ENGLISH PROFICIENCY AND COMPUTER LITERACY OF MALAYSIAN POLITECHNIC CIVIL ENGINEERING STUDENTS

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by

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TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

PENGUASAAN BAHASA INGGERIS DAN LITERASI KOMPUTER

PELAJAR - PELAJAR KEJURUTERAAN AWAM POLITEKNIK MALAYSIA

ABSTRAK

Kajian ini dijalankan untuk mengkaji penguasaan bahasa Inggeris dan literasi komputer pelajar-pelajar kejuruteraan awam politeknik Kementerian Pengajian Tinggi Malaysia. Satu borang kajiselidik yang berasaskan kaedah *Programme for International Student Assessment (PISA)* telah dibina dan diedar kepada 480 pelajar kejuruteraan awam dari enam buah politeknik. Pelajar-pelajar ini telah menjalani program latihan industri selama satu semester di beberapa buah organisasi. Borang kajiselidik yang dikenali sebagai *Malaysian Polytechnic Employability Skills Questionnaire* (MPESQ) telah diguna untuk mendapat maklumat penting seperti kemahiran sedia ada (*acquired skill*) dan kemahiran yang diperlukan (*required skill*) di dalam bahasa Inggeris dan aspek berkaitan subjek komputer.

Dapatan dari kaji selidik menunjukkan tiada perbezaan signifikan dalam kekerapan penggunaan bahasa Inggeris dan komputer di antara sektor awam dan swasta. Walaubagaimanapun, bagi kebolehan mengguna bahasa Inggeris dan komputer, dapatan menunjukkan terdapat perbezaan signifikan di antara pelajar peringkat sijil dan diploma. Dapatan juga menunjukkan perbezaan signifikan di antara kemahiran sedia ada dan kemahiran yang diperlukan untuk kedua-dua kemahiran bahasa Inggeris dan komputer.

Analisis kekurangan kemahiran (*skill deficiency*) untuk kedua-dua bahasa Inggeris dan komputer menunjukkan jurang pembelajaran (*learning gap*) yang luas di antara kemahiran sedia ada dan kemahiran diperlukan.

Analisis data juga telah mengenal pasti kemahiran yang penting di tempat kerja dan empat kemahiran bahasa Inggeris yang dinilai paling penting adalah berkait dengan tugas spesifik di tempat kerja: *memahami dokumen teknikal dan aliran kerja, mengguna istilah-istilah teknikal dan menulis laporan pengujian.* Untuk kemahiran aplikasi komputer, kemahiran mengguna aplikasi *Computer Aided Design and Drafting (CADD)* untuk menghasilkan lukisan kejuruteraan dinilai lebih penting daripada kemahiran *word processing*. Dapatan dari kajiselidik ini membayangkan bahawa perlu ada perubahan (seperti isi kandungan dan kaedah pengajaran) pada kurikulum yang digunapakai sekarang supaya lulusan politeknik menepati keperluan di tempat kerja.

THE ENGLISH PROFICIENCY AND COMPUTER LITERACY

OF MALAYSIAN POLYTECHNIC CIVIL ENGINEERING STUDENTS

ABSTRACT

The purpose of this study was to investigate the English proficiency and computer literacy of Malaysian polytechnic civil engineering students. A questionnaire, modeled after the Programme for International Student Assessment (PISA) approach was developed and administered to 480 civil engineering students from six polytechnics. These students had completed a mandatory one-semester industrial training programme with various organizations. This post industrial training survey, through the use of a self-report questionnaire called the Malaysian Polytechnic Employability Skills Questionnaire (MPESQ) provided an important opportunity to capture crucial data from students such as their acquired (actual) and required skills in both the English language and computer-related subjects.

Findings of this study showed no significant difference in students' frequency of application of both English and computer skills between public and private organizations. However, significant differences were found between certificate and diploma-level students with regards to their English and computer abilities. There were also significant differences between the students' acquired and required English proficiency, and acquired and required computer literacy. Analyses of skill deficiencies for both employability skills revealed wide learning gaps between the acquired and required skill attributes.

Analysis of the survey data had also identified a list of important skill attributes in the workplace, and the four most highly valued English skill attributes were all related to

specific job-related tasks: *comprehending technical documents and work schedule, explaining technical terms, and writing test reports.* For computer application skill attributes, *Computer Aided Design and Drafting (CADD)* skills for engineering drawing was considered more important than word processing skills. The results of this study implied the need for curriculum changes (such as content and mode of delivery) so that polytechnic graduates could meet the workplace expectations.

CHAPTER 1

INTRODUCTION

1.1 OVERVIEW OF THE STUDY

The economic development of Malaysia, in its pursuit of high-level industrialization lies in the progression of a knowledge-based economy (k-economy). Jawhar (2002) stated that a k-economy requires a certain kind of human resource and the education system must be able to deliver human resource who possesses, among others, the following capabilities: adept at information and communication technology and capable in the English language. A competent, versatile and skilled workforce hence is a prerequisite in preparing the country for k-economy and this is given due attention in the Third Outline Perspective Plan (OPP3, 2001 – 2010). The OPP3 report stated that Malaysia's capability and capacity in the management of new knowledge and technologies will be determined by the quality of its human resources. The 10-year economic blueprint outlines several strategies to achieve objectives such as providing market-oriented education to reduce unemployment and promoting lifelong learning to adapt to the ever-changing industry needs and technologies.

Employability skills of fresh graduates have recently received considerable attention in the local media. This interest is partly aroused by revelations of graduate unemployment due the lack of English language proficiency and computer literacy (The Star, April 2005). Lack of proficiency in the English language has become a problem even in the private sector with graduates becoming unemployable as a result (Jawhar, 2002). The Industrial Master Plan 3 IMP3 (2005) Whitepaper on Human Resource Development reported on various surveys carried out on companies in

relevant industries to gauge whether graduates are meeting industry needs. The Whitepaper relied on data collected from the following surveys:

a. Productivity Climate Investment PCIS Survey (2001),
b. Bank Negara Survey (2002),
c. Malaysian Employers Survey MEF (2003),
d. Multimedia Development Corporation MDC Survey (2003), and
e. Federation of Malaysian Manufacturers FMM Survey (2002, 2003 & 2004).

The PCIS survey found skills lacked most in skilled workers in the order of importance were English language proficiency, Information and Technology skills, Communication skills and Technical and Professional skills. The Bank Negara Survey indicated a wide disparity in the basic skills between local graduates and foreign graduates where the most widely reported skills gap pertained to both communication skills and English language oral skills. The survey reported that 90.4% of respondents indicated local graduates were lacking in such skills. The survey also reported that 75.4% of respondents indicated local graduates displayed poor English writing skills. As for the MEF survey, 57.5% of the respondent companies found that non-executives lacked language skills both in Malay and English followed by Writing skills (47.0%), Oral skills (45.5%), Technical skills (38.5%), Analytical skills (33.0%), Creativity skills (27.0%), Computer skills (21.0%) and Business skills (13.0%).

The FMM survey highlighted the following employability skills inadequacies in ICT graduates: weak command of spoken and written English and inability to comprehend technical documentation and instructions in business English. The survey stated that poor command of English has been one of the major difficulties in recruiting fresh graduates among the federation members. The FMM survey was in agreement with the MDC Survey, which found that ICT graduates have poor oral and writing skills and

as such experienced difficulties in securing jobs with the MSC companies. Information in the Whitepaper was also obtained from American firms in Malaysia who found that one of the challenges faced by US firms in the country was the rapid decline in English language skills along with the lack of creative and innovative thinking skills among younger graduates.

Another similar research on the perceptions of Malaysian Employers regarding employability and workplace literacy was carried out by Mustapha in 1999. The purpose of the study was to examine employers' perceptions regarding the critical workplace literacy and employability skills of vocational graduates. The feedback from 120 employers of large and medium-sized manufacturing companies indicated that vocational and technical graduates possessed the necessary technical skills but were less satisfied with other employability skills such as communication and entrepreneurial skills. This view was supported by the feedback on issues related to human resource development gathered from employers' association and compiled by Pembangunan Sumber Manusia Berhad which among others, indicated that the small and medium enterprises (SMEs) wanted workers to have common IT application skills in the work environment to improve work productivity and work effectiveness. The SMEs lamented that the CAD/CAM software used in training institutes were different from those used in the industry. Additionally, language skills especially in business communication and English proficiency were also still lacking in workers (PSMB, 2006).

Data from the above-mentioned surveys offer insights into how employers perceive the quality of their existing workforce. The recurring theme that emerged from the surveys has been the lack of English language and computer skills among fresh graduates. The PICS survey (2001), for example, asked employers about their experience in filling vacancies and deficiencies in the quality of their existing workforce while employees

were asked independently about the skills they lack the most in doing their job (Yogeesvaran, 2005). The employees were also asked about their perceived adequacy between their field of education and the work they do. Findings of the survey have identified issues of inadequate supply of skilled workers, skills mismatch and quality of education and training delivery systems. It is worth noting that the PICS survey concluded its findings by stating that the quality of the education system is an issue of concern due to the low skills content of the education system especially in general skills such as English language skills, thinking and creativity skills.

A study focusing on the English proficiency and computer literacy of polytechnic students, therefore, is timely, to ascertain the level of skills that have been acquired through the polytechnic education system and the level of skills that is required for employment. It is important that polytechnic students be equipped with market labour realities such as English language proficiency and computer literacy when entering the job market. Polytechnic students are competent in their technical fields. However, failing to equip them with the employability skills could result in a loss of trained manpower to the nation, especially in the non-executive, middle-skill occupations.

1.2 BACKGROUND OF THE STUDY

Polytechnic education was introduced in Malaysia through the Colombo Plan in 1969. Since then, it has been upgraded and reinforced with provisions in a study by the Cabinet Committee on Implementation of Education Policy (1997) and the National Industrial Master Plan (1985 – 1995). The Department of Polytechnic and Community College Education (DPCCE) under the Ministry of Higher Education was established in January 2005 to conceptualize policies and set the direction for polytechnic and community college education to develop human capital in the technical, commercial

and service sectors. Currently there are 20 polytechnics operating throughout the country with the following primary objectives:

a. to provide broad-based education and training for upper secondary school-leavers to enable them to either become technicians or skilled technical assistants in the various engineering fields or junior and middle-level executives in the field of commerce, tourism and hospitality.

b. to provide relevant technological and entrepreneurial education and training to enhance basic skills.

c. to promote collaborative programs with the private and public sectors through Time Sector Privatisation in areas of research, development and consultancy.

Polytechnics offer two-year certificate and three-year diploma courses which are approved by the Public Services Department. Currently, polytechnic education offers a total of twenty-four certificate and thirty-eight diploma programs, ranging from courses in engineering (mechanical, electrical, civil, marine and petroleum) to courses in the business and service fields. Along with the technical and commercial subjects, polytechnic students are required to take courses in English, Islamic Studies/Moral Education and Entrepreneurship. In 2006, the polytechnic education system successfully produced 29,577 graduates to help meet the demand for skilled manpower in the various engineering, commercial and service sectors (DPCEE, 2007). Appendix A is a list of courses offered for both Diploma and Certificate programmes by the polytechnics.

Apart from the courses that are conducted within the polytechnics' campuses, students are also required to undertake a one-semester industrial attachment with either government agencies or private organizations. The industrial training programme for polytechnic students is a mandatory programme with the main objective of exposing the students with hands-on experience of actual work demands. The students can choose to undergo their training either in public or private organizations which suit their academic background based on their fields of study. Certificate-level students undergo their training during the 3rd semester whilst diploma-level students undergo theirs during the 4th semester of their studies. This placement programme is guided by the Industrial Training Handbook and the Polytechnic Industrial Training Guidelines, developed by the polytechnics and used as reference by both the training providers and students, respectively.

Assessment of the training programme is carried out by both the training providers and visiting lecturers. Student performance is jointly assessed by the training provider and the polytechnic based on the following weightage :

a.	Training Provider (Supervisor's Assessment)	(40 %)
b.	Log Book (Lecturer's Assessment)	(10%)
c.	Industrial Training Report (Lecturer's Assessment)	(30%)
d.	Interview (Lecturer's Assessment)	(20%)

The assessment by the supervisor uses an assessment form provided by the polytechnic and focuses on the following five competencies as outlined in the Industrial Training Curriculum :

a. Personality Development

b. Communication Skills

c. Work Ethics

d. Application of Specific Skills

e. Log Book Writing

The lecturer's assessment, which focuses on report writing and oral interview, uses a different form from that of the supervisors at the workplace.

1.3 STATEMENT OF THE PROBLEM

In 1997, a Tracer Study Project was initiated by the Technical Education Department, Ministry of Education to appraise the effectiveness of the polytechnic education system. One of the earliest studies done was known as The Year 1999 Polytechnic Convocation Survey where the objectives of the survey were to determine graduates' perceptions on the quality of curriculum and instruction and the adequacy of facilities in the polytechnics. The activities of The Tracer Studies were continued with The Year 2000, 2001, 2003, 2004 and 2005 Polytechnic Convocation Surveys. In the 2003 Polytechnic Convocation Survey, additional information on employability and trainability as well as economic potential of polytechnic graduates was collected. The Year 2004 Polytechnic Convocation Survey used questionnaires that were developed from an earlier version and modified together with the assistance of the Economic Planning Unit of the Prime Minister's Department. Counterparts from local institutions of higher learning were also involved. The questionnaire consisted of a 34-item survey instrument divided into five main sections: Background, Polytechnic Course Experience, Further Studies, Job Placement and Employment (First Job), Job Placement and Employment (Second/Current Job). Open-ended questions were also used to obtain the respondents' views on how to improve the quality of teaching and learning in the polytechnics.

Information collected through the 2004 Polytechnic Convocation Survey indicated that the respondents (graduates) were satisfied with the polytechnic education system in preparing them for their first job especially in the following aspects: team working, confidence in performing jobs workplace adaptability and problem solving skills. The respondents, however, were of the opinion that polytechnic education was barely effective in honing their skills to use computer applications as well as to write and converse in English. These findings were similar with the 2000, 2001 and 2003 Convocation Surveys where respondents expressed disappointment with the teaching of English and computer application courses in polytechnics.

The findings of the Tracer Study Projects clearly showed that the teaching and learning of the English language and computer subjects are, thus far, not effective in producing graduates with an acceptable level of English proficiency and computer literacy skills as required by the industry. As indicated by the respondents of the Convocation Surveys, the polytechnic curriculum has a "moderate to low relevancy between the content of the programs of study with the required skills at the workplace". However, the Tracer Study Projects did not identify the specific aspects that were lacking in the graduates. Therefore, to produce English proficient and computer literate graduates, it is important to identify general areas of need for updating the present curriculum content. These workplace or employability skills are essential if polytechnic graduates are to have a smooth transition from classrooms to the world of work.

This study on students' perception on the acquired and required skills is pivotal in providing all stakeholders with the essential details about the workplace relevance of their polytechnic study and employability. The Polytechnic Convocation Surveys conducted by the Department of Polytechnic and Community College Education, Ministry of Higher Education have been successful in collecting broad information on career advancement, employability and trainability as well as economic potential of

polytechnic graduates. Valuable information has also been collected on the aspect of the mastery of the English language of final semester students through an activity known as the Small Scale Study, which is a spin off from the Tracer Study of polytechnic graduates. However, the studies have not sufficiently covered the range of processes that need to be performed by the graduates thus missing the content or structure of knowledge that graduates need to acquire in the workplace. The identification of this missing construct would provide the opportunity to gather and assess student perceptions of the relevance of their academic experience towards the development of workplace competence.

Employers are often impressed by the technical competences of polytechnic graduates. However, the career potential of these graduates can be undermined by limited English and computer skills. The post-industrial training survey focusing on English proficiency and computer literacy provides an important opportunity to capture crucial data from students regarding their acquired and required skills and their relations to the demands of the workplace. Evaluation of inputs from the students based on their industrial training experience is one approach where the existing curriculum can be critically appraised to ensure its relevancy with respect to industry needs.

1.4 OBJECTIVES OF THE STUDY

The main aim of this study is to assess the English proficiency and computer literacy skills of polytechnic civil engineering students.

The objectives of the study are:

a. To assess the frequency of application of the English language and computer skills by students during their industrial training program.

b. To assess students' satisfaction on their ability to use the English language and computer skills during their industrial training program.

c. To assess differences in student perceptions regarding their:

   i. Acquired and required English proficiency.

   ii. Acquired and required computer literacy.

1.5 RESEARCH QUESTIONS

The following research questions guided this study:

Research Question 1

Is there a difference in the frequency of the application of the English language according to the types of employment sectors?

Research Question 2

Is there a difference in the frequency of the application of computer skills according to the types of employment sectors?

Research Question 3

Is there a difference in students' perception on their ability to use the English language according to their level of study?

Research Question 4

Is there a difference in students' perception on their ability to use their computer skills according to their level of study?

Research Question 5

Is there a difference in students' perception on their acquired and required English proficiency?

Research Question 6

Is there a difference in students' perception on their acquired and required computer literacy?

1.6 HYPOTHESES

This study tested the following hypotheses:

Ho 1 There is no significant difference in the mean scores on the frequency of the application of the English language between different employment sectors.

Ho 2 There is no significant difference in the mean scores on the frequency of the application of computer knowledge between different employment sectors.

Ho 3 There is no significant difference in the mean scores of the students' ability to use the English language between certificate and diploma-level students.

Ho 4 There is no significant difference in the mean scores of the students' ability to use their computer skills between certificate and diploma-level students.

Ho 5_1 There is no significant difference in the mean scores on the students' acquired and required oral English proficiency.

Ho 5_2 There is no significant difference in the mean scores on the students' acquired and required English reading proficiency.

Ho 5_3 There is no significant difference in the mean scores on the students' acquired and required English writing proficiency.

Ho 6 There is no significant difference in the mean scores on the students' acquired and required computer literacy (software application for specific purposes).

1.7 DEFINITION OF TERMS

Assessment

A process for measuring performance against a set of standards through examinations, practical tests, observed performances or projects.

Competencies

Competencies are descriptions of specific abilities required in the workplace to ensure workers' success. These abilities may take the form of knowledge, skill, attitude, judgement or task.

Computer Literacy

The level of expertise and familiarity someone has with computers. Computer literacy generally refers to the ability to use applications rather than to program.

Employability Skills

Generic skills that are related to the performance of critical work functions across a wide variety of industries and occupations. They complement the technical skills required for a specific job.

English Language Proficiency

The level of attainment of skills in listening, speaking, reading, writing, and comprehension in the English language.

Private Training Providers

Private organization or entities such as Telekom Malaysia Berhad, Tenaga Nasional Berhad, Engineering Consultants, Contractors etc.

Public Training Providers

Government or semi-government bodies such as Jabatan Kerja Raya, Jabatan Bekalan Air, State Economic Development Corporations etc.

Skills

Refer to an ability to perform a specific task.

Skills Standard

Employer defined knowledge and skills that are needed by employees to ensure success on the job. Standards are defined by occupational areas and validated by representatives from the occupation. Standards include the functions, tasks and performance criteria for a job area and identify the knowledge, skills and abilities needed to meet performance expectations.

Technical Skills

Refer to the "ability to do" or to perform specialized tasks that may be particular to a single occupation or industry or cross a range of industries.

1.8 LIMITATIONS OF THE STUDY

This study was limited to the use of the developed Malaysian Polytechnic Employability Skills Questionnaire (MPESQ) in six Ministry of Higher Education (MOHE) polytechnics. This study was also limited to the assessment of two employability skills: English proficiency and computer literacy. The number of students that was involved in this study was 480 and was restricted to certificate and diploma-level civil engineering students. These students completed their five months industrial training programme in June 2006.

1.9 SIGNIFICANCE OF THE STUDY

The main aim of this study was to assess civil engineering students' English proficiency and computer literacy skills after the completion of their industrial training program. Assessment was carried out using a self-report instrument, the Malaysian Polytechnic Employability Skills Questionnaire (MPESQ). Although discipline-specific skills and knowledge are crucial to prospects of employment, employability skills such

as English proficiency and computer literacy are nevertheless applicable in a broader context. Much of the public discussion about employability skills had focused on employers' report of skill shortages or requirements in their organizations or industries. This study added another dimension to the debate by presenting an empirically grounded description of the levels of English proficiency and computer literacy from the perspective of graduating students. The students' point of view, through the MPESQ, would itself act as an awareness raising exercise since employers are becoming more articulate in their expectations of graduates' skill levels. Students' self-assessment of their English and computer skills would help identify specific areas of strength and need. The outcome of the MPESQ will reveal the level of proficiency acquired by the students in the classrooms and can be compared with the proficiency required in the workplace. The gaps, if any, between the acquired and required skills, hopefully will help the policy makers, polytechnic educators and curriculum developers in reviewing and formulating a curriculum, which will be more relevant with what the industry demands. It is also hoped that the MPESQ will be used for subsequent research on the other key employability skills, such as problem solving, creative thinking and teamwork.

1.10 SUMMARY

This study addressed two employability skill attributes: English language proficiency and computer literacy. Its purpose was to assess the following factors with regards to English proficiency and computer literacy: frequency of application, satisfaction regarding ability level, and the acquired and required skills. The focus was on polytechnic civil engineering students who had completed a one-semester industrial training program. The result of this study is hoped to contribute to improvements in the

polytechnic curricula by providing information about the English proficiency and computer literacy of polytechnic civil engineering students.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

The primary aim of this study was to assess the English proficiency and computer literacy skills of polytechnic civil engineering students. This chapter provides a review of the literature regarding the study. Several elements of the literature have particular relevance for this study. The relevant factors to be considered from the literature are as follows: a) the concept of employability and employability skills, b) issues in the assessment of English proficiency and computer literacy, and c) issues in the design of English for Specific Purposes and Computer Literacy curricula. Appropriate literature and studies on these topics help develop the conceptual framework, which provides the context underlying the scope and methods of study.

2.2 EMPLOYABILITY

Employability is the capability of an individual to secure employment at their level of potential and to be able to manage further employment transition within and between organizations in the future (Tangney, 2003). In other words, employability conveys a sense of an individual's long-term capacity to build a career and to prosper in a labour market. Yorke and Knight (2004) go further by defining employability as " a set of achievements – skills, understandings and personal attributes that make graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community and the economy. The term ''employability skills" was first coined by The Conference Board of Canada in 1992 to describe the set of skills that employers identified as those needed for a high-quality

Canadian workforce. There are many labels for these particular skills such as generic skills, transferable skills, basic skills, core-skills, core competencies, key competencies, critical workplace competencies, workability skills, non-technical skills, soft skills and essential skills but the industries' preferred terminology is employability skills.

Many definitions are used in different environments or by different organizations to describe employability skills that all employees may have. Saterfiel and McLarty (1995) defined the term "employability skills" as those skills required to acquire and retain a job. The Australian Chamber of Commerce and Industry (ACCI) defined employability skills as skills required not only to gain employment, but also to progress within an enterprise so as to achieve one's potential and contribute successfully to enterprise strategic directions. Down (2005) defined employability skills as those basic skills and capabilities required for getting, keeping and doing any job. They complement the technical skills required for a specific job. Sherer and Eddie cited by Cotton (2001) stated that employability skills are not job specific, but are skills which cut horizontally across all industries and vertically across all jobs from every level to chief executive officer. Another definition by Overtoom (2000) described employability skills as transferable core skill groups that represent essential functional and enabling knowledge, skills, and attitudes required by the 21st century workplace. She also stated that these skills are necessary for career success at all levels of employment and for all levels of education.

Employability can be viewed from three different perspectives :

1. Employer's perspective – employability is about someone having basic skills and experience.

2. Student's perspective – employability is about being attractive to employers, in terms of skills, knowledge and experience, and the articulation of these, so that they are recruited.

3. Institution's perspective – employability is about trying to develop students, through a variety of means to enhance their academic training, broaden their perspective and experiences and enable them to actively enter the workforce.

2.3 EMPLOYABILITY SKILLS

A skill is most often considered a description of the ability to carry out a specific task by using special competencies based upon particular kinds of training and experience. Most studies emphasize that skills are based upon specific training or job experience. In recent usage, the term "employability skills" is often used to describe the preparation or foundational skills upon which a person must build job-specific skills. Brown (1990) cited foundational skills as those, which relate to communication, personal and interpersonal relationships, problem solving and management of organizational processes. Skills are sometimes thought of as being adaptive, functional, or specific content skills. Adaptive skills are those, which a worker has learned early in life, and they are used to cope with the demands of the environment or interpersonal relations. The Qualifications and Curriculum Authority, United Kingdom defines functional skills as those core elements of English, mathematics and ICT that provide an individual with the essential knowledge, skills and understanding that will enable them to operate confidently, effectively and independently in life and at work (O'Hagan, 2005).

2.4 INTERNATIONAL FRAMEWORK ON EMPLOYABILITY SKILLS

In a 2001 report entitled “Employability Skills For Australian Industry : Literature Review and Framework Development” by the Australian Council for Educational Research (ACER), broad frameworks for identifying employability skills developed in Australia, United Kingdom, Canada and the United States of America were compared. These national frameworks share many common features (Table 2.1) and clearly show that communication and information technology skills are important domains of employability skills that employers have identified.

Table 2.1 Comparative Table of National Employability Skills Framework
Source: ACER (2001).

Australian Mayer Key Competencies	**United Kingdom (NCVQ) core skills**	**Canada Employability Skills Profile (1992)**	**United States (SCANS) workplace know-how**
Collecting, analyzing and organizing information	Communication	Thinking skills	Information Foundation skills: basic skills
Communicating ideas and information	Communication Personal skills: improving own performance and learning	Communication skills	Information Foundation skills: basic skills
Planning and organizing activities	Personal skills: improving own performance and learning	Responsibility skills Thinking skills	Resources Foundation skills: personal qualities
Working with others and in teams	Personal skills: working with others	Positive attitudes and behaviour Work with others Adaptability	Interpersonal skills
Using mathematical ideas and techniques	Numeracy: application of number	Understand and solve problems using mathematics	Foundation skills: basic skills
Solving problems	Problem solving	Problem-solving and decision-making skills Learning skills	Foundation skills: thinking
Using technology	Information technology	Use technology Communication skills	Technology Systems

2.5 STUDENT EMPLOYABILITY PROFILE

An employability guide known as *The Student Employability Profiles: A Guide for Employers* was prepared by Kubler and Forbes (2004) for The Council for Industry and Higher Education (CIHE) to raise awareness amongst employers of the employability skills that are developed through the study of a wide range of academic subjects. Each profile identifies a set of work related skills that is developed from studying a particular subject. The twenty-three subjects covered in this guide comprised of technical subjects such as Architecture and Engineering and non-technical subjects such as Geography and Religious Studies.

Though the profiles do not offer a definitive list of subject related skills and knowledge, students will be able to use them as evidence for prospective employers the skills they bring to the workplace. The student employability profiles help academics to better articulate (to prospective students and employers) the employability skills developed through the study of a particular discipline. Some suggested areas for using the profile are as follows:

a. Helping students to expose and articulate skills they have acquired.
b. Relating their skills to career planning and job search activities.
c. Preparing students for work experience.

In the context of communication (i.e. English language proficiency) and technology (such as computer literacy), the guide states that the students are expected to:

a. Express ideas effectively and conveys information appropriately and accurately (written communication).

b. Use an appropriate approach to questioning in order to gain information from which to draw conclusions and/or assist in the making of decisions (questioning).

c. Show a range of verbal and non-verbal signals that the information being received is understood (listening).

d. Develop and maintain a knowledge of key trends in technology (technical knowledge).

e. Have experience of using modern technology.

2.6 ENGINEERING TECHNICIAN OCCUPATIONAL PROFILE

Engineering technicians, engineering assistants and technical assistants are some of the different labels used to describe employees who perform paraprofessional and clerical work in support of technical engineering programs and projects. They also conduct research reviews, gather and analyze data, prepare statistical and other reports, conduct inspections, maintain automated engineering related data and/or draft plan details. The Occupational Information Network O*NET (2004) developed for the US Department of Labor provides information about the specific knowledge, skills and abilities needed for a given occupation; which occupations are most suited to specific work values and personal interests; and how to transfer proven skills to a new occupation. According to the O*NET, civil engineering technicians are defined and described as follows:

> *Apply theory and principles of civil engineering in planning, designing, and overseeing construction and maintenance of structures and facilities under the direction of engineering staff or physical scientists.*

In the Malaysian context, engineering technicians are certificate holders, and are usually from the government polytechnics. These graduates are given designation

according to their job function, for example, maintenance technicians, quality control technicians, and test technicians. Under the government's Malaysian Remuneration System (SSM), they are placed in the J17 category (BEM, IEM, & FEIIC, 2003).

The *Occupational Outlook Handbook, 2006-07 Edition of the* Bureau of Labor Statistics, U.S. Department of Labor lists major duties of engineering technicians. However, these duties vary according to the type of project they are working on. Civil engineering technicians help civil engineers plan and build highways, buildings, bridges, dams, wastewater treatment systems, and other structures, as well as do related research. Some estimate construction costs and specify materials to be used, and some may even prepare drawings or perform land-surveying duties.

Many engineering technicians also assist in design work, often using computer-aided design and drafting (CADD) equipment. However, in the context of computer applications, it is important to draw a distinction between those who are simply users of computer systems (including softwares) and those who work in the computer industry. Because engineering technicians are also part of a team of engineers and other technicians, good communication skills are important. The Engineering Technician Standard, published by the Engineering Council, United Kingdom (EC^{UK}) lists the generic competences that have to be demonstrated in order to achieve registration as a professional Engineering Technician. One of these competences is the use of effective communication and interpersonal skills, which includes the ability to *use oral, written and electronic methods for the communication in English of technical and other information*.

2.7 ASSESSMENT

Assessment is the process of collecting evidence and making judgments on the extent and nature of progress towards the performance requirements set out in a standard, or a learning outcome (Hagar, Athanascou & Gonczi, 1994). Entry-level competency standards established by an industry, for example, will detail the standards of performance required of all new entrants to that industry. In a competency-based system, assessment is the process of determining whether a candidate meets the prescribed standards of performance, i.e. whether they demonstrate the competency level required for entry to that industry.

In the educational context, Hedges and Axelrod (1995) defined assessment as a process involving the collection and analysis of pertinent information to judge educational outcomes. It is also conducted to determine how education can be improved. Judging educational outcomes can refer to the school, program, classroom or the student levels. In this literature review, it is more concerned with student outcomes. Students' outcomes are the knowledge, skills and attitudes that learners are expected to attain as a result of their educational experience.

2.7.1 Planning The Assessment

Assessment of student progress must consider the skill areas to ensure that students are prepared for the world of work. The Ohio Department of Education cited in Hedges and Axelrod (1995) suggested occupational, academic and employability skills as key skill areas to prepare students to successfully enter, compete and advance in a changing work environment. An Act known as The Goals 2000 was passed in the United States in 1994, which includes a number of provisions affecting assessment of workplace. The National Skills Standards Board, which was established by *Goals 2000*

determine skills standards to adopt which include: 1) a description of the segment of work for which the standard applies; 2) a list of essential knowledge and skills that are critical to the work segment; 3) a list of the essential tools and equipment critical to the work segment (if applicable); and 4) the criteria used to measure competency in performing the work segment.

Saterfield and McLarty (1995) stated that several criteria must be kept in mind when selecting an approach for assessing employability skills. First is the validity of the assessment, which they argued rests on job analysis where a clear and validated relationship should exist between the assessment and skills required for one or more jobs. Second, the skill assessed should be teachable. Since the essence of employability skills is preparation for the job, they suggested that the focus of the assessments should be directed to those aspects of the relevant skills that can be taught. Finally, the authors noted that each assessment must be evaluated in the context of its purpose, that is either to make personnel decisions, which require strict reliability and validity standards or to guide instruction, where greater emphasis is placed on providing instructionally relevant experiences to students.

Grummon (1997) suggested that assessment for generic workplace readiness should start with a taxonomy of generic workplace skills. The SCANS taxonomy identified two levels of skills, foundation skills (e.g. reading, writing, mathematics, problem solving, personal) and workplace competencies (e.g. managing recourses, using technology, acquiring and using information). A similar taxonomy is known as the Framework for Assessing Workplace Readiness Skills. This Framework includes skill descriptions in such areas as personal management, thinking/problem solving and communication.

Information from the evaluation of students' achievement, knowledge and skills has often been used to determine students' readiness to advance in the educational