implemented in the class. In general, active learners retain information better if they could find ways to do something with it.

The result also shows that these academically-challenged students tend to be sensing learner (85.7%) as compared to intuitive learner (14.3%). Sensing learner remembers and understands information best if they can see how it connects to the real world. Again, PBL could help these students by providing simulation of real-life scenarios where they could participate actively in finding the solutions.

In addition, the result also shows that 100% of these academically-challenged students are visual learner. Visual learners remember best by what they see, either through pictures, diagrams, flow charts or through demonstration. In most university, however, very little visual information is presented and students mainly listen to lectures and read material which is not that appealing to this group of students.

Finally, it could also be interpreted from the result that the majority of these academically-challenged students are sequential learner (77.8%) compared to global learner (22.2%). It means that if PBL is implemented, the teacher/lecturer have to present the concept in a logically connected manner. They have to be able to relate previous terms or topics to the next.

5. Recommendation for Implementing PBL

The result in this study shows that academically-challenged Civil Engineering students might benefit from the implementation of PBL based on the hypothesis that their learning styles may not have suit the conventional teacher/lecturer centered approach commonly practiced in most engineering courses. For future study, however, the author intended to expand the survey to include the good students (CGPA $\geq$ 2.5) in order to understand their learning styles and whether PBL is suitable for them.

In implementing PBL, subtle introduction is recommended as the students go through their years of study in university/college. It

must be noted that first year engineering students are used to the teacher-centred delivery styles during their junior and high schools days. These students are apt to view their roles as passive recipients of knowledge and might resent if being asked to play active role in class. Furthermore, their knowledge of the programme that they are taking might be limited.

During this early stage, PBL might not be suitable for them due to the limited knowledge on the subject matter and their resentment at playing an active role. At this stage, teacher/ lecturer could play their role by providing an environment that foster close interaction; probably through more group work and informal cooperative learning. During their second year, in order to expose the students to the element of PBL, they could be exposed to more cooperative and collaborative learning. And finally during their third and fourth year, they will be introduced to PBL; of course first with guidance and finally the guidance should fade away.

6. Conclusion

In moving towards outcome-based approach in engineering education, a paradigm shift in terms of learning theory and delivery method is unavoidable. The conventional approach, where students learn by repetition (behaviourism theory), are not that practical in producing engineering students that could solve problems creatively and are able to work in a team.

Constructivism theory may be the approach to produce engineering students that fulfill the programme educational objectives in engineering courses. By simulating real scenario, PBL is one of the delivery methods in constructivism theory that could provide the opportunity for them to participate actively in problem-solving and work in a team. Result from the author's survey shows that PBL, if implemented in a well-designed manner, could increase the performance of academically-challenged engineering students whose learning styles does not suit the conventional approach. Implementation of PBL, however, must be in stages, first through cooperative learning, then guided PBL before the guidance slowly fade.

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Application of Learning Theories in Teaching and Learning in the Faculty of Engineering

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ABSTRACT Learning theories can be divided into behaviour and constructivism model. Under these models, there are few theories that can relate to students learning styles. Engineering subjects are predominantly cognitive subjects. The complexities of the subjects must be balanced with lecture and practical based resources. The humanistic approach must be included as teaching and learning for engineering students are now relevant. The shift to student centred learning are now a requirement for accreditation process. This paper attempts to describe the teaching and learning process based on learning theories.

1. Introduction

The teaching and learning approach within the Faculty of Engineering is undergoing a shift from the conventional method of teacher/lecturer centered to student-centred learning. It is now being reviewed [1] in conjunction with the newly implemented accreditation process as required by Malaysian Quality Assurance (MQA) and Engineering Accreditation Council (EAC). The Faculty of Engineering adopts Outcome-Based Education (OBE) [2] to enhance the quality of education as well as to fulfill the accreditation requirement. To maintain the quality of teaching and learning in the faculty, the involvement of stakeholders and industrial panel advisor are also necessary.

The teaching and learning method can be generalized as models of either behaviour, constructivism and cognitive. The theories are inter-related as students learning styles varies. The variety of these theories is also noticeable amongst the engineering students.

This paper will describe the various learning theories in relation to engineering students. The descriptions are more on explaining the theories and the relations between these theories and engineering students. The chosen main theory is the Roger Experiential Learning [3], and though constructivism, the theory is also interrelated with the Behaviourism theory. This paper will discuss in general the description of these theories..

2. Teaching and Learning

Students at the Faculty of Engineering come from various backgrounds. They, however, show similar traits in terms of learning. In particular, the cognitive part i.e. the brain is very much significant. This is due to the application based subjects.

Engineering students however, would perform better if there are laboratory based learning i.e. practical method. The learning process from the cognitive (theories) is then put into practice by experimental work. In this case, experimental work is the experiential approach [3].

The related learning techniques that can be considered for the engineering students is the Rogers Experiential Learning theory. The learning theory distinguished the two types of learning into cognitive and the experiential.

In engineering education, the four year courses can be divided into two phases. The first phase is the first 2 years and the second phase is the last 2 years.

The first phase can be considered as the fundamental parts. At this level, the core engineering or the fundamentals are instilled to the students. Engineering fundamentals are the important elements that distinguish the engineering profession.

The academic knowledge refers to the cognitive part of the Roger Experiential Learning. This part initiate the learners and when engaged together with the experiential learning process (i.e. the passion to self-explore), it would enhance the learning process.

The second stage or the self initiate process is the needs for a learner traits. These are process involvement, self-initiation, self-motivated, self-evaluation, etc. These traits relates to the process change and growth or maturity. Each of the engineering students has the ability for natural learning process provided that they have adequate understanding in the cognitive part.

Roger Experiential Learning would necessitate organization change. A positive environment must be prepared to fully implement this theory. This includes adequate and comfortable place to learn i.e. lecture halls and tutorial rooms. Learners must be notified of the purpose of each courses or the learning outcomes as well, in order to comprehend the intention of the topics.

In addition, learning resources such as the lecture notes, references, books, or any other materials must be made available, accessible and adequate. These however, need to be balance with the courses. The learning process also requires balancing the intellectual and emotional components of learning. For example, the amount of course syllabus, lectures, and tutorials for a given courses must be relevant to the students workload.

To initiate the experiential learning, students must also be able to work in a team. This would give an avenue for ideas exchange and students are free to access any comments or suggestions pertaining to the course. This approach are humanistic where elements of self -motivation is required.

2.1 Learning Traits

There are numerous learning theories that can be reviewed [4, 5]. The two most frequently reviewed are the behaviour (directed) and the constructivist theories. Under these two models, there are few more sub-theories. For engineering students, as mentioned earlier, the fundamental aspects would require the engagement of many different type of theories to represent the students which includes Skinner, Gagne, Bandura, Miller and Thorndike.

2.1.1 Skinner

Skinner Theory is a function of change in overt behaviour. The behaviour is the response to events that occurs in the environment. The key element in this theory is reinforcement.

The reinforcements can be good grades, praises and satisfaction. Skinner theory is a step by step process. As an example, students

in engineering course must undergo pre-requisite courses. During the intermittent topics, positive reinforcement must be given in such a way that the students may respond positively to the learning process.

2.1.2 Gagne

Gagne's Theory is based on the Conditions of Learning theory. This theory specifies that there are several different types or levels of learning. The principle is that a different instruction is required for different learning outcomes.

Gagne also suggests that learning task for intellectual skills can be organized in a hierarchical manner. Learning hierarchies define what are the intellectual skills that need to be learned. An example of this theory can be observed in an Engineering Drawing course. In this course, students are given verbal instructions, drawing skills, and design strategies to perform the given task.

2.2.3 Bandura

Bandura is a social learning theory based on emulation of ideas, attitudes and also the interest. The students learn through observation and as a result will develop the ability to generate new ideas. The components of this theory are attention, retention, motor reproduction and motivation. In describing these four components for engineering students a good example would be in a laboratory course.

The model events (attention) are the demonstration from the lecturer. The students would then receive (retention), and the cognitive part of the student would then assess the theory and the practical work. The students are asked to reproduce. As a result, student will show the physical capabilities through the self observation. The motivation of the student will be external reinforcement which in this case, is the evaluation given by the lecturer.

2.1.4 Miller

Miller Information Processing Theory is the idea of short-term memory. The short-term memory consists of digits, words, and chess positions of people's faces. The theory, however, is limited to several sets of memory. The best examples in engineering students are to trouble shoot computer problems or in automotive instructional guidelines.

2.1.5 Thorndike

Thorndike learning theories is a framework of behavioural psychology. It is the association between stimuli and responses. The theory is based on trial and error learning. Students learn from their own mistakes. Some of the related engineering courses are the software-oriented especially for programming courses.

In general, these coursework involves simulation and programming. For example, the use of Matlab, Borland C++, Fortran, etc. These activities require the students to create programming code. This is based on trial and error. Students learn to associate simulation results with the next trial in order to achieve the correct code or parameter.

3. Summary

The application of learning methods for an engineering student would not be effective if only a single method is applied. The behaviour

and constructivism theory must be engaged together as students come from different background and the student perceptions towards learning are different from one another.

The relationship between both behaviour and constructivism are inter-related based on the year of study. The behaviour parts are common during the first two years and the constructivism during the later years of study. It is impossible to pinpoint the specific theory for an engineering student as it largely depends on courses, lecturers and individual students.

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How to Write the Course Outcomes

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ABSTRACT This paper is a part of series of "How to develop effective course outcomes". It begins with the definition of course outcomes (COs) and then followed by the importance of COs in Outcome Based Education (OBE) approach. Useful guidelines to write good COs are also discussed in this paper. The good COs must consist of three important components, namely behaviour, condition and standard. In addition, practical examples are also given to comprehend the understanding of the topic discussed.

1. Introduction

Outcome Based Education (OBE) approach is currently compulsory for every institution of higher learning especially those who are offering engineering courses in Malaysia. There are some pros and cons in implementing this new approach. Some of the advantages of OBE are; it is well organized and every single topic must be documented and proved.

The most crucial document to develop in OBE approach is the Course Outcomes (COs). COs must be provided for every courses offered. According to Centre for the Advancement of Teaching and Learning, The University of Western Australia (2004), COs have been defined as a statement of what a learner is expected to know, understand or be able to do as a result of a learning process. COs can be used as an indicator for the students, lecturers and assessor to indicate level of achievement of the learners.

2. How to Write Good Course Outcome

Good COs must consist of three components, behaviour, condition and standard. Combination of these three components will ensure the effectiveness of the courses.

2.1 Behaviour

Behaviour is also known as an action verb in a common sentence. A good selection of action verbs must fulfilled the SOMART [1]:

- Specifically to explain the expected outcome
- Observable at any time by assessors
- Measurable for the assessment purposes
- Achievable by majority of the students
- Realistic in real situation
- Time frame for learners to gain the behavior within the specific time given

Table 1 shows the Bloom's Taxonomy that is recommended for use in expressing the behaviour of the COs. It consists of six categories of thinking levels. The first two categories (knowledge and comprehension) are in the lower order and the other four categories are considered as the higher order of thinking. All action verbs mentioned in Table 1 has fulfilled the SOMART.

Explain is an example of action verb. An example of CO using the *explain* as an action verb is "At the end of this course student should be able to **explain** the principles of Newton's Laws of Motion."

Table 1: Bloom's Taxonomy [2]

Knowledge	Define, List, Name, Recall, Record, Relate, Underline, Label, Quote, Locate, Match, Cite, Reproduce, Identify, State
Comprehension	Describe, Discuss, Explain, Express, Depict, Locate, Recognise, Report, Restate, Review, Translate
Application	Apply, Demonstrate, Dramatise, Employ, Illustrate, Interpret, Operate, Practice, Schedule, Sketch, Use
Analysis	Analyze, Appraise, Calculate, Categorise, Criticise, Classify, Debate, Diagram, Differentiate, Distinguish, Examine, Experiment, Inspect, Question, Relate, Solve, Test
Synthesis	Arrange, Assemble, Collect, Compose, Construct, Create, Design, Formulate, Manage, Organize, Plan, Prepare, Propose, Combine, Integrate
Evaluation	Appraise, Assess, Choose, Compare, Defend, Estimate, Evaluate, Judge, Justify, Measure, Rate, Revise, Score, Select, Value

It is common mistake to find verbs such as understand, appreciate, know, learn, aware and familiar in COs. These verbs are not preferable to be used in COs and must be avoided because the verb is whether too general, difficult to measure or too ideal. The behaviour used must reflects the learners' ability at the end of the course and not what the lecturers hope to achieve

2.2 Condition

Condition refers to limitation or context under which the behavior is to occur. It also refers to method use to measure or assess the behavior. By adding condition to the same example mentioned earlier, the CO can be rewrite as "At the end of this course student should be able to explain **orally** the principles of Newton's Laws of Motion." The word **orally** in the CO is an example of condition. Conditions can be used as a tool to assess the behavior of the COs.

2.3 Standard

Standard is a criteria of acceptable level of performance. Standard is used to show the accuracy, quantity, time constraint or it also can be standardization quality body. Based on the definition of standard, same example mentioned earlier can be rewrite as:

"At the end of this course, student should be able to explain orally **three** principles of Newton's Laws of Motion"

The word **three** is the standard for this CO. This is an example of a complete CO. Combination of all three components make the COs specific and realistic to be achieved by the learners at the end of the course. At the same time the COs can be measured and monitored by the assessors.

3. Dos and Don'ts

There are some beneficial tips in writing good COs. What are the "DOs" and "DON'Ts" in writing a good COs?

A very common issue in writing COS is the adequate number of COs necessary for a course. In general, there are no specific limits, as it depends on the expected outcomes that are necessary to reflect the students ability at the end of the course.

Brief guidelines when deciding numbers of COs for a course are as follows [3]:

- Each major topic in the course should have one to three learning outcomes.
- Each three-credit course should have between five to twelve learning outcomes.

At the same time it is preferable that each of the COs has only one behaviour or action verb per outcome. A course is considered as well-balanced if the outcomes can contribute to both orders (lower and higher order of action verbs in Bloom's Taxonomy)

Good COs point on the knowledge and understanding of the outcomes. The COs must avoid the elements listed below [2]:

- Too broad in scope
- Too narrow in scope
- Overloading course with too much content

4. Conclusion

COs is the essence of the course outline. Good COs must be able to guide, organise and define the depth of what the learners are expected to achieve at the end of the learning period. Good COs consist of appropriate selection of words to show the behaviour, condition and standard of the outcome. By following the "DOs" and "DON'Ts" given, it is hope that an effective COs can be produced.

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Prospect of Integrated Design Project Course

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ABSTRACT Two new courses, KNS4444 Integrated Design Project (IDP) 1 and KNS4674 Integrated Design Project 2, will be introduced to the 4th Year Civil Engineering students starting from Semester 1, 2008/2009 session. The objective of the course is to give opportunity to the final year students to design a typical Civil Engineering project. The contents of the course are the integration of several Civil Engineering subjects. This paper aims to highlight the objectives and expectations of the course as well as the implication of the course to both students and facilitators.

1. Introduction

In order to help students integrate curricular material and gain valuable experience in "real world" problems which will prepare them for professional practice, the department is offering two new courses: KNS4444 Integrated Design Project 1 and KNS4674 Integrated Design Project 2. These new courses need to be completed in two successive semesters and has been introduced to the 4th Year Civil Engineering students starting from Semester 1, Session 2008/2009, integrating the field exposure with academic pursuit.

The objective of the courses is to enable students to design a typical civil engineering project. The courses had been designed to enhance Civil Engineering students' technical, communication, and team work skill. It is anticipated that these courses can deepen student understanding, aid in long term retention of knowledge, and provide valuable opportunities to interact with classmates, faculty, alumni and engineers in the profession.

2. Objectives of the IDP Course

There are some aspects to the integration: the development of a central design project, the reconfiguration of existing lectures and materials to better suit the students' needs as they move through the phases of the design project, the incorporation of materials to facilitate and support the group progression, and the involvement of practicing engineers in the discussion of design plans.

While projects are completed as a group, the concept, design, and assessment are collaboratively discussed with each group member during the discussion sessions held after each lecture. Facilitators will assist in providing ongoing feedback and support. Since students need to work as a team, peer evaluation will be regularly conducted during the course to assess their design team commitment and contribution to their group. At the end of each semester, students are also required to give an oral presentation of their design efforts to the facilitators.

3. Expected Course Outcomes

Although the implementation of this course is still in progress, it is envisaged that the project could provide exposure to the students on the advanced topics that cater for research activities.

Considering that many of these students will be working in the industry after the completion of their degree programme, this course could be one of the alternatives which will help create collaboration with industries. Any agencies that are interested in appointing *'this affordable consultation firm (the IDP students' groups)* to perform a preliminary study for their projects may propose a real engineering project for this course.

Through this project, the students will get extensive industry exposure; one which shall create an ideal environment for exploring upcoming areas of construction and engineering study. The benefits of this collaboration could be shared between these two parties as the students could gain knowledge throughout the real scenario project, whereas the industries will get a reliable input from these future engineers through the preliminary study of their projects.

The output of this project will be a presentation that will test the students' ability to create and apply strategic wealth solutions to a client scenario. They will prepare an integrated wealth plan beginning with client discovery and assessment. Then, the expertise to meet the client's service needs, as well as timelines and risks could be identified. Finally, they need to create a complete, comprehensive strategic plan for the clients to comply.

It is hoped that at the end of this course, the department could organize a formal conference for the presentation of the best IDP group project. As an incentive to highlight the importance of excellent communication skills, an award should be given to the best presentation. This award recognizes the need for all engineers to be able to communicate their technical ideas, concepts and projects in a manner that can be easily understood by an audience who may not have their level of expertise.

4. Implications of this Course

These kinds of changes are not without challenges. The challenges can include ongoing student expectations for knowledge and comprehension focus in courses, concerns of increased workloads, concerns about individual vs. group marks, and lack of familiarity and support for group work. Attempts to introduce group projects can meet resistance because of student's lack of familiarity with group work and a perception that it will interfere with the ability to get good marks.

Although these changes will address some concerns that students have, we feel that all should be optimistic in order to perceive this project to be a more powerful design project experience. Society, industry and our accrediting bodies are increasingly demanding that our graduates should gain the necessary "soft" skills to adequately contribute to their profession and society. It is hoped that this project will help our students gain these skills.

5. Conclusions

Project success will result in better students' performance and learning outcomes. Furthermore, it will creates high quality materials to support this initiative. In addition, the project success will generates faculty and staff expertise through the development and delivery of this Integrated Design Project.

This course has shown a clear path to reach our intended learning objectives and this will provide our students with the valuable learning experiences and skills that will help them serve both their profession and society well. The development of these courses must be continued but their inclusion into the curriculum should not await perfection.

Many of the components can and should be taught now, preparing students to undertake integrated design project course. As stated by Nelson Mandela, *"Vision without action is merely dreaming. Action with no vision is just passing time. But with vision and action you can change the world."*

6. References

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APPENDIX A

Semester 1

Week	Topic	
1	**Briefing** Brief the students on the course. Distribute Course Syllabus Rules and Regulation (e.g. minutes of meeting must be recorded every time the students have their group discussions, etc.) *Distribute Peer Rating Form* Assessment	Class Instruction
2	**Briefing** Student Grouping (The students have to appoint the leader, distribute jobs and responsibility amongst themselves to work out their integrated design project.) *Distribute Drawings* Briefing on the overall Project	Class Instruction
3	**Seminar** This seminar gives bigger picture of the design activities, the design requirement by various statutory bodies (i.e. Firegrigade, Council, environmental issues, project constraints, etc). It is hoped that it could be used by the students as the platform to conduct their 1st Project Group Meeting.	Invited Speaker
4	**Project Planning and Scheduling** Students are briefed on how to manage their project. They have to prepare their Project Proposal (in groups) and to be submitted in Week 5. *Submit Peer Rating Form.*	Class Instruction
5	**Drawing** Students are briefed on the different types of drawings and how to prepare the title block. They have to identify drawings to be produced and prepare the site plan using AutoCad.	Class Instruction
6	**Geotech** Students are briefed on the geotechnical aspects of the projects. Students have to identify the design considerations. These design considerations are to be incorporated in their Preliminary Report.	Class Instruction
7	**Earthwork and Road** Students are briefed on the earthwork and road design aspects. They have to produce earthwork cross-sections (cut and fill). They must also determine the road design considerations.	Class Instruction

8	**Drainage and Water Supply** Students are briefed on the drainage and water supply design aspects. They have to produce drainage and sub-soil drain layout and water supply layout plan. ***Submission of Progress Report No. 1*** (Site plan in hardcopy and softcopy to be included.) *Submit Peer Rating Form*	Class Instruction
9	**Sewerage** Students are briefed on the sewerage design aspects. They have to produce sewerage layout plan.	Class Instruction
10	**Structure (RC Design)** Students are briefed on the structural aspects (RC design component) of the projects. Students have to come out with the beam and slab key plan.	Class Instruction
11	**Structure (Steel Design)** Students are briefed on the structural aspects (Steel design component) of the projects. Students have to identify the design considerations. These design considerations are to be incorporated in their Preliminary Report.	Class Instruction
12	**Compilation of Preliminary Design Report**	Group Discussion
13	**Group Presentation &** ***Submission of Preliminary Design Report*** *Submit Peer Rating Form*	
14	**Group Presentation &** ***Submission of Preliminary Design Report*** *Submit Peer Rating Form*	

Semester 2

Week	Topic	
1, 2	**Briefing** Brief the students on the activities at this second part of the course and how it would be conducted and assessed. Remind them that at the end of this course, they have to come out with a Final Report and Drawings. Brief the students about the content and format of the final report and drawings. As a start up, they could conduct their **Project Group Meeting No. 4** discussing on their progress and next design activities.	Class Instruction
3	**Seminar** This seminar gives guidelines to the students on how to prepare the bill of quantities, final drawings that need to be produced, final report.	Invited Speaker
4,5, 6	**Detail Design** Students continue with their detail design activities. *Distribute Peer Rating Form* (in Week 6) *Submission of Progress Report No 2* (in Week 6)	Class Instruction Invited Speaker
7, 8, 9	**Detail Design** Students continue with their detail design activities. Distribute Peer Rating Form (in Week 9).	Class Instruction Invited Speaker
10, 11	**Compilation of Drawings and Final Report**	Group Discussion
12	***Submission of Drawings and Final Report***	
13	**Group Presentation** *Distribute Peer Rating Form*	
14	**Group Presentation** *Distribute Peer Rating Form*	

Improving Peer Assessment for Groupwork in Civil Engineering Courses

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ABSTRACT The increase in the number of students and changes in teaching pedagogy have made group assignments as one of the essential learning tool/evaluation elements in engineering courses apart from tests and examinations. One of the most difficult and challenging tasks about assessing the group assignments is determining individual marks from the work submitted as a group. Several courses conducted by the Civil Engineering Department have adopted the peer rating or peer assessment approach to derive a so-called `peer factors' which later can be multiplied to the group project marks to give individual mark to the group members. Results from three Civil Engineering courses that apply the peer rating assessment are compared and discussed. Based on these results and the experience of using this method, some recommendations are made to improve the future assessments for granting individual mark in a group project.

1. Introduction

The increase in the number of students and changes in teaching pedagogy have made groupwork or working in groups one of the effective cooperative learning tools and is becoming a popular teaching method. However, determining individual marks from a group work is a challenging task.

Giving every student the same grade for a group assignment may encourage `free-riding', `gang-up against one student', `helping each other' by group members. One approach is to assess and evaluate individual contributions that may be helpful in determining individual grades is through *peer assessment and/or peer evaluation*. [1, 2]

Peer assessment is a process in which the contribution of individual members is assessed by asking team members to evaluate one another. The data collected will be used in the *`peer evaluation'*, that is, the adjustment of individual grades from group grades using the peer rating multiplier calculated from the peer assessment data. [1, 2]

Peer assessment and/or peer evaluation has been adopted in several courses in the Civil Engineering Department in recent years and a study on the application, effectiveness and fairness of this approach was made. In this article, results from three courses, namely, KNS1043 Civil Engineering Materials, KNS4213 Structural Steel Design, and KNS2153 Fluid Laboratory are used for discussion (refer to Appendix A). Groupwork mark: 50% to the total mark consisting of 5% group presentation and 45% Design report, based on real on-going/completed building projects.

Eight groups, comprising of 5 good and average students per group, were formed by the course lecturer. Group reports were evaluated and multiplied by peer factor to get the student's individual marks.

2. Observations and Discussions

The following trends are observed for KNS1043 Civil Engineering Materials course. Groups with multiracial students gave equal and high rating for each group members. This may be an indication of good shared work. Groups consist of all female students tend to be more judgmental in their peer assessment reflecting large variation in peer factors.

Most of the all male groups (irrespective of races) prefer to evaluate each other equally and not critical about their marks. The difference between the peer factors among the groups ranges from 9% to 60%. Groups with 10 members have peer factor difference of as big as 60% among its members, which may indicate that some members could work in the group or do not contribute significantly in the group or presence of '*free-riders*'.

Results from KNS2153 Fluid Laboratory course show an effective result of peer assessment. Except for one group, the other 13 groups are observed to assess their group members almost equally. Group peer factor difference ranges from 3% to 5% only.

For KNS4213 Structural Steel Design course, 5 out of 8 groups were judgmental in their assessments; irrespective of race, or whether they are all male or all female students. The groups peer factor difference ranges from 4% to 14%. Some members in the group are concerned on who are in their groups and consulted the lecturer for advice or changed group members.

For all the three courses above, the peer evaluation is carried out only ONCE, that is, towards the end of the semester.

3. Conclusion

The number of members per group, the year of study and the nature/type of course are seen to have contribute to the peer factor differences.

For courses similar to KNS1043, where most PBL work is carried out outside the supervision of the lecturer, it is essential to have peer assessment component. Group sizes, however, should be made smaller where 5 to 6 students are considered ideal and reasonable assessment can be made.

For laboratory courses like KNS2153, the laboratory supervision and the compulsory individual reports assure the evaluation of each students and individual contributions lead to a fairer individual mark. A small range of peer factor can be used to encourage students for active participation in Evaluation and Bonus Points.

To avoid passing students who failed individual tests (esp. Final Exam), announcement must be made on Day 1 that group marks will only count for students whose average grade on the individual tests is at or above a passing level. Students who failed the tests will fail the course, even if their homework grade is 100%![1]

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APPENDIX A

I. Peer Assessment Results and Observations

KNS1043 Civil Engineering Materials course is a 1st year course consisting of 140 students. The groupwork mark contributes 30% which consists of presentation (10%), Project Based Learning report (5%) and Site Visit report (15%). The groups consist of 5 to 10 members and are formed by the students themselves. Group reports were assessed and multiplied by peer factors to obtain the individual marks. Table 1 shows a typical peer assessment result.

Table 1: Typical Peer Assessment Results

Total Group Marks 26				
Names	Individual Average	Adjustment Factors	Imposed Limits	Individual marks
Fong	17.0	0.91	0.91	23.6
Kiu	18.3	0.98	0.98	25.5
Lau	19.3	1.03	1.03	26.9
Lai	19.7	1.05	1.05	27.3

KNS2153 Hydraulic Laboratory course is a 2nd year course consisting of 102 students. The groupwork mark contributes 40% to the total course mark. The groups consist of 7 to 9 members, are multiracial, and of mix gender. Selection was done by the lecturer. Laboratory work was carried out in a group but each student produced their own individual report. Peer assessment was made for the group activities and the peer factor was then multiplied to the group average to obtain the individual laboratory report marks.

KNS4213 Structural Steel Design course is a 4th year design course. 46 students took the course in 2007. This course involved laboratory activities. If the course is laboratory based, generally a big number of members in a group DO NOT affect the peer assessment factor since individual laboratory submission is compulsory.

For courses similar to KNS4213, where the groupwork contributes HIGH PERCENTAGE to the final course marks and written examination examines the lessons learnt from the PBL work, the peer assessment alone is inadequate to reflect individual contributions. Individual marks from the peer evaluation are NOT SUFFICIENT to show that the students have gained understanding or ability as required in the Learning Outcomes. Student may get good grades for their design work but individual exam result (especially Final Exam) may reveal otherwise. The students' understanding should also be gauged from their results in their exams.

As for the HIGHER-LEVEL students (as in KNS4213), the students are more judgmental towards their group members. The members become aware and critical on who perform or contribute what to the group report.

II. Improvements and Recommendations

a) When *Peer Assessment* is part of group/individual evaluation tool, three important steps must be carried out to make the assessment effective: [2]

Step 1: Tell the student early. Announce rules and format on the first day of class
Copies of form used for assessment and evaluation can be handed out with (or as part of) the syllabus.

Step 2: Give the student practice. Do assessment before (the real) evaluation.
Provide opportunities for students to assess other team members in situations in which their assessments do not affect project grades

Step 3: Include feedback. Allow improvement
Most students are more willing to give honest feedback to peers as they gain experience with assessment. Generally, they will improve their performance upon receiving feedback from peers. Thus, providing them the opportunity to improve performance *before* making counts against their grades

b) Employ ***Peer Assessment*** **multiple times along the duration of the course**. [2]
Equal rating or over-rating occurs frequently in the first or second cycle of assessment. However, most students become more consistent and reasonable in their assessment in subsequent cycles. Assessments must be carried out multiple times, especially during the peak activity of the PBL.

c) Course Grading by **combining other Assessment Tools such as Signature Blocks, Workload/Percent-effort Tables, Peer Assessment, Peer Evaluations and Bonus Points.** [2]
Generally, the instructors may use *Signature Blocks* and *Workload Table* to adjust team assignments or report to indicate who contribute to the assignment and who do not. Individual members of the group contributing to the assignment get the same grade or zero, if otherwise. Adjustment of semester course grade or project average for individual are also done by other methods like Peer Assessment, Peer Evaluations and Bonus Points.

The Roles of Training Organization in Delivering Effective Industrial Training for Undergraduates

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ABSTRACT Industrial training is the core course for undergraduate students at the Faculty of Engineering, UNIMAS. Most of the students have their first working experience during this training. The experience that they gain throughout this training would definitely leave impact on them on their perception of work, responsibilities and knowledge. The responsibility of providing a proper training programme lies not only on the Faculty, but also on the training organizations. Proper and meaningful trainings would motivate the students and give them an insight into working life. With the introduction of Outcome-Based Education (OBE), it is the wish of the Faculty that relevant objectives and expected outcomes can be achieved through successful implementation of industrial training programme by the training organizations.

1. Introduction

Engineering education gives a lot of emphasis on industrial training. The duration of industrial training differs from 10 weeks to 6 months amongst local institutions of higher learning. The Engineering Accreditation Council (EAC) is shifting its paradigm to an outcome-based approach and thus engineering schools are expected to describe their programmes according to the outcome-based mode [1].

In order to be a permanent signatory of Washington Accord, OBE approach has to be incorporated in curriculum development. In 2000, the Malaysian Engineering Education Model (MEEM) proposed and identified five important criteria for engineering education – *scientific strength, professional competencies, multi-skilled, well-respected and potential industry leader, and morally and ethically sound.*

Practical competency is highlighted as an important skill to enable the students to be directly involved with hands-on activities or real-life situations [1]. It has been shown that students who underwent proper practical trainings have better performance in subsequent years and attained remarkable standard for their final year projects [2]. Thus, successful implementation of industrial training is an important part of undergraduate engineering education.

2. Organization's Need for Industrial Training

Training organizations can be categorized into two main groups based on their intention for having trainees – the active-oriented and passive-oriented. The active-oriented organizations acquire industrial trainees to fulfill the needs of having someone to handle specific projects or tasks, or in the hope of identifying future potential employees for the organization.

Students normally learn a lot and are able to practice their engineering skills when attached to these organizations. Multinational corporations such as Shell [3] and Microsoft [4] have internship programmes that are meant for these purposes.

On the other hand, the passive-oriented organizations hire trainees in order to fulfill their social responsibility, to be identified as having university-industry collaboration to reap certain benefits, or simply to fulfill the organization's cost-efficient or cost-free manpower need.

Students normally do not have specific tasks, do trivial (and sometimes non-engineering) jobs and are not well-supervised in this category of training organizations. As a result, trainees from the passive-oriented category tend to feel that doing industrial training is a waste of time. Clear advantages can be seen for students who join the active-oriented organizations where the students acquire engineering skills, exposure to real-life engineering work, and experience engineer's responsibilities and challenges.

The Faculty desires to have all its students trained with active-oriented organizations but in reality, there are some challenges and difficulties to achieve this ideals. Students may have preferred choice of training locations, type of training organizations and other preferences due to their own constraints especially in term of transportation, accommodation, family, friends, academic result, etc.

All these constraints limit their choices of training organizations which eventually would force them to join passive-oriented organizations for their industrial trainings. Also, active-oriented organizations normally take limited number of trainees and select the students based on certain criteria such as academic performance.

From the Faculty point of view, students should achieve relevant Program Educational Objectives (PEOs) and Program Outcomes (POs) after their industrial training. For example, students should demonstrate the ability to communicate effectively and to use engineering skills or tools for problem-solving.

In large or multinational organizations, internship programmes usually are well-designed, thus students do not have much complaints on the training programmes and are able to demonstrate these capabilities. For small and some medium-sized industries, however, improvement should be done to ensure that the students enjoy and learn from their industrial trainings.

3. Implementation of Effective Training

There is no standard or ideal model which can be referred by organizations as best practice for implementation of industrial training. Effective training, however, should basically have the following basic internship components:

i. Orientation programme – this includes introduction to the company's background and departmental functions, senior management, the trainee's supervisor and colleagues. This programme is important for the new trainee to instill a sense of belonging in the new environment.
ii. Environmental, Health & Safety (EHS) – environmental health and safety issues that everyone in the organization must know. This would help to protect the student's safety and create awareness on safety issues which may pose danger to fellow colleagues.
iii. Plant or site tour – simple introductory tour to let the student understand the processes or products of the organization.

iv. Project or task briefing – immediate supervisor to brief on task or work assigned to the trainee. Timeline, references, relevant trainings and help should be given to guide the trainee in completing the project.

v. Periodic review – review of the work done by the trainee. This can be done weekly or bi-weekly. The supervisor can prepare written comments, file them and give a copy to the Faculty after the training for evaluation purposes. Periodic review could also help to establish a continual improvement in the quality of the student's work. Students can keep record of all the reviews in their log books or reports.

vi. Exit interview – to gather feedback from trainee regarding the internship for future improvement of the organization's training programme.

Students who are attached to organizations which provide the above internship components as above are generally satisfied with their trainings and learning experience. For example, X-FAB Sarawak Sdn. Bhd. has internship programmes which incorporated all of the basic training components.

4. Conclusion

In conclusion, organizations which intend to hire trainees should prepare their internship programme and at least have all the basic internship components. It is inevitable that some smaller scale companies lack the experience to design such internship programmes. For these cases, the faculty could work out the industrial training programme together with the organization. This will ensure that students benefited from their industrial training and learn from real-life working experience.

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Comparison between Students' Self Assessment on Course Outcomes and their Performance

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ABSTRACT Starting from Semester 2 2007/2008 session, the Faculty of Engineering has conducted student survey on their level of course outcome achievements for all courses offered. The survey was conducted towards the end of the semester. Their self-comprehension ratings were then compared to their end of semester results. This study focuses on only 3 courses offered to Civil Engineering students, two of which are for first year courses and the other one for second year course. These courses are KNS 1461 Engineering Laboratory 2, KNF 1023 Engineering Mathematics 2, and KNS 2153 Hydraulics. Assessment for KNS 1461 Engineering Laboratory 2 focuses fully on laboratory reports and their attendance, while assessments for KNF 1023 Engineering Mathematics 2 and KNS 2153 Hydraulics are combination of assignments, tutorials and exams. This study shows a significant relationship between students' self assessment on course outcomes and their end of semester results.

1. Introduction

Course outcomes specify the observable and measurable knowledge, skills and judgment, which students are expected to have developed or acquired throughout the semester. They are what the students should know or be able to do or demonstrate at a given point in their development. [1]

Course outcomes were prepared in advance and made known to students by including them in their syllabi, and reviewing them with students throughout the semester. Course outcomes are linked closely to the department Programme Outcomes (POs). Hence, it is important for the course outcomes to be achieved to ensure that POs are met.

For this study, 3 taught courses were analyzed. The courses are KNS 1461 Civil Engineering Laboratory 2, KNF 1023 Engineering Mathematics 2, and KNS 2153 Hydraulics. The number of respondents were 58, 72, and 44, respectively.

Such study has been applied by many universities around the globe, such as Indiana University-Purdue University Indianapolis [2], Rochester Institute of Technology [3], and South Mountain Community College [4].

2. The Survey

The survey form was designed by the Faculty of Engineering. It rates the course outcomes from Strongly Achieved (5 points), Achieved (4), Uncertain (3), Not Achieved (2), and Strongly Not Achieved (1). Sample of the form is given in Table 1.

The survey form was distributed at the end of Semester 2 2007/2008 session. Results were gathered and analyzed to demonstrate level of students' self assessment/comprehension on the course outcomes.

Assignments were given to students to polish their level of understanding. For KNS 2153 Hydraulics, a project was also given. The notes, tutorials, and assignments were also made accessible to students via Morpheous. Lecturers of both courses also promoted 2-way interaction between lecturers and students and encourage pair/group discussion in class.

Table 1: Sample of Student Survey Form

No.	Course Outcome (CO)	Strongly Achieved (5)	Achieved (4)	Uncertain (3)	Not Achieved (2)	Strongly Not Achieved (1)
1	CO 1					
2	CO 2					
3	CO 3					
4	CO 4					

These interactive ways include students in discussions and ensure effective teaching and learning activities took place.

3. Results and Discussions

Figure 1 compares results from the self assessment survey with the average students' performance for the courses taken.

From Figure 1, 81% of KNS1461 Engineering Laboratory 2 outcomes were achieved. Students' average result for the course is 84.1%. However, for both KNF 1023 Engineering Mathematics 2 and KNS 2153 Hydraulics, results were lower than the comprehension level claimed by students.

Self assessment results for KNF 1023 Engineering Mathematics 2 and KNS 2153 Hydraulics are 72.2% and 74.2%, respectively. Students' average performances recorded at the end of the semester are 68.2% and 62.4% for KNF 1023 Engineering Mathematics and KNS 2153 Hydraulics, respectively.

There is an increment in the final assessment for KNS 1461 Engineering Laboratory 2 compared to students' self assessment as there were no exams given and all laboratory works were done in groups.

As for KNF 1023 Engineering Mathematics 2 and KNS 2153 Hydraulics, both courses has similar mark distributions. That caused a declining pattern in the end of semester results compared to students' self assessment in the survey.

The margin of difference is minimal, however, which shows that the course outcomes for all courses in this study was achieved.

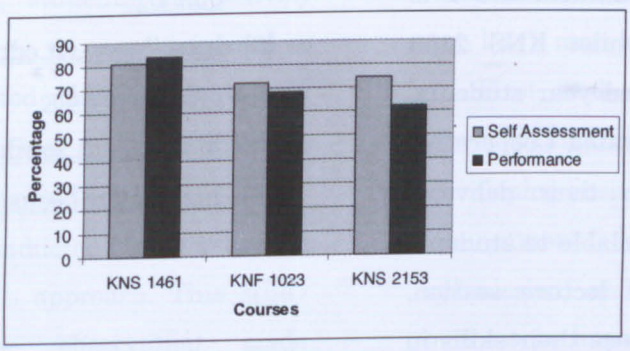

Figure 1: Students' Self Assessment Survey and Performance Results for Courses Taken

Average individual student results at the end of the semester were then compared with these survey results. Assessment of each courses differ from another.

KNS 1461 Engineering Laboratory 2 consists of seven laboratory experiments which come from Engineering Survey and Strength of Materials. Students are to submit all laboratory reports which carry 90% of the total mark. Another 10% is from their attendance.

Assessment for KNF 1023 Engineering Mathematics 2 consists of 20% assignments, 30% tests, and 50% from the final exam. Whereas for KNS 2153 Hydraulics, 20% of the marks are allocated for assignments, tutorials and project, 30% for test, and the remaining 50% for the final exam.

KNS 1461 Engineering Laboratory 2 is a first year course conducted in laboratories, where for each laboratory session, the laboratory manuals was put up in Morpheous for students to download and read before each session commences. Although the laboratory experiments were done in group, students are to submit their reports individually a week after the particular laboratory session.

KNF 1023 Engineering Mathematics 2 is also a first year course, whilst KNS 2153 Hydraulics is taught to second year students. Both courses apply the Integrated Cooperative Learning (ICL) methods in their delivery. Lecture notes were made available to students at least a week before the lecture session. Tutorials were given to enhance their skills in solving related problems and were discussed in the classroom.

4. Conclusion

This study shows a significant relationship between students' self assessment on the course outcomes with their end of semester results. Students' performances are lower than their self-assessment for courses with final exams. From the conducted survey, the comprehension rate of students ranges from 72% to 81%. Their end of semester results show average class mark ranging from 62% to 84%.

Although there is a tolerable difference in the two results, the course outcomes for all 3 courses studied was achieved. This shows effective method of teaching and learning has taken place throughout the semester for the three courses studied.

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Cooperative Learning: Stimulant for a New Leaf

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ABSTRACT This paper discusses the application of Cooperative Learning (CL) method in teaching engineering course. CL is one of the teaching approaches in Outcome Based Education (OBE). A study was conducted to verify the effectiveness of the CL approach. In this article, the KNJ1013 Statics course was chosen for the case study and the respondents were repeating students. The students' results were improved with the use of the CL approach.

1. Introduction

Engineering is one of the toughest programme offered in university. Core engineering courses such as Statics, Dynamics, Fluids and Thermodynamics are example of courses that normally have high percentage of failure among engineering students. The newly introduced teaching method, Cooperative Learning (CL) is hoped to ease the learning process of the "killer subjects".

In CL, students work with their peers to accomplish a common goal. The goal is achieved through interdependence among all group members rather than working alone [1]. CL is more towards student-centered learning, which is subset of Active Learning (AL) [2]. Using this approach, students are actively involved in the learning process, compared to the conventional method where students only sit and listen. CL activities make the learning process more interesting and effective.

A study was conducted to verify the effectiveness of the CL approach. This study was based on the observation made (throughout Semester 2, 2007/08 session) on a special class conducted for the repeating students who had failed their KNJ 1013 Static course. The syllabus, assessment, schedule and text book were the same. The differences were the size of the class and delivery method used. The subject of the study was the repeating students.

There were nine repeating students registered for the course. One of them has taken the course more than twice. And he has been barred from taking the final exam due to insufficient attendance record. The other members of the class are one second year student and seven first year students (Second Semester).

2. Turning Over a New Leaf

'Turning over a new leaf in your life and seeing what is on the other side'. It is hoped that by taking the course for the second time with the new teaching approach, the student can learn more effectively and get better grade.

First and foremost, the repeaters were given motivation the emphasis was towards developing positive attitude. This includes their commitment in attending lectures, task submission, and participation in class. Moreover, it is important to build up their confidence since they might be depressed due to their failures; to keep reminding them it is possible to get 'A' grade even if they had failed the course earlier and to remind them that they deserve it if they really change their attitude and learning style [1].

Having a small group of students is an advantage. Small group is easier to handle, more attention can be given to each students, and it helps in building good relationship between lecturer and students, as well as among students. Students are strongly encouraged to study in-group. Thus, in such cases, CL activities can be applied effectively in teaching.

CL is a well known successful techniques to support active learning [2]. There are several types of informal CL used in the class namely Think Pair Share, Cooperative Note-Taking Pair, and Pair Composition.

With little modification, CL activities can be used to suit the course needs. The students are encouraged to participate in class through Think-Pair-Share activities and the students themselves can come up with relevant topic to be discussed in class. Usually at the end of the topics, the students are given Take-Home-Quiz that works similar to Pair Testing activity. The students work in pair/group to solve the quiz.

Another CL activity is the Cooperative Note -Taking Pairs where students are assigned with different topics in which they have to summarise and prepare an example of question together with the solution. The students are also asked to present their note in front of the class and respond to questions.

Based on Outcome Based Education (OBE), the students are assessed continuously through quizzes, assignments, tests and exam. Indirectly, this consistent monitoring really affects their discipline and performance as well. By giving them take home quiz or assignment, the students are forced to do revision from time to time before they can complete the task. As most of the tasks are groupworks based, the "lazy student" is indirectly forced by his/her friends to study too.

In addition, the take-home quizzes are given at the end of the class. Only those students who attended the class on that day and submit the quiz by the due date are entitled for the mark. Normally the quiz has to be submitted during the next class. Therefore, the students must attend both of the classes. As a result, the students' attendance improved and they will be well prepared at all time (not 'last minute' before the test/exam).

3. Results and Discussions

Figure 1 shows the comparison of final results for the KNJ1013 Statics course. Result 1 shows their previous final marks while Result 2 is for the current session 2007/08 (Semester 2). Each of the 8 students are represented by number from S1 to S8. The axis 'Marks' refers to their final mark which includes course works and final examination.

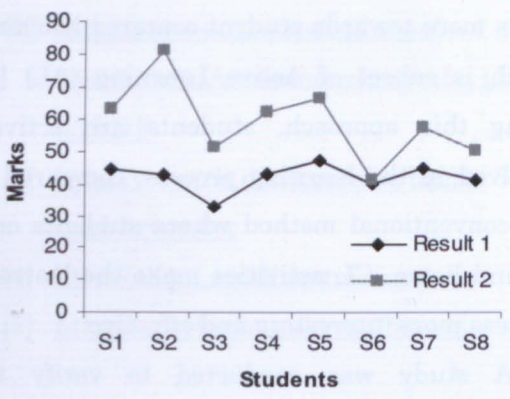

Figure 1: Comparison of Results

In general, most of the students showed improvement except student S6. In average, percentage of marks improvement is 19%. The

Minimum improvement is two grades meanwhile the maximum is nine grades (showed by student S2). The student has shown an outstanding improvement in getting to grade A from grade D.

Student S2 has good result prior to UNIMAS. Due to problem adapting into the new environment as a university student, he failed to perform in the earlier semester [3]. By giving him the second chance, he had proved that he could also qualified for the Dean's list (Semester 2, 07/08 Session).

The reasons for the students' earlier failure the first time they took this course are due to their negative attitude and weak academic background. For example, students S3 and S8 do not have strong fundamental engineering background. In addition, student S8 also have problem concentrating in his studies and can easily fall asleep after 10 minutes of lecture. Meanwhile, student S7 has problem in understanding English, making it difficult for her to understand the course. Student S4 is hardworking person but prefers to study alone (not recommended in engineering). Students S2, S5 and S6 are staying with their families and this apparently affects their concentration and time for doing revision.

Student S6 is the only student that shows no improvement. And he failed due to his attitude problem. Many quizzes and assignments were not submitted. The trend became severe towards the end of semester as his attendances also worsen. It seems that he had lost his focus in study due to other activities. Basically, student S6 failed to put priority on his study.

With these specially conducted classes, the students gained more attention, motivation and exposure to the correct study techniques. CL forced them to be more actively involved in discussions which is good as it keeps their mind on constant alert. CL has successfully developed their interest and improved their understanding of the subject. They have been encouraged to ask any questions including those related to basic subjects such as mathematics and physics as means to help them understand the KNJ1013 Statics course.

Other than enhancing learning, CL has indirectly helped the students to obtain additional skills such as generic skills. They are able to discuss and communicate effectively with high level of confidence. Working together made them closer and the study group become enjoyable. At the same time, their discipline level showed positive improvement. This is shown by their attendances, which exceeded 80% and all of them submitted most of their courseworks except for student S6.

4. Conclusion

As a conclusion, the CL approach has proved to be effective. With little adjustment on the activities, CL is a very practical approach for in teaching engineering courses. This was proven by the repeating students as they learned better with the help of CL. In addition, smaller class size will make the learning process more effective and the implementation of CL easier.

5. References

[1] http://alumni.media.mit.edu(20 October 2008).

[2] K. M. Yusof, Z. Tasir and S. M. S Hassan. Handout, A 2-day Workshop on Student-centred Learning for Outcome-Based Education (OBE)-Part 1, April 2007.

[3] A. S. Zainal Abidin and R. Muslimen. Kaedah Mengoptimumkan Potensi Diri Pelajar, Academic Quality Symposium, Faculty of Engineering, UNIMAS, 5th December 2007.

Centre of Research Excellence in Energy and Environmental Engineering(CORE^3)

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ABSTRACT Parallel to rapid growth in industrial and urbanisation in the past few decades, there has been a sky-rocketing increase in the demand of energy through the burning of fossil fuels to generate electricity and power automobiles. Ever increasing emissions of industrial hazardous pollutants and use of agrichemicals have significantly affected the environmental resources. Conversely, due to immense energy acquisition and agricultural activities, severe environmental pollution on a regional and global scale has become a recent phenomenon; to an extent where such anthropogenic emissions are capable of producing such effects as global warming (greenhouse effect), trans-boundary haze pollution, widespread of acid rains, and significant damage to ozone layer.

However, for developing country such as Malaysia, energy and environment are the utmost important elements for sustainable development and poverty reduction. Generally, the poor are disproportionately affected by environmental degradation, and are worsens by their inaccessibility to affordable energy services. Undoubtedly, supply of sufficient and affordable energy services can play a key role in all aspects of nation development, especially in socioeconomic development and environmental sustainability including education, agricultural productivity, access to clean water, and health.

In line with the launch of Sarawak Corridor of Renewable Energy (SCORE) located in the Central Zone of the State of Sarawak that stretches from Similajau (Bintulu) to Tanjong Manis on 11 February 2008 by the State Government of Sarawak, the proposed Centre of Research Excellence in Energy and Environmental Engineering (CORE^3) wishes to conduct critical research, development, demonstration, and innovation of technologies utilising hydroelectric, solar, biomass, biopower, biofuels, and wind energy sources. Also, the proposed Centre wishes to embark on the development and innovation of environmental protection technologies for the mitigation and prevention of air, water, and soil pollution .

1. Objectives

The proposed Centre of Research Excellence in Energy and Environmental Engineering (CORE^3) shall be a designated centre located at the Faculty of Engineering (FENG), West Campus, Universiti Malaysia Sarawak (UNIMAS). The primary objectives of the proposed Centre are as follows:

i. To conduct research, development and innovation of alternative and renewable energy technologies, and provide solutions to tactical energy and environmental issues; and
ii. To promote self-sustainable, renewable and affordable energy for rural communities, and environmental awareness for materials recovery, reuse and recycling.

2. Management and Finance

It is anticipated that the operation and management of the Centre shall be carried out by the team members and staff of FENG, and that no extra costs are required.

Additionally, with the exception of reimbursable and allowances (such as transportation and per diem), the director, deputy directors and team members of the proposed Centre shall receive no extra allowance. The financial implications on R&D, IP protection, innovation, etc. shall be supported by the funding secured by the Centre or team members.

3. Members

As of February 2008 (based on information provided by Post Graduate & Research Committee, FENG), there are 17 members (all from FENG) who had expressed their interest to participate in energy and environmental related research. The members are:

i. Prof. Dr. Salim Said
ii. Prof. Ir. Dr. FJ Putuhena
iii. Prof. Ir. Dr. Law Puong Ling
iv. Assoc. Prof. Ir. Dr. Andrew Ragai Anak Henry Rigit
v. Assoc. Prof. Dr. Awangku Abd. Rahman Pgn. Hj. Yusof
vi. Dr. Azhaili Baharun
vii. Dr. Siti Halipah Ibrahim
viii. Dr. Mohd. Omar Abdullah
ix. Dr. Abu Saleh Ahmed
x. Ir. Dr. Mohammad Shahril Osman
xi. Dr. Al-Khalid Ohtman
xii. Dr. Onni Suhaiza bt Selaman
xiii. Dr. Rubiyah Baini
xiv. Mdm. Shanti Faridah Saleh
xv. Mr. Nazeri Abdul Rahman
xvi. Mdm. Dyg. Azra Awang Mat
xvii. Mr. Shahrol B. Mohamaddan

4. Ongoing Research Projects

i. Solar Energy-Powered Pepper Drier
Funding: RM170,000.00, Pepper Marketing Board, Sarawak 2007

ii. Performance of Dielectric Barrier Discharger and Flow Visualization
Funding: RM100,000.00, MOSTI e-Science Fund 2007

iii. Development of an Efficient Hybrid Thermo Electric Adsorption Air Conditioning System
Funding: RM143,200.00, MOSTI e-Science Fund 2007

iv. A Phase Separator with Inclined Multiple Angles Parallel Arc Coalescence
Funding: RM188,200.00, MOSTI e-Science Fund 2007

v. A Trickling Filter with Hexagonal Closest Packed (HCP) Arrangement
Funding: RM129,800.00, MOSTI e-Science Fund 2007

vi. Study of an Environmentally-Green Palm-Diesel Biofuel Derived Gasoline for Small IC Engine
Funding: RM40,000.00, UNIMAS 2007

vii. A System for Conversion of Biomass-to-Fuel Gases
Funding: RM100,000.00, Top-Down UNIMAS 2006

viii. Design and Testing of Medical Nasal Sprayer
Funding: RM50,000.00, UNIMAS 2006

ix. Unmanned Underwater Search Craft
Funding: RM40,000.00, UNIMAS 2005

x. An Evaluation of Thermal Comfort in Modern Affordable Housing in Sarawak
Funding: RM40,000.00, UNIMAS 2005

xi. Energy comfort, Sustainability and Hybrid-Solar Refrigerator for Engineering Laboratory
Funding: RM50,000.00, UNIMAS 2005

xii. Construction of Mini-fuel Cell Energy System
Funding: RM30,000.00, UNIMAS 2005

xiii. Effects on Signal Penetration into Building in Malaysia by their Construction Materials
Funding: RM40,000.00, UNIMAS 2004

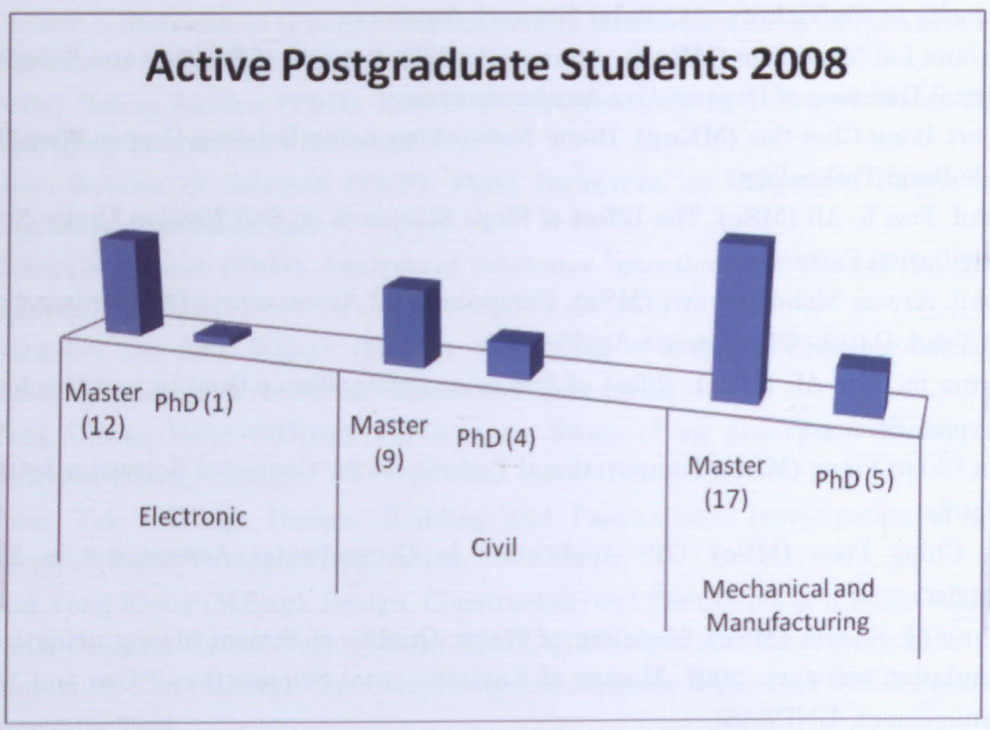
5. Postgraduates

1. Lai Sai Hin **(Post-Doctoral)**. Biomass and Municipal Solid Waste-to-Energy.
2. Leo Sing Lim **(PhD)**. Solar-driven Air-conditioning System for Automobile.
3. Ir. Ooi Koon Beng **(PhD)**. Modeling a Building Zone to Optimize Energy and Comfort in Kuching and Melbourne using Energy Plus Simulation Software.
4. Lisa Yong **(PhD)**. Spectrum Delivery Scheme and Bit Error Rate of a Radio-over Fibre System Involving Laser Dynamic Non-linear Distortions.
5. James Ho Thiam Hee **(PhD)**. Modeling of Air Flow behind Big Obstacles.
6. Almon Chai Wei-Yen **(PhD)**. Improvement of Heat and Mass Transfer in Large-scale Drying Equipment.
7. Ngu Lock Hei **(PhD)**. Development and Optimization of a 2-Stage Wastewater Treatment System.
8. Wong Kien Kuok **(PhD)**. Development and Performance Evaluation of a Treatment System for Machining Coolants.
9. Haidar Abudllatif **(PhD)**. Solid-Oil-Water Separator with Inclined Curved Arc Coalescence Plates.
10. Mohamed Daud **(PhD)**. An Expert System for Predicting Distribution and Consumption of Irrigation Water in a Paddy Irrigation Scheme.
11. Ahmed A. Ganfoud **(PhD)**. Simulation and Control of Saltwater Intrusion in Coastal Aquifers.
12. Thamir A. Mohammed **(PhD)**. Flood Simulation Models for a River System in a Tropical Region: The Case of Linggi River, Malaysia.
13. Abdul Hakim Almdny **(PhD)**. Effects of Agrochemicals on Different Water-Table Depths in Managing Groundwater Pollution".
14. Onni Suhaiza bt Selaman **(PhD)**. Flood Estimation at Un-gauged Basins in Sarawak by Regionalization Technique.
15. Ruslan b. Hassan **(PhD)**. Analysis of Saltwater Intrusion in a Coastal Aquifer: The Case of Bachok, Kelantan.
16. Noraziah Bte Abd. Wahab **(MEng)**. Evaluation of a Single Chamber Microbial Fuel Cell Using Graphite Felt Anode for Wastewater Treatment.
17. Tang Chung Heng **(MEng)**. Performance Study of an Absorption Cooling System under Different Energy Sources.
18. Peter Yek **(MEng)**. Design, Building and Performance Investigation of an Airboat for Sarawak Rural Transport Application.
19. Gan Yong Kiong **(MEng)**. Design, Construction and Simulation of a Fuel Cell Signal Detector and a Compact Hybrid Battery-Solar-Fuel Cell Multipurpose Emergency Kit.
20. Jamuri Hj. Zen **(MEng)**. The Complexity and Hazards Associated with Internal Inspection of Ammonia Tank.
21. Samsudin Sulaiman **(MEng)**. Technical Application and Cost Implication of District Cooling System in UNIMAS New Campus.
22. Rudy Purnawarman **(MEng)**. Enhancing Tourism for Integrated Riverbank Area Development in Kuching, Sarawak.
23. Chai Choung Jung **(MEng)**. Development of Power Consumption Pattern.

24. Felix Khenvilay **(MEng, International Exchange Student)**, University of Technology, Belfort-Montbéliard, France. Project: Medical Nasal Sprayer.
25. Matthieu Ferraro **(MEng, International Exchange Student)**, University of Technology, Belfort-Montbéliard, France. Computer Simulation of Fluid Flow Around a Submarine.
26. Henry Anak Stian @ Sebastian **(MEng)**. Dielectric Barrier Discharger.
27. Muhammad Faizal Bin Ishak **(MEng)**. Solar Dryer.
28. Lai Koon Chun **(MEng)**. Pepper Berries Colour Sorter.
29. James Tan Yiaw Beng **(MEng)**. Artificial Neural Network.
30. Robin Leong **(MEng)**. Design of Electrostatic Agricultural Sprayers and Spray Characteristics.
31. Thian Kah Kien **(MEng)**. Construction and Contract Management.
32. Chong Kok Hin **(MEng)**. Biomass-to-Energy Conversion System: Heat Distribution Analysis.
33. Lim Su Boon **(MEng)**. A Particle Separator Conveyor with Inclined Separation Plate.
34. Oon Yin Wee **(MEng)**. A Micro-Scale Wastewater Treatment System for Domestic Effluents.
35. Freddy Kho WL **(MEng)**. Assessment of Carbon Monoxide Levels at Signalized Intersection and Roadway.
36. Gracie Chong SC **(MEng)**. A Model for Prediction of Nearby Population and In-Plant Workers Exposure to Air Pollutants Released from Industrial Facilities.
37. Jong Tze Kian **(MEng)**. Quantitative Measurements and Modeling of Microwave Field Intensity in the Vicinity of Cellular Network Antennas.
38. Adriana Lai Mook Kim **(MEng)**. Analyze the Effectiveness of Position and Velocity Feedback in Critical Damping of Capacitative Accelerometers.
39. Albert Bong Chor Sar **(MEng)**. Home Networking using Existing Copper Wire Based on Ultra Wide Band Technology.
40. Mohd. Fozi b. Ali **(MSc)**. The Effect of Slope Steepness on Soil Erosion Under Natural Rainfall Distribution Patterns.
41. Mohd. Azwan Mohd Zawawi **(MSc)**. Computational Assessment of Groundwater Production in the Teluk Datuk- Olak Lempit Aquifer.
42. Zarina bt. Md. Ali **(MSc)**. Effect of Urbanization on Water Quality and Discharge in Taman Mayang, Selangor.
43. Tan Chiau Siang **(MSc)**. Computational Techniques for Control of Saltwater Intrusion in Small Islands.
44. Hii Ching Poon **(MSc)**. GIS Application in Groundwater Assessment in Kuala Selangor District.
45. Penny ak Sumok **(MSc)**. Modeling of Water Quality of Sungai Maong using Infoworks River Simulation software. 2007. Master of Environmental Science (Land Use and Water Resource Management, UNIMAS).
46. Liew Ke-Bo **(MSc)**. Hydrology Model of Extensive green Roof for Kuching. 2007. Dissertation Submitted for Master of Environmental Science (Land Use and Water Resource Management, UNIMAS).
47. Sharifah Raha bt Wan Ab Rahman **(MEng)**. Assessing Variation in Water Distribution and Pressure Drops in an Existing Water Supply Network.
48. Norafina Safri **(MEng)**. Energy Efficiency in Office Buildings – The Significance of Blinds.

Postgraduate Students Faculty of Engineering

The Faculty of Engineering has produced many postgraduate students since it was formed back in 1993. Shown in the chart below are the current active postgraduate students at the Electronic Engineering Department, Civil Engineering Department and the Mechanical Engineering and Manufacturing System Department.



Research Grants (On-Going)

No.	Project Title	Researchers	Grant
1.	A Study on the Long-Term Deflection and Deboding Behaviour of Reinforced Concrete Beams Strengthened with FRP sheets	Assoc. Prof. Dr. Ehsan Ahmed, Dr. Mohammad Ibrahim Safawi, Assoc. Prof. Dr. Ahmed Lebbe Mohamed Mauroof, Azida Rashidi	FRGS
2.	Theoretical Development of Fuzzy Logic Based Assessment Model for Failure Evaluation Problem in Manufacturing	Tay Kai Meng, Assoc. Prof. Dr. Teh Chee Siong, Ir. David Bong Boon Liang	FRGS
3.	The Determination of Optimum Mix Proportion for Foamed Concrete Used as Road Base on Soft Soil	Dr. Mohammad Ibrahim Safawi Mohd Zain, Abdul Razak Abdul Karim, Jethro Henry Adam	FRGS
4.	Improvement on Particle Image Velocimetry Analysis on Simple Soil – Structure Interaction	Dr. Siti Noor Linda Bt. Taib, Dr. Prabir K. Kolay, Shamsiah Suhaili	FRGS
5.	Investigation of Physical, Mechanical and Acoustic Properties of Wood-Polymer Composites (WPC)	Assoc. Prof. Dr. Sinin Hamdan, Dr. Zainal Abidin Talib, Dr. Mahbub Hasan, Dr. Md. Abu Affan	FRGS
6.	The Effects of Malaysian Atmosphere on the Durability Aspects of Epoxy-Resin Concrete	Idawati Ismail, Azida Rashidi, Dr. Mohammad Ibrahim Safawi Mohd Zain, Assoc. Prof. Dr. Abd Aziz Saim	FRGS
7.	Estimation of Parking Pricing Model to Mitigate Congestion at Congested Business Districts	Mohamad Raduan Bin Kabit, Prof. Dr. Wan Hashim Wan Ibrahim, Zamri Bujang	FRGS
8.	Modeling of an Artificial Neural Network Based Load Forecasting System for Sarawak	Ir. David Bong Boon Liang, Tay Kai Meng, Ngu Sze Song, Kho Lee Chin	*Dana Galakan*
9.	Developing Standard Procedures and Flow Chart for Identifying Peat's Geotechnical Properties	Norazzlina M. Sa'don, Dr. Siti Noor Linda Bt. Taib	*Dana Galakan*
10.	Experimental Investigations on the Effect of Binders on Peat	Abdul Razak Abdul Karim, Norazlina M. Sa'don	*Dana Galakan*
11.	Performance of a Dielectric Barrier Discharge Plasma Actuator and Flow Simulations	Assoc. Prof. Ir. Dr. Andrew Ragai ak Henry Rigit	e-Science Funds (MOSTI) Project No.: 06-01-09-SF0023 (RM100,000)

Research Grants (On-Going) (continue)

12.	A Trickling Filter with Hexagonal Closest Packed (HCP) Arrangement	Prof. Ir. Dr. Law Puong Ling	e-Science Funds (MOSTI) Project No.: 06-01-09-SF0036 (RM129,800)
13.	Hydrosystems for Integrated Control of Flood and Low Flow for a River Basin in Sarawak	Charles Bong Hin Joo	e-Science Funds (MOSTI) Project No.: 04-01-09-SF0004 (RM197,294)
14.	Development and Performance Evaluation of a Phase Separator with Inclined Multiple Angles Parallel Arc Coalescence Plates	Prof. Ir. Dr. Law Puong Ling	e-Science Funds (MOSTI) Project No.: 06-01-09-SF0017 (RM188,200)
15.	Development of an Efficient Hybrid Solar Thermoelectric-Adsorption Cooling System	Dr. Mohammad Omar Abdullah	e-Science Funds (MOSTI) Project No.: 03-01-09-SF0018 (RM143,000)
16.	An Investigation into the Stabilization of Peat Soil and Application of Lightweight Foundation	Dr. Mohammad Ibrahim Safawi Mohd. Zain	e-Science Funds (MOSTI) Project No.: 03-01-09-SF0032 (RM308,900)
17.	A Tricking Filter with Spherical Hollow Perforated Plastic Medium in Hexagonal Closest Packed (HCP) Arrangement	Prof. Ir. Dr. Law Puong Ling	e-Science Funds (MOSTI) Project No.: 06-01-09-SF0036 (RM129,800)
18.	Development and Testing of an Adsorption Air Conditioning System for Automobile on-the-road Application	Dr. Mohammad Omar Abdullah, Leo Sing Lim	*Geran Dana Khas Inovasi*
19.	Design and Development of a Mechatronic Harvester for Harvesting Pepper in Typical Terrain	Ir. Dr. Mohd Shahril Osman, Shahrol Mohamaddan, Noor Hisyam Nor Mohamed, Siti Nor Ain Musa, Aidil Azli Alias, Shamsiah Suhaili, Abg. Mohd Nizam Abg. Kamaruddin, Nur Tahirah Razali, Maimum Huja Husin, Kasumawati Lias	Malaysia Pepper Board-UNIMAS Project 1-08 (RM95,000)
20.	Design and Development of a Solar-Based Pepper Dryer	Assoc. Prof. Ir. Dr. Andrew Ragai ak Henry Rigit, Ir. Dr. Mohd. Shahril Osman, Dr. Rubiyah Baini, Ervina Junaidi	Malaysia Pepper Board-UNIMAS (RM170,000)

Research Patents

No.	Title	Researchers	Patent Number	Remarks
1.	Deposition of Materials	J. Stokes, L. Looney, M. S. J. Hashmi, M. Hasan & M. Tyrrell	Irish Patent Number 2006/0821	Accepted in 2007
2.	Apparatus and Method for the Separation of Oils and Solids in a Liquid	Law P.L., Ngu L.H. & Wong K.K.	PI20070094	Filed (2008)
3.	Trickling Filter with Medium Consists of Perforated Spherical Hollow Plastic Balls in Hexagonal Closest Packed (HCP) Arrangement	Ngu L.H., Law P.L. & A.A. Rahman	Novel	Filed (2008)
4.	A Separator with Inclined Multiple Angles Arc Coalescence Plates	Law P.L., Haidar S. Abdullatif & A.A. Rahman	Novel	Filed (2008)
5.	A Phase Separator with Dual-Angle Coalescence Plates	Ngu L.H., Law P.L., Wong K.K. & A.A. Rahman	Novel	Filed (2008)
6.	Spiral-Framed Human Hair -Based Filter	Oon Y.W., Law P.L. & A.A. Rahman	Novel	Filed (2008)
7.	Heat Driven Adsorption Air-Conditioning System for Automobile	M.O. Abdullah & S. L. Leo	PI20081641	
8.	Portable Banana/Yam/ Tapioca Slicing Machine	M.O. Abdullah, A. Kadir B. Umar, V. H. Kuan & R. A. Fridy	PI20082356	Beginning Commercialization

Refereed Journal Papers 2007/2008

Abdullah, F., Ferraro, M., and Rigit, A. 2007. Design Optimization of an Unmanned Underwater Vehicle. *Journal of Engineering Science and Technology*, **Vol. 2** (No.2), *pp.119-125.*

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Khoo, F.W.L., Law, P.L., and Ibrahim, S.H. 2007. Carbon Monoxide Levels Along Roadway. *Int. Journal of Environ. Sci. Tech.,* **Vol. 4** (No. 1), *pp. 27-34.*

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Law, P.L., Law, I.N., Lau, H.H. and Kho, F.W.L. 2007. Impacts of Barrage Flushing and Flooding-in Operations on Total Suspended Solids Upstream. *Int. Journal of Environ. Sci. Tech.,* **Vol. 4** (No. 1), *pp. 75-83.*

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Law, P.L., Wong, N.H. and Lai, S.H. 2007. Field Tests on a Grease Trap Effluent Filter. *Int. Journal of Environ. Sci. Tech.,* **Vol. 4** (No. 3), *pp. 345-350.*

Liew, F.K., Hamdan S. and Osman, M.S. 2007. The Relationship Between Ultrasonic Wave Velocity, Strain and Microstructure in Mild Steel Bar. *CINDE (Canadian Institute for Non Destructive Evaluation Journal).*

M.S. Norazlina, and V.A. Sawant. 2007. Flexural Stress Analysis of Rigid Pavements Using Axi-Symmetric and Plane Strain FEM. *ASEAN Journal on Science and Technology for Development (AJSTD).*

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Gold Award: Abdullah, M.F.A., Dim, A., Lamat, M. and Rigit, A.R.H. (2007), "Unmanned Underwater Vehicle," *Malaysian Trade Exhibition 2007, Kuala Lumpur, Malaysia.*

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ICT e-Bario, e-Asia 2007 Exhibition, February 2007, Putrajaya International Convention Centre, Putrajaya, Malaysia.

Accreditation Committee in Faculty of Engineering, UNIMAS

Rohana Binti Sapawi, Siti Nor Ain Bt Musa and Nazeri Bin Abdul Rahman
Accreditation Committee, Faculty of Engineering, UNIMAS
E-mail: srohana@feng.unimas.my

The importance of accreditation goes far beyond the quality of a student's educational programme. Accreditation does not only bring quality to educational programmes, but also provides an educational experience that is valued by the engineering profession. An understanding of accreditation can assist students to make an informed decision for their future.

Engineering Accreditation Council (EAC) is the body delegated by BEM to award accreditation to engineering degrees. EAC is made up by representatives from the Board of Engineers Malaysia (BEM), The Institution of Engineer, Malaysia (IEM), Malaysian Qualification Agency (MQA) and the Public Service Department.

The main objective of accreditation is to ensure that graduates of the accredited engineering programme satisfy the minimum academic requirements for registration as a graduate engineer with the Board of Engineers Malaysia (BEM) and for admission to graduate membership of IEM. In addition, accreditation is used to ensure that Continual Quality Improvement (CQI) is practiced by Institutions of Higher Learnings (IHLs) and may also serve as a tool to benchmark engineering programmes offered by IHLs in Malaysia [1].

The Faculty of Engineering was successfully accredited in 2004. As the accreditation was accorded for a period of four years to all programmes in Faculty of Engineering, the Faculty is currently in the process of applying for re-accreditation. With this new exercise, amongst the important element that will be evaluated is the effectiveness of the quality assurance systems and procedures that is being practiced in the faculty. In other words, the CQI practiced by the Faculty will be assessed.

In order to achieve and monitor the implementation of CQI, the accreditation and OBE committees was established. The committees are responsible in assisting the Faculty management with the accreditation exercise. Currently, the committees are coordinated by Mdm. Rohana Sapawi and Mr. Nazeri Abdul Rahman, respectively. The main purpose of the establishment of these committees is to ease the compilation and documentation process for certain accreditation elements at Faculty level. Under the committees are representative from each department to assist the coordinator. In general, these two committees are in charge of the accreditation process and implementation of OBE that needs to be centralised at the Faculty level.

As for accreditation committee, current, representative of each department is Mr. Charles Bong Hin Joon (Department of Civil Engineering), Ms. Shafrida Sahrani and Mr. Mohd. Faizrizwan Mohd. Sabri (Department of Electronics Engineering) and Ms. Siti Nor Ain Bt. Musa (Department of Mechanical and Manufacturing Engineering).

For the time being, this committee has came out with new format to standardise the self-assessment report of each department, centralised the documents regarding accreditation and OBE from each department in the Faculty Resource Centre, compiled necessary documents that are required for accreditation purposes, and ensure that each department has compile course files for the past four years in order.

Faculty of Engineering received the accreditation panel visit from 18 – 20th August 2008. Committee members with the assistance from all Faculty members prepared and updated all the documents for the accreditation process and the committee liaised with OBE committee to ensure the Faculty is well prepared.

Accreditation is important in order to assist students and their parents in choosing good quality university/college programme, enables employers to recruit well trained graduates, and is useful for the professional bodies to screen the applicants. Accreditation also gives colleges and universities a structured mechanism to assess, evaluate and improve the quality of their programmes. Overall, accreditation does not only benefit the IHL itself but also the other stakeholders. Therefore, accreditation is one of the major concerns of Faculty of Engineering.

In conclusion, accreditation is a continual process where each of the Faculty members is involved whether directly or indirectly. As a result, this will bring a better quality in engineering education. The accreditation committee is responsible in to monitor an ensure that the accreditation process goes as smooth as possible. Each of the Faculty members, however, is responsible in ensuring the faculty is accorded with full accreditation.

Reference:

[1] Engineering Programme Accreditation Manual, 2007.

FENG Seminar Series 2007/2008

It is a trend for Faculty of Engineering (FENG) to organise seminar series which serve as a platform to discuss on-going research activities. This idea was first initiated by Deputy Dean of Undergraduates and Student Development, Dr. Mohammad Ibrahim Safawi B. Mohammad Zain in 2005. And it has received good response from academic staff and students.

In this seminar series, fellow researchers share their research works with others. With Q&A session, this activity allows researchers to get feedback and opinions from others with various academic backgrounds and experience, which may guide them in their future work. Today, FENG seminar series is published in UNIMAS portal, and participation of researchers from other faculties are highly welcomed.

Topics presented during 2007/08 session are listed below:

Date	Speaker	Program	Topic
Jan 2007	Mdm. Ervina Junaidi	Mechanical and Manufacturing	Technical Visit Cum Lab Attachment at Kyushu University, Japan for Ervina Junaidi and Shanti Faridah Salleh
Feb 2007	Mdm. Kho Lee Chin	Electronics	Measurement of Signal Penetration into Building Construction Materials at 900MHz
Mar 2007	Mr. Abdul Razak Abdul Karim	Civil	Aluconcrete Composite Beams
Apr 2007	Assoc. Prof. Ir. Dr. Andrew Ragai Henry Rigit	Mechanical and Manufacturing	From a Conceptual Design to a Final Product: Design and Development of a User-Friendly Nasal Sprayer
May 2007	Mr. David Bong	Electronics	Car-Park Occupancy Indication System (COINS)
Jun 2007	Mr. Mohd. Raduan Kabit	Civil	Roundabout Capacity Considering Unbalanced Flows and Lane Specific Operations: A Case Study Using Arcady 5
Jul 2007	Dr. Mahbub Hasan	Mechanical and Manufacturing	High Velocity Oxy-Fuel (HVOF) Thermal Spray Deposition of Aluminium/Tool-Steel Functionally Graded Coatings on Aluminium Substrates
Aug 2007	Mr. Tay Kai Meng	Electronics	An Application of Fuzzy Modeling Technique in Failure Mode and Effect Analysis (FMEA)

Nov 2007	Ms. Shamsiah Bt. Suhaili	Electronics	Detection of Lightning Position in Space
Dec 2007	Mdm. Azida Bt. Rashidi	Civil	Using CSC software in the Teaching and Learning of Structural Engineering Course
Jan 2008	Assc. Prof. Dr. Ehsan Ahmed	Civil	Bondekii/ Cemboard Composite Floor Panel: Development, Structural, Performance and Application
Feb 2008	Mr. Shahrol B. Mohamaddan	Mechanical and Manufacturing	Development of Finger Rehabilitation and Grip Mechanism Assistant Device
Mar 2008	Mdm. Rohana Bt. Sapawi	Electronics	Simulation of CMOS Schmitt Trigger
Apr 2008	Assc. Prof. Dr. Ahmed Lebbe Mohamed Mauroof	Civil	Failure of World Trade Centre-A Critical Review
May 2008	Ir. Dr. Mohammad Shahril B. Osman	Mechanical and Manufacturing	Photoelastic Technique for Stress Measurement
Jun 2008	Mdm. Sakena Bt. Abd Jabar	Electronics	Optical Amplifier Number and Placement in SuperPON Architecture
Jul 2008	Mr. Ron Aldrino Chan	Civil	Preliminary Evaluation and Development of Climate Change Screening Framework for Road Projects
Aug 2008	Mr. Noor Hisyam B. Noor Mohamed	Mechanical and Manufacturing	Adhesive Strength of Epoxy Resin with Aluminum Filler under High Temperature Environment

ROBOCON Report 2008

Yoon Yin Koo and Kai Meng Tay
Faculty of Engineering, UNIMAS
E-mail: kmtay@feng.unimas.my

ABSTRACT ROBOCON is an international annual robot contest organised by Asia-Pacific Broadcasting Union (ABU) for university, college, and polytechnic students in the Asia-Pacific region. In this contest, participants from each team compete with their peers from other countries with hand made robots. With the support from the Vice Chancellor, Dean of Faculty of Engineering, and Head of Department of Electronics Engineering, University Malaysia Sarawak (UNIMAS) has sent a team which consists of two lecturers and eight students to participate in this contest. In this paper, we share on the ROBOCON 2008 contest theme. Also, design constraint of our robot is discussed, and part of our robot design is shared.

1.Introduction

ROBOCON is an international annual robot contest organised by Asia-Pacific Broadcasting Union (ABU) for university, college and polytechnic students in the Asia-Pacific region [1, 2]. Under a common set of rules, participants from each team compete with their peers from other countries with hand made robots. The contest is hosted by different broadcaster/country every year. ABU ROBOCON was launched back in 2002 in Tokyo. The baton of host country has been passed on to Bangkok, Seoul, Beijing, Kuala Lumpur, Hanoi, and now the host for 2008 contest is Doordarshan (DDI/MIT), Maharashtra Institute of Technology (MIT), India with different sets of theme and rules.

In Malaysia, the contest (national level) was organised by SIRIM Berhad and Minister of Higher Education Malaysia, at the Dewan DECTAR, Universiti Kebangsaan Malaysia (UKM), from 26 March to 30th March 2008. For the contest, Department of Electronics Engineering, Faculty of Engineering, UNIMAS has sent a team of lecturers and students (consists of two lecturers and eight students) to participate in ROBOCON 2008.

2. Theme of the Year: GOVINDA

The theme of ROBOCON 2008 is based on an Indian mythology related to Lord Krishna (a Hindu deity) and the festival of Dahi-Handi, celebrated annually in northern part of India. Born as a prince and brought up into a cowherd family, Krishna is often referred to as "Govinda".

As a child, Govinda and his friends used to raid kitchens and searched for milk, butter (Makhkhan) and cheese (Paneer). They also used to tease young girls (Gopis) carrying pots (Matka) filled with water, milk, butter, or cheese on their heads. A common practice in rural India is to suspend these pots (containing cheese, butter and milk) from beams high in the ceiling out of reach of cats.

During the day when the men were busy in the fields and the women folk busy with outdoor chores, the naughty and adventurous Govinda along with his band of friends would form a human pyramid to reach these pots and help themselves to the contents, as depicted in Figure 1, which was then led to the born of the Dahi-Handi festival.

Figure 1: Govinda

Figure 2: The Festival of "Dahi-Handi"

During the festival of Dahi-Handi, large earthen pots filled with milk, curds, butter, honey, fruits and coins are suspended at a height of 20-40 feet from the ground. Young men and boys (Govindas) form a human pyramid by standing over each other's shoulders, as shown in Figure 2. When the pyramid is tall enough, the topmost person in the pyramid would reach out and break the pot to claim its contents as well as the currency notes tied to the rope by which the pot hangs. This prize money is distributed among those who formed the human pyramid.

ROBOCON 2008 requires students to design robots that can carry each other to form a robot pyramid to get the yellow butter in the contest ground, as depicted in Figure 3.

In spite of having fewer team members, limited time and budget (RM 10,000) compared to other universities, UNIMAS managed to design and build four robots that can perform different tasks. This includes a manual robot and three autonomous robots.

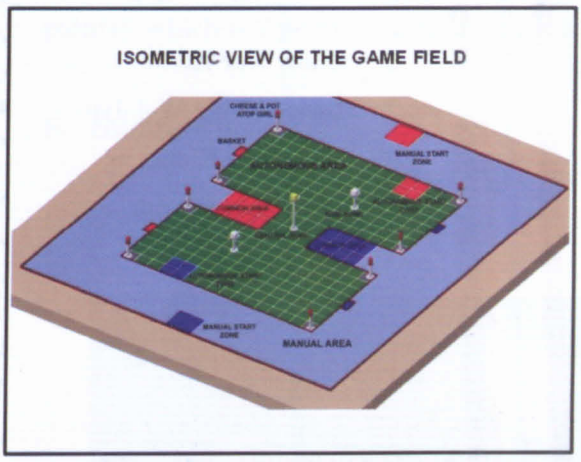


Figure 3: Contest Ground of ROBOCON 2008

Figure 4: In Dewan DECTAR, UKM.
(From The left) Chow Kar Kean, Chai Koh Kiong, Ting Sing Chung and Mr. Tay Kai Meng

3. ROBOCON 2008 Participation

UNIMAS started to participate in ROBOCON contest since 2006. With the support from our Vice Chancellor, Faculty Dean, and Head of Department of Electronics Engineering, we have formed a ROBOCON Team to participate in the competition this year. The ROBOCON Team members are as below:

Team Manager: Mr. Tay Kai Meng
Technical Advisor: Mdm. Sakena Abd. Jabar
Team Leader: Koo Yoon Yin
Team Members:

i. Chow Kar Kean
ii. David Tiong Wei Jye
iii. Chai Koh Kiong
iv. Ting Sing Chung
v. Lee Bon Sheng
vi. Yu Ka Chai
vii. Chong Yung Fook

4. Planning and Schedule

The ROBOCON tasks started with the planning and scheduling process. The mission began with brainstorming the design and strategies, followed by preparing the necessary components, and finally with the fabricating and building the actual robots. Table 1 shows the milestones of the whole processes.

5. Extra Challenges

As the contest took place in Peninsular Malaysia, one of the major challenge faced by the team was that the robot must be designed in such a way that the robots are easy to assembled and dissembled, as well as packed. For this reason, the robots were designed with screws and nuts instead of rivets, which indirectly increase the weight of the robots.

In addition to this, the dimension of each of the unassembled part have to follow the maximum size of luggage allowed by airline company. Again, that gave extra constraint during the designing process and inevitably effect the performance of the robots.

Table 1: ROBOCON 2008 Timeline

Week	Date	Plan	Actual
1	25 Feb – 2 Mac	To complete Manual Robot, towers and game field for test run.	Completed on 4 March
2	3 – 9 Mac	To complete Auto Robot 1	Completed on 12 March
3	10 – 16 Mac	To complete Auto Robot 2 & 3	Completed on 16 March
4	17 – 21 Mac	To install all electronics circuit and sensor to the robot body and test run.	Completed on 21 March
5	22 – 23 Mac	Packing	Completed on 23 March

6. Design of the Path Navigation System

The autonomous robots built for this contest used a self-developed low cost Path Navigation System to navigate on the game field. The designed system used photoresistors as the sensors to detect light intensity reflected from the floor, and hence sense the white lines on the game field. This allows the autonomous robots to move on the floor with guidance from lines on the floor.

Figure 5 demonstrates the operation of the sensors in our Path Navigation System. The white LED provides incident light to the floor. If it hits on a darker surface, more lights are absorbed, and the reflected light intensity will

be low, hence resistance of the photoresistor will increase. On the other hand, if it hits at a color surface, resistance of the photoresistor will decrease.

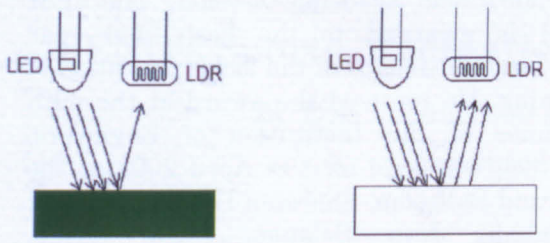


Figure 5: The Sensor Operation

Figure 6 depicts the block diagram of overall Path Navigation System for autonomous robots. Sensors are connected to the sensor board, which includes Line Tracker Board and Intersection Detector Board, before they are connected to a Microcontroller Board. The Microcontroller Board controls the operation of Motor 1 and Motor 2, and display the status of the overall system in a 7-segment displayer. Figure 7 depicts a photo of all the 4 developed robots.

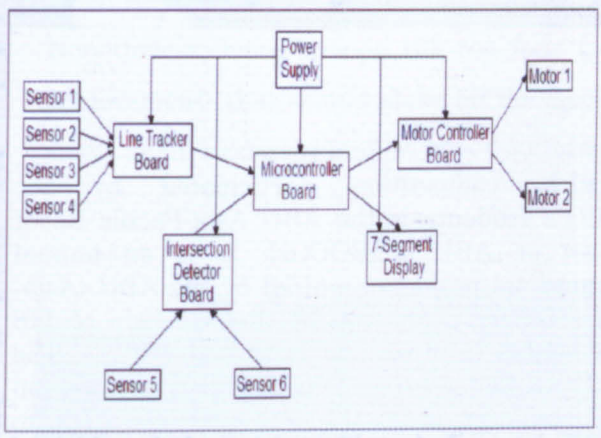


Figure 6: Block Diagram of Path Navigation System

7. Competition day

The UNIMAS autonomous robot was purposely designed to be simple and lighter, so that our robot could reach the yellow cheese faster than other teams. Meanwhile, the third autonomous robot was designed for to pick up white cheeses, and to avoid other teams to gain marks.

In the first game, UNIMAS team lost to Universiti Malaysia Sarawak. However, in the second game UNIMAS team had won against Universiti Malaysia Perlis. In the third game, again, UNIMAS team lost to the opposite team. Although the victory was not on UNIMAS side, the team managed to score high points (7 points), which is 2 points less than the winner.

8. Summaries

In this short paper, our experience in ROBOCON 2008 is shared.

Figure 7: Developed Robots

9. References

[1] SIRIM Berhad, "Robocon 2008", http://www.robofest.org.my/ (Accessed 4 June 2008).

[2] ABU-Robocon2008 Host, "Robocon 2008",www.roboconindia.com (Accessed 4 June 2008).

STUDENT ACHIEVEMENTS

Congratulations to Terence Leong Shuh Onn, a final year student from the Department of Civil Engineering for being awarded the IEM Gold Medal Award for 2007/2008 academic session. The IEM Gold Medal is awarded to the best final year engineering student in each of the local institution of higher learning. He received the award at the 49th Annual Dinner of the Institution of Engineers, Malaysia which was held on 19th April 2008 at the Selangor Grand Ballroom, Sheraton Hotel and Tower Subang, Subang Jaya, Selangor Darul Ehsan, Malaysia.

In addition, faculty undergraduate student, Tan Ai Tang from Civil Engineering Department was one of the recipients of REAM Engineering Student Best Project Awards at the Going Global REAM Gala Dinner on 30th May 2008. Supervised by Mr. Zamri Bin Bujang, she was the first student from UNIMAS to receive this award. The award carries a cash grant of RM1500 and a certificate. The Road Engineering Association of Malaysia (REAM) introduced the REAM Engineering Student Best Project Award in 2003 in conjunction with the biennial REAM Gala Dinner. This award is open to all final year undergraduate and graduate students from the public universities.

Other competition participated by the Faculty's students is the ABU Asia-Pacific Robot Contest or ABU ROBOCON. It is an annual international project organised by the ABU (Asia-Pacific Broadcasting Union) that consists of 118 broadcasters from 53 countries and regions. The Faculty of Engineering, UNIMAS had sent a team which consists of 8 students and 4 robots to participate in this year competition. The competition was held at Universiti Kebangsaan Malaysia, from 26th March to 30th March 2008. The event was organised by SIRIM. For the year 2008, the theme of the competition is based on Indian mythology related to Lord Krishna (a Hindu deity) and the festival of Dahi-Handi (celebrated annually in northern part of India).

Kelab Sukan, Rekreasi Dan Kebajikan
Fakulti Kejuruteraan, UNIMAS

FENG's Sports, Recreational and Welfare Club (2007/2008)

By: Dyg. Mazina Awang Batu and Mohamad Raduan Kabit
Faculty of Engineering, UNIMAS

There were several activities, regardless of its venues and occasions, conducted as well as participated by the staff of the Faculty of Engineering (FENG). The first activity was the "break -fasting" gathering among the Muslim staff at the Faculty during the 2007 Ramadan. It received a very warm respond from the staff. Subsequently, Eid-Mubarak was celebrated at the shop area of Manufacturing and Mechanical Engineering building. There were a number of distinguished guests at the event including as Prof. Dr. Khairuddin Abd. Hamid (Deputy Vice Chancellor for Alumni and Student's Affair, 2007), Faculty's Dean, and many others.

As for sport activities, our Faculty members are well known for their talents, courage, and competitiveness, such as in canoeing, tennis, bowling, futsal, dart, etc. In 2007, Mr. Mohd. Ruzaini Razak was the runner-up in the Men's Single Explorer Category, while Mr. Edward Egat secured a third place in Men's Single Fibre category for canoeing. In 2008, FENG Football Team achieved their best ever performance. The new FENG Team management has brought a new paradigm and new era for the Faculty's football history. Although the championship was not secured, the team ability to reach semi-final should be given credits. The epic journey ended when the FENG Team lost in the semi-final and booked the fourth place in 2008 Registrar Cup. Nonetheless, being among the top four football teams in UNIMAS is the most remarkable achievements that should make all the faculty members proud. With this achievement, we shall strive again next year and become the champion, InsyaAllah....

FENG Football Team 2008

FENG Team, Double Dart Tournament

FENG ACTIVITIES

New Students Registration 2008

ZECON 2008 Excellence Award

FENG Booth during UNIMAS Convocation 2008

FENG ACTIVITIES

Engineering Accreditation Council Visit 2008

Mukah Polytechnic Student Visit 2008

FENG Reception Day during UNIMAS Convocation 2008

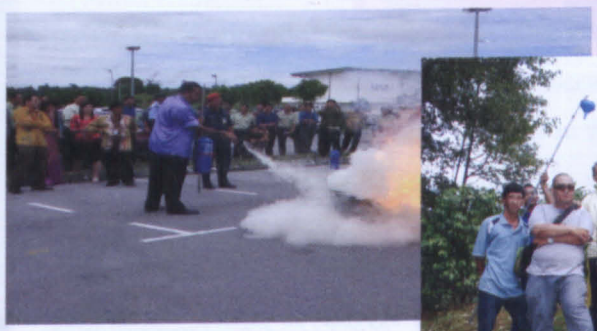
FENG ACTIVITIES

Ministry of Higher Education Visit 2008

Basic Firefighting and Safety Course by Firebrigade and Rescue 2008

5S Briefing at Cahaya Mata Sarawak 2008

THE FACULTY.. IT'S HAPPENING



2007. This programme was held at the Faculty of Engineering, UNIMAS.

The objective of the programme was to provide information about courses that are being offered by Faculty of Engineering to school students from Samarahan. In addition, the programme is also to build a good relationship and cooperation between Ministry of Education and UNIMAS.

The programme started with group registration and students were divided into several groups for *LDK* (Latihan Dalam Kumpulan) by facilitators. After a short briefing by facilitators, a forum entitled "Halatuju Lepasan SPM" was organised by a group of UNIMAS students before the school students visited Centre for Academic Information Services (CAIS) and laboratories.

This forum emphasised on qualities that the students should have in order to pursue their studies at university level. The students were given explanation on how to handle problems and manage studies effectively. The programme ended at 4.30 pm. Programme evaluation was done at the end of the programme to evaluate its effectiveness. It is hoped that all the details discussed in the forum will be of great benefit to the students in the future. A big thank you to all the staff and SAFE members that contributed to the success of the event.

2.5 SAFE Annual General Meeting (AGM) and Election

This event was held on 16 January 2008, at CTF 1, DK 1, UNIMAS West Campus. The event involved all the Faculty's lecturers and undergraduates. They had to propose their own candidate for the SAFE committee. The candidates were proposed from each department, such as the Civil Engineering Department, Mechanical and Manufacturing Engineering Department, and Electronics Engineering Department. Sixteen people were elected as SAFE committee members.

A speech was given by the SAFE advisor, including an introduction of SAFE to the new undergraduates for the 2007/2008 session and hopefully they will be involved with SAFE activities in the future.

SAFE AGM and election are held annually. The SAFE committee members only hold their positions for two semesters, after which a new committee will have to be elected.

Below is the list of the SAFE committee members for 2007/08 session:

President:

Mr. Alexcis Teo Nyelang

Vice President 1 (Academic):

Mr. Jack Oh Chee Pin

Vice President 2:

Mr. Mohd Hidayat Bin Isa

Secretary:

Ms. Jane Lau Sze Sze

Vice secretary:

Ms. Khor Jo Anne

Treasurer:

Mr. Uh Chee Siang

2.6 IEM Talk

In conjunction with Engineer's Week, Faculty of Engineering successfully conducted an IEM talk, titled 'Route to Professional Engineer', on 19 March 2008 at the Lecture Theater at Central Teaching Facility 2, UNIMAS.

The talk was in collaboration with The Institution of Engineers, Malaysia (IEM) Sarawak Branch, Faculty of Engineering, and SAFE. The objectives of the talk were:

i. To give awareness to students on IEM and BEM; and to highlight the differences between these two bodies.
ii. To highlight the Continual Professional Development (CPD) for Professional Engineer (PE)
iii. To encourage students to register as members of BEM and IEM

The invited speakers were Ir. Leslie Chai Kim Pau from (Renewable Energy) Sarawak Energy Berhad, and Deputy Dean of Faculty of Engineering, Assoc. Prof. Ir. Dr. Andrew Ragai Henry Rigit. The topics which were covered in the talk are:

i. Introduction to IEM
ii. The differences between IEM and BEM
iii. Route to PE or PI Workshop
iv. CPD requirement for PE

The talk gave students the opportunity to know more about the importance of becoming Professional Engineers.

At the end of the talk, the organiser urged all the engineering students to register as student members under the graduate and students section of IEM. Through that path, it is hoped that the students will gain more knowledge in preparation for their working life thus making them eligible to become Professional Engineers.

2.6 BBQ Party for Final Year Students

This event was organised on 9 April 2008 at Civil Laboratory, Faculty of Engineering. It started at 7.30pm until 10pm. About 300 people attended the event including the FENG lecturers, undergraduates, and UNIMAS staff. It was hosted by Mr. Mohd Hidayat, from the SAFE committee. The event started with speeches from the SAFE president, Mr. Alexcis Teo, and from the Faculty Dean, Prof. Dr. Wan Hashim Wan Ibrahim. Many activities were held, such as karaoke, eating and drinking competition, lucky draw, etc. During the party, the new SAFE advisor, Mr. Ron Aldrino Chan @ Ron Bulking was introduced to the students.

Again, the BBQ party marked another successful event organised by SAFE. It is hoped that all FENG undergraduates will join SAFE activities in future.

3. Conclusion

This article reports on the various activities that had been organised and participated by the students of Faculty of Engineering from 2007 to 2008. By conducting such activities, students are able to develop and improve their soft skills that will prove invaluable in future. In addition, by organising such activities, the students also developed a closer relationship with lecturers, university, schools and other institutions.

It is hoped that more activities will take place in future and all lecturers and students will participate in the upcoming SAFE activities.

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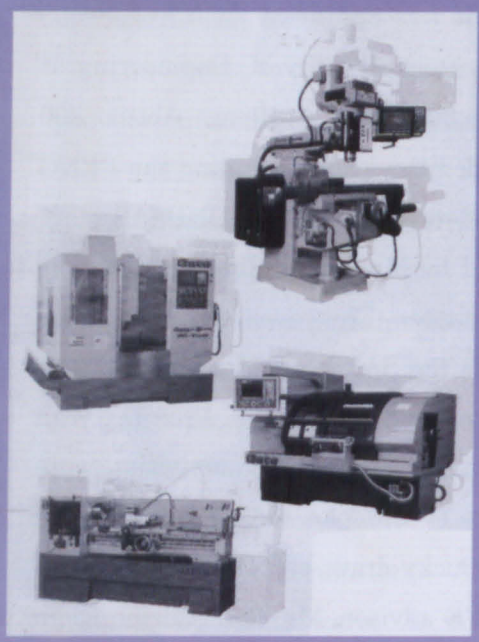

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