

MEETING THE MARKET DEMAND OF GENERIC SKILLS :
AN ANALYSIS OF GENERIC SKILLS ACQUISITION AMONG
FINAL YEAR ENGINEERING STUDENTS OF KUITTHO



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JUDUL : MEETING THE MARKET DEMAND OF GENERIC SKILLS: AN ANALYSIS OF GENERIC SKILLS ACQUISITION AMONG FINAL YEAR ENGINEERING STUDENTS OF KUITTHO

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MEETING THE MARKET DEMAND OF GENERIC SKILLS:
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The quotations below are to be reflected and thought upon:

“The mediocre teacher tells, the good teacher explains, the superior teacher demonstrates, the great teacher inspires”

William Arthur Ward

“ There are two kinds of people, those who do the work and those who take the credit. Try to be in the first group – there is less competition”

Indira Gandhi

“What sculpture is, to a block of marble, education is, to the soul”

Joseph Addison

“The roots of education are bitter, but the fruit is sweet”

Aristotle

“Education is what survives when what has been learned has been forgotten”

B.F. Skinner

“It is possible to store the mind with a million facts, and still be entirely uneducated”

Alec Bourne

“Good teaching is one fourth preparation and three fourth pure theatre”

Gail Goodwin

“Anyone who has never made a mistake has never tried anything new”

Albert Einstein

ACKNOWLEDGEMENTS

“ The young and the old have all answers. Those in between are stuck with the questions. In youth we run into difficulties, in old age difficulties run into us ”

Josh Billings

First and foremost, I would like to express my gratitude to Associate Professor Dr. Zulkifli Bin Mohamed for tirelessly and unendingly supporting, motivating, and inspiring me. I am deeply indebted to him for the freedom, wisdom, guidance and trust rendered.

“ A teacher affects eternity; we can never tell where his influence stops ”

Henry Adams

A million thanks to Mr. Murugadas Ramdas, Mr. Jerry Wee Cheng Suan and Mr. Ong Sin Hock for their priceless assistance and contribution .

“First of all, our young men must be strong. Religion will come afterwards. Be strong, my young friends; that is my advice to you. You will be nearer to heaven through football than through the study of Gita. These are bold words, but I have to say them, for I love you ”

Vivekananda

Last but not least, I would like to forward my acknowledgement to the Technical and Vocational Education Department, Faculty of Engineering, Graduate School and all who have contributed in the realization of this case study.

“If I have seen further than others, it is by standing upon the shoulders of giants ”

Isaac Newton ”

ABSTRAK

Kejuruteraan dilihat sebagai bidang yang akan membentuk wajah dunia pada abad ke 21. Antara cabaran yang bakal dihadapi oleh bakal jurutera pada zaman informasi adalah keupayaan untuk belajar sepanjang hidup mereka. Keupayaan ini dianggap penting kerana maklumat dan ilmu telah menggantikan modal sebagai faktor pengeluaran yang utama di dalam sistem ekonomi dunia. Hasil rujukan yang dibuat, mendapati bahawa kemahiran generik dianggap sebagai asas yang perlu dikuasai oleh setiap graduan untuk membolehkan mereka belajar sepanjang hidup mereka, malah wujud pendapat yang mengatakan kemahiran generik lebih penting dari kemahiran – kemahiran kerja atau teknikal kerana penguasaan kemahiran generik yang tinggi akan membolehkan seseorang pekerja itu menguasai kemahiran kerja atau teknikal yang jumud dengan pantas.

Kajian yang dilakukan ke atas 150 orang pelajar (mengikut persepsi pelajar), tahun akhir Kejuruteraan Mekanikal, Elektrikal dan Awam, KUiTTHO, mendapati bahawa kesedaran terhadap kemahiran generik adalah rendah dan tahap penguasaan kemahiran generik adalah sederhana. Justeru itu, langkah – langkah yang efektif harus dilaksanakan untuk mewujudkan tahap kesedaran, penguasaan dan kepentingan kemahiran generik yang tinggi untuk membolehkan graduan – graduan KUiTTHO kekal relevan di dalam era K – Ekonomi.

ABSTRACT

“Education is a controlling grace to the young, consolation to the old, wealth to the poor, and ornament to the rich”

Diogenes Laertius

Generic skills are perceived as the skills of the future. The future is all about the acquisition and manipulation of knowledge which then generates wealth. A high level of generic skills mastery enables this. In order to remain relevant in the Knowledge Based Economy, every prospective employee has to inculcate a life long learning culture within him or herself and again a high acquisition of generic skills enables this. Equipping a graduate merely with a sound job specific or technical knowledge is perceived as inadequate due to the fast pace of the Knowledge Based Economy which results in knowledge or skills becoming obsolete fast.

The fast obsolescence of knowledge poses a challenge to prospective employees to learn, unlearn and relearn throughout their lives. This generates a view that generic skills have become more dominant than job specific or technical skills, because a high acquisition of generic skills enables a high acquisition of technical or job specific skills. The findings of the research carried out on 150 final year Mechanical, Electrical and Civil Engineering students (as perceived by the students) of KUiTTHO, reveals that the generic skills awareness level of the students is low and their generic skills acquisition level is moderate. Steps have to be taken effectively to generate a high level of generic skills awareness, acquisition and importance among the students of KUiTTHO, regardless of programme.

“Illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn and relearn”

Alvin Toffler

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PART ONE
PREFACE

CHAPTER I

PREFACE

1.1 Introduction

Reigeluth (1999), has defined generic skills as a skill which can be applied across a variety of subject domains, and takes longer to acquire than domain-dependent (subject-area) skills. Reigeluth adds that, it is what Gagne' refers to as "cognitive strategies" and what many cognitive scientists refer to as "Domain Independent Knowledge". The major kinds of generic skills include thinking skills (such as problem solving techniques), learning strategies (such as creating mnemonics to help you remember things), and meta cognitive skills (such as monitoring and revising your problem solving techniques or mnemonic-creating techniques).

Generic skills are also known as employable skills, in a more practical and realistic manner. The demand for generic skills has shown a tremendous increase among employers of the global manufacturing sector which is in great need of engineers. Mayer (2000), in an article titled 'State of the world Industry and Outlook for the post-2000" has stated that the 1995 Global Forum on industry predicts that the share of developing countries in global manufacturing value added will reach 25% by year 2000, and suggests that a 30% share is attainable by 2005, when their share of manufacturing exports could have risen to beyond 35%. Post 2015, advanced developing countries will march into the ranks of developed economics and a narrowing of the "GDP per capita gap" between developed and developing countries will occur.

In realization of this, the Malaysian government through the 8th Malaysia Plan: 2001-2005 has allocated a sum of RM10.3 billion for the development of the commerce and industrial sector and a sum of RM10.7 billion for the education sector

(British High Commission, 1999). Snow (1998), comments that education is an investment in the future, and in the future, engineering will be a profession with tremendous employment possibilities.

Kolej Universiti Teknologi Tun Hussein Onn (KUiTTHO) is one of the 9 institutes of higher learning in Malaysia which generates Mechanical, Electrical and Civil Engineers into the job market. The increasing market demand of generic skills among engineers brings about change worldwide in the skills mix required to succeed in the job market as an engineer.

A recent study by the Institution of Engineers of Australia identified a number of important trends for the future of engineering. Information technology and the communications revolution will profoundly shape the world of the 21st century. Engineering will be the heart of these new industries and engineers will become even more integrated into management, community decision making and international projects.

Wormley (1999), the Dean of the Engineering Faculty of Penn State University has stated that engineering education will be of significant importance to the country's future both in the human and economic turns in the new millennium. Wormley adds that a paradigm shift is required in which significant professional and life skills are introduced into the curriculum, while maintaining an emphasis on fundamental knowledge and key engineering processes, and this is parallel with Penn State's objective, that is to generate world class engineers. The 21st century brings along the challenges of Globalization and Market Liberalization. In order to thrive in the era of Globalization which foresees manufacturing as its core component, Malaysia needs a workforce which is not only competent in terms of job specific skills, but also employable skills or also known as generic skills.

Connor, Dench and Bates (2001), in a research summary of an assessment of skill needs in engineering have stated that it is important that course content curriculum and qualifications reflect the way skill needs in the U.K are changing, whereby new and specific technical skills are required but education and training provision needs to reflect the importance employers attach to personal and generic

skills in all area of engineering. The third and final report of the U.K National Skills Task Force “Skills for All’ reports that a broad shift has occurred in the past 30 years in the workforce that anticipates a rising demand in generic skills (Gibb, 2000).

In addition, realising the importance of generic skills among engineering graduates, the Faculty of Engineering of the University of Sydney’s strategic plan has the goal:

“ To produce graduates with engineering, technical and generic skills which are recognised nationally and internationally as being of the highest caliber ”

Briggs and Hodgson (2000) of Deakin University, Australia has commented that Australian employers have perceived engineering graduates to be poor in problem solving skills, oral business communication skills and interpersonal skills. In addition, earlier surveys reported that employers are looking for graduates who can think creatively, analytically and who are good communicators, good team workers and adaptable life long learners. In their report titled “Generic Skills in Undergraduate Engineering Education”, Briggs and Hodgson (2000), have also stated that engineers are required to think creatively and critically, to communicate effectively with all sections of the community, to work well in teams in various roles and to define and solve complex problems. This is in line with a famous engineering quotation as follows:

“ Engineering problems are under-defined, there are many solutions, good, bad and indifferent. The art is to arrive at a good solution. This is a creative activity, involving imagination, intuition and deliberate choice ”

Ove Arup

1.2 Background of the Problem

Lederer (2001) comments that the global economic slowdown triggered by the U.S.A is expected to slow world economic growth to 2.4% this year, with at best a modest recovery going into 2002. For developing countries, the United Nations Global Economic Outlook Report forecasts a slowdown in economic growth from 5.7% to 4.4% in 2001, with a rebound to 5.2% for 2002. In realization of this the Federation of Malaysian Manufacturers (FMM) has urged the manufacturing sector to enhance competitiveness. The Vice-President of FMM states that the industry will face a different scenario under the 8th Malaysia plan, where years of rapid growth during the previous plan will slowdown due to stiff competition from newly industrialised countries. In addition, statistics show that 85% of Foreign Direct Investment (FDI) flow to Asia is invested in India and China, which have huge market bases, while the rest goes to South East Asia, hence, the country has to be a strong advocate of the free trade regime. In order to attract more FDI, Low suggested that:

“Thus, we have to upgrade our human capital to produce more professionals by inculcating a lifelong learning culture”

The Sun Daily, 2001

In realization of this, the researcher foresees an interest in carrying out a case study to analyze the generic skills acquisition (GSA) of Kolej Universiti Teknologi Tun Hussein Onn's (KUiTTHO) product which comprises of Mechanical, Electrical and Civil Engineering final year undergraduates. According to Yang Berhormat Datuk Dr. Fong Chan Onn, Minister of Human Resources, there seems to be an increasing demand of engineers in the nation, and currently out of 16 institutions of higher learning in Malaysia, nine are offering courses in engineering and 2000 engineers are expected to be generated a year. In addition, Malaysian engineers must acquire the skills and competencies which will enable them to export engineering services. This is viewed as a huge potential (Human Resources Ministry, 2000).

This is parallel with the Entrepreneurship Centre at Stanford School of Engineering's, (U.S.A) Stanford Technology Ventures Programme (1999) which states that engineering graduates play many roles in industry:

- Design and development of technology based products within engineering teams
- Technical leadership of engineering departments
- Marketing and product management of technology based products
- Sales and customer support for high tech products
- Leading technology based companies
- Founding high technology businesses

All these roles require entrepreneurial skills. In addition, the Centre also reports that graduate engineering skills are as the following:

- Effective Communicators
- Problem solvers
- Life long Learners
- Critical Thinkers
- Able researchers
- Independent workers
- Team players
- Effective managers
- Self motivated
- Ethical
- Economically, environmentally, and socially aware

A Professional Skills Project by Curtin University of Technology reports that feedback from employers worldwide suggests that existing undergraduate programmes are not producing graduates with the kinds of skills that they need in order to be successful in the world of work and for life. Excerpts from the report are as follows:

“ They come out with a lot of academic theory but can't present, they can't write, they don't understand what business is about.

While they are made to present assignments at university, they are not actually taught how to do them”

Large Business, Sydney, cited in AC Nielsen Research Services, 1998

“Both technical and non-technical entry level employees are deficient in basic skills such as thinking abstractly, establishing priorities and setting goals and using interpersonal skills to handle conflict and criticism. Employers are particularly concerned about writing and presentation skills of technical graduates (Scientists, Accountants, engineers).

Survey of Employers, U.S.A, cited in O’Brien, 1997, pg.9-10

The Professional Skills project also suggests that employers of graduates have requested a shift in learning objectives towards those of an emphasis on generic skills, this may require some reduction in average content (Johnson, 1998).

The Malaysian economy is facing a quantum leap from the production economy to a knowledge economy. Thus, corporations will become increasingly global in their orientation. In view of this, human resources will be the biggest assets in the K-economy, and employees with a background in Science and Technology will have the edge. Furthermore, the K-economy may also require employees with broad based general skills which will enable them to adjust to change (Human Resources Ministry, 2000). Ir Rocky Wong Hon Thang (Managing Director, JS Mahir Sdn Bhd) in a speech titled “Beginning of an engineering profession” at Universiti Multimedia Telekom, Engineering Faculty, Melaka has stressed that one of the requisites of engineers of the next millennium will be to develop and master interpersonal skills, the ability to project ideas across and a feel for socio-economic realities. In addition, engineers need to equip themselves with integrity, creativity and innovative thinking, in order to carry out their roles more effectively.

Bellinger (2000), comments that the 1999 salary survey suggests that the engineers of today have to be able to communicate, he or she has to speak well, write forcefully and nail business skills early in a career if the person wants to advance. A Design engineer responding to the survey noted that:

“Communication skills are vital to being able to correctly specify technical requirements across different organizations”

In addition, a department head responding to the survey noted that:

“Dealing with non technical people in technical management positions requires a unique ability to communicate”

The researcher strongly feels that for engineers, technical skills are a given. What they don't have today, they'll learn tomorrow. However, generic skills are another matter, its acquisition depends on the content of the curriculum and activeness of the students themselves. After reviewing the curricula and the syllabi of the Mechanical, Electrical and Civil Engineering Programmes the researcher has concluded that generic skills subjects are being taught separately according to fields such as communications and computer applications.

Generic skills subjects being taught are as follows:

Mechanical Engineering:

- BKU 1012 Computer Application Competency
- BKU1022 Information Acquisition Skills
- UHB2232 Technical Writing
- UHP 3052 Communication Skills
- BMM 5053 Management, Law and Professional Ethics

Civil Engineering

- BPP 3132 Communication Skills
- BUN 4132 Professional Ethics

Electrical Engineering

- BKU 1012 Computer Application Competency
- BKU1022 Information Acquisition skills
- UHP 3052 Communication Skills

The research which will be carried out will evaluate the effectiveness of the generic skills subjects being offered and also evaluate the acquisition of generic skills which are not being offered through the hidden curriculum phenomenon.

1.3 Statement of the Problem

Is KUiTTHO really producing workforce comprising of the Faculty of Engineering final year graduates that meet the current market demand of generic skills?

1.4 Research Questions

1. What is the **level** of generic skills acquisition of the final year Mechanical, Electrical and Civil Engineering students of KUiTTHO?
2. What is the **level** of importance of generic skills as perceived by the final year Mechanical, Electrical and Civil Engineering students of KUiTTHO?
3. What is the **level** of contribution by the Mechanical, Electrical and Civil Engineering programmes in developing generic skills as perceived by the final year Mechanical, Electrical and Civil Engineering students of KUiTTHO?
4. Is there a significant relationship between the academic performance of the final year Mechanical, Electrical and Civil Engineering students of KUiTTHO and their level of generic skills acquisition?

Null Hypotheses: There is no significant relationship between the academic performance of the final year Mechanical, Electrical and Civil Engineering students of KUiTTHO and their level of generic skills acquisition

5. Is there a significant relationship between the level of generic skills acquisition and the level of importance of generic skills of the final year Mechanical, Electrical, and Civil Engineering students?

Null Hypotheses: There is no significant relationship between the level of generic skills acquisition and the level of importance of generic skills among the final year Mechanical, Electrical, and Civil Engineering students

6. To what extent are the final year Mechanical, Electrical and Civil Engineering students of KUiTTHO aware of generic skills?

1.5 Purpose of the Study

The purpose of the study is to determine whether KUiTTHO has produced workforce that meets the current demand of generic skills. Specifically, this study intends to:

- Understand the students level of understanding of generic skills
- Determine to what extent have the students mastered generic skills
- Pinpoint that potential employers have their own skill needs
- Determine whether or not KUiTTHO has significantly contributed towards the GSA of the students.

1.6 Objectives of the Study

The study which will be conducted by the researcher has the following as its objectives:

1. The researcher intends to determine the **level** of generic skills acquisition among the final year Mechanical, Electrical and Civil Engineering students.
2. The researcher intends to determine the **level** of importance of generic skills among the final year Mechanical, Electrical and Civil Engineering students of KUiTTHO

3. The researcher intends to determine the **level** of contribution by the Mechanical, Electrical and Civil Engineering programmes in developing generic skills among the final year Mechanical, Electrical and Civil Engineering students of KUiTTHO?
4. The researcher intends to determine whether there is a significant relationship between the academic performance of the final year Mechanical, Electrical and Civil Engineering students of KUiTTHO and their level of generic skills acquisition.
5. The researcher intends to determine whether there is a significant relationship between the level of generic skills acquisition and the level of importance of generic skills among the final year Mechanical, Electrical and Civil Engineering students.
6. The researcher intends to determine up to what extent are the final year Mechanical, Electrical and Civil Engineering students aware of generic skills.

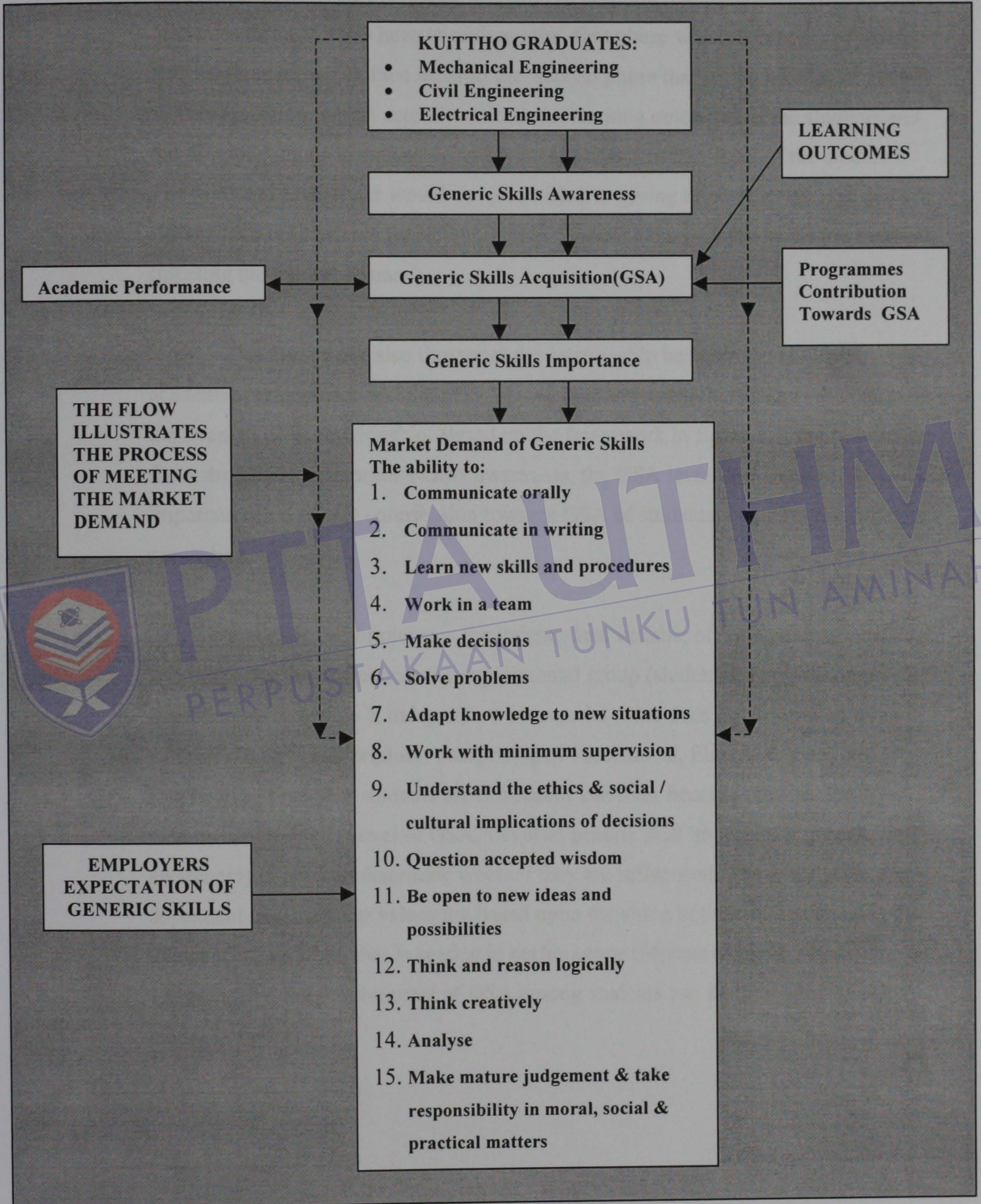


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1.7 Theoretical Framework

The theoretical framework below illustrates the relationship between KUiTHHO Engineering graduates and the market demand of generic skills.

Figure 1.1 Theoretical Framework

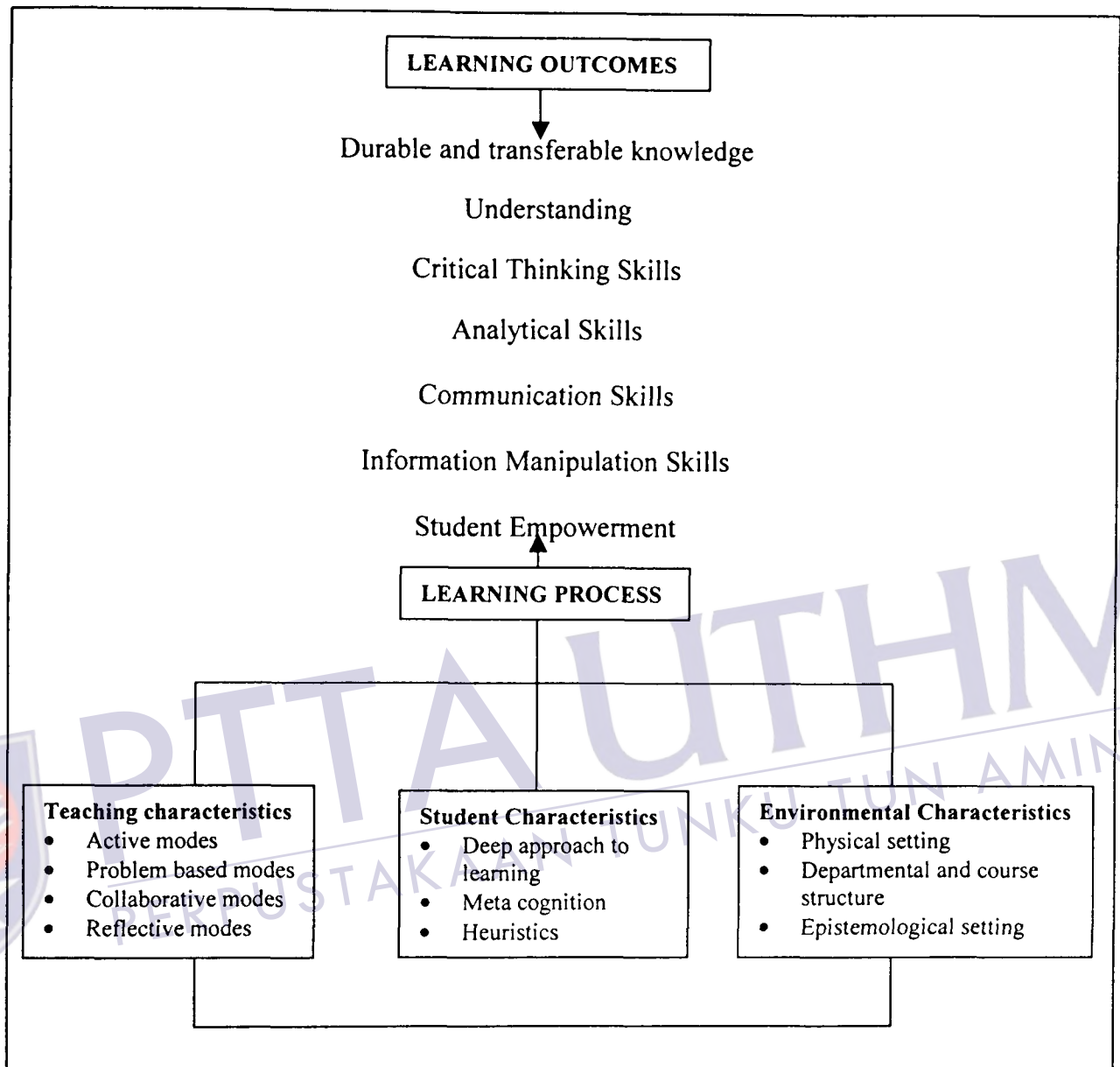


The theoretical framework in figure 1.1 illustrates the relationship between KUiTTHO graduates comprising Mechanical, Electrical and Civil Engineering final year students and the market demand of generic skills, and at the same time pictures the process of meeting the market demand. In addition, the framework stresses that graduates of KUiTTHO have to undergo the first phase which is process of generic skills awareness which then leads to the second phase that is the process of generic skills acquisition which actually reflects the learning outcomes of the students and the Engineering programmes contribution towards the GSA level of the students. The third and final phase would be prioritising or giving importance to the generic skills which the students feel is important in securing a sound job in the job market (meeting the market demand).

The framework also illustrates the relationship between the students academic performance and their GSA level, here the researcher intends to determine the strength of its relationship. Based on the framework in figure 1.1, the researcher feels strongly in determining GSA awareness, the GSA level, and Generic Skills importance and course contribution towards GSA of students, based on the students perception.

Academic performance is the independent variable of the framework because it is the factor that influences the experimental group (students). Furthermore, academic performance is independent because its value does not depend on other variables. KUiTTHO products comprising of Mechanical, Electrical and Civil Engineering final year students are dependent variables because they are the outcomes measured (Level of GSA, Level of generic skill importance, generic skill awareness) in order to determine whether they are influenced. These variables are dependent because their values are based upon the value of their influence upon the independent variable, that is academic performance (Mohamad Najib , 1999). Theoretically, the development of GSA among students can be illustrated by the model in figure1.2

Figure 1.2 Model for Achieving Enhanced Learning through IT Use in Higher Education



The model in figure 1.2 stresses that teaching characteristics, student characteristics and environmental characteristics have been found to contribute significantly to the attainment of enhanced learning outcomes, whereby, generic skills are generated (Learning Outcomes). For example, the use of student modes is seen to lead towards a higher order of learning outcome. This mode, is usually manifested in small group work, as a result students analyze the problem, discuss relevant aspects of the problem and hypothesise about possible solutions. This

"Saya akui karya ini adalah hasil kerja saya sendiri kecuali nukilan dan ringkasan yang tiap-tiap satunya telah saya jelaskan sumbernya".

Tandatangan

:



Nama Penulis

:

SHARMA THAYABARASILAN

Tarikh

:

SEPTEMBER 2001

actually enhances problem solving skills, strengthen critical analysis and inculcate information manipulation skills (Matthew, 2000).

This actually brings to attention the significance of the relationship between students level of GSA and their academic performance (Student Characteristics). In addition the model in figure 1.2 also explains the contribution of the Engineering programmes of KUiTTHO (Teaching and Environmental Characteristics) towards the GSA of students.

1.8 Importance of the Study

KUiTTHO students of Engineering and the industry itself will benefit directly from the findings of this study.

The study will benefit KUiTTHO students in particular, because KUiTTHO will soon be facing a Quantum Leap in establishing itself as a University, and to emerge as a prestigious University KUiTTHO has to undergo a paradigm shift in its curriculum contents of courses offered in terms of generic skills which will be the ultimate learning outcome of the students.. The Generic Skills survey conducted by the University of Western Australia has triggered the continuing of monitoring the value of its courses against the expectations of industry and employers, whereby the University seeks to maintain its standards of excellence in teaching and learning. Fortunately, it is anticipated that a follow up investigation will be carried out in the future (Paton, 1996). In view of this, KUiTTHO also has to equip itself by updating its content curricula in meeting the demands of the industry for the sake of its students . This is in line with the quotation below:

“If I have seen further than others, it is by standing upon the shoulders of giants”

Isaac Newton

Furthermore, the research outcome of the Department of Education, Training and Youth Affairs (DETYA), Australia shows that generally employers in Australia are satisfied with the qualities of graduates recruited by them and the same time exists an overflow of graduate job seekers in the job market, so employers have the opportunity to handpick the employees that they prefer. As a result, many graduates were left unemployed because they lack of basic graduate skills (employable skills). This is parallel with the following quotation

“ Chance favours the prepared mind”

Louis Pasteur

The findings of the study will also benefit the industry, mainly manufacturing. This is because through the enhancement of generic skills among KUiTTHO students, a better breed of engineers will be generated by KUiTTHO to meet the increasing demand of engineers. This is because there seems to be an increasing demand in full time Research Scientists and technologists, whereby their number is currently estimated to be approximately 7000.

This gives a ratio of 400 per million population which is low compared to the ratios ranging from 3,500 per million to 6,500 per million found in industrialized countries. By the year 2000, Malaysia will aim to achieve a high ratio of Science and Technology personnel to around 1,000 per million (Human Resource Ministry, 2000). In view of this the researcher feels that engineers with better generic or employable skills should be generated to meet the demands of the industry. In conclusion, this would actually benefit the employers in the long run, whereby the cost of importing service from abroad will be reduced.

1.9 Scope of the Study

The researcher will only focus upon the final year Mechanical, Electrical and Civil Engineering students of KUiTTHO. This is because, the final year students are at the peak of their studies and are ready to enter the job market. Besides that, their learning outcomes will be at its best during their final years. The main focus of the

study is towards the GSA of the students. Besides that, the researcher also intends to determine the level of GSA, Generic Skills importance, level of Programme's contribution towards the GSA and the relationship of academic performance with GSA. The researcher would like to stress that only GSA is the focus of the study and the researcher has no intention of studying the curriculum of the engineering programmes.

1.10 Definitions

1.10.1 Generic Skills

Reigeluth (1999), has defined generic skills as a skill which can be applied across a variety of subject domains, and takes longer to acquire than domain-dependent (subject-area) skills. Reigeluth adds that, it is what Gagne` refers to as "cognitive strategies" and what many cognitive scientists refer to as "Domain Independent Knowledge". The major kinds of generic skills include thinking skills (such as problem solving techniques), learning strategies (such as creating mnemonics to help you remember things), and meta cognitive skills (such as monitoring and revising your problem solving techniques or mnemonic-creating techniques). Generic skills are also known as employable skills, in a more practical and applicable manner. For further discussion of Generic skills please refer Chapter Two of this proposal. Mc Laughlin and Mc Cartney (2000), comment that the generic skills the employers expect students to acquire during their undergraduate years include:

- Communication
- Team building
- Information Literacy

1.10.2 Engineering

In 1982, the Annual Report of ABET (Accreditation Board of Engineering and Technology) of USA defined engineering as:

“ The profession in which a knowledge of the mathematical and natural sciences gained by the study, experience and practice is applied with judgment to develop ways to utilize, economically, the materials and forces of nature for the benefit of mankind”

Ir Rocky Wong Hon Thang, 1999





PTTA UTHM
PERPUSTAKAAN TUNKU TUN AMINAH

PART TWO
REVIEW OF THE LITERATURE

CHAPTER II

REVIEW OF THE LITERATURE

2.1 Literature Review

2.1.1 Students Perception of Generic Skills

The graduate skills assessment (GSA) project launched in Australia in year 2000 aimed to assess non-disciplinary skills covering written, critical thinking, problem solving and interpersonal understanding, Australian Federal Education Minister, David Kemp said universities and employers wanted the new test to measure generic skills that cannot be determined solely by traditional university exams and courses. Kemp added that students needed to learn more than just the information provided in their courses if they were to be successful in the future. Students wanted the test to show prospective employers that they had more skills than those represented in their university results (I.T. Newsletters, 2000).

In 1996, The University of Western Australia's Careers Advisory Board conducted a Generic Skills survey to develop and improve the employment possibilities of UWA graduates. The survey itself was important in raising student awareness of generic skills. According to the survey, the top five skills that students rated as important were oral communication, mature judgment, think creatively, team work and ethics of decisions in order of importance. The survey also revealed that students considered the development of generic skills by UWA courses less than satisfactory, moreover the survey also revealed that no course greatly contributed to the development of any generic skills.

Nevertheless, students' understanding of the value and importance of generic skills is high. Students are aware of the generic skills requirements in the workplace and, as such, seek a more symbiotic relationship between UWA courses and the external world of employment. In addition, statistical evidence reflects that women respondents had an earlier awareness of generic skills than male respondents. 30% of women first became aware of generic skills in their first year at UWA compared to 24% of men in their first year. By second year, the awareness levels are almost the same, 18% for women compared to 19% for men. As an awareness exercise the questionnaire had a significant impact on respondents; 14% of the women and 19% of the men becoming aware of generic skills through the survey. Furthermore, the average response per item for course contribution to the development of generic skills of female students was 1.95 and male students was 1.86. Average response per item for importance of generic skills for female students was between 2.47 - 2.91, and for male students was between 2.26 - 2.86 (Paton, 1996).

Grayson (1995) in a survey report titled "Value Added in Generic Skills Between First and Final Year" in York University commented that according to Business publications such as Canadian Business and Fortune, business is putting increased emphasis on the need for the development of generic skills in both Canada and the United States. In addition, The Conference Board of Canada argues that employers want employees who can communicate effectively, think critically, have a commitment to continuous learning, demonstrate positive attitudes and behaviours, are responsible and adaptable, and can work well with others. Grayson added that, it is unfortunate for universities, when discussing about generic skills, to assume that these generic skills will develop as a natural by-product of studies in various disciplines and only few institutions of higher learning identify the acquisition or honing of generic skills as desired outcomes of the university experience.

The findings of the survey, "value added in generic skills between first and final year" concluded that the greatest net gains were for analytical and communication skills (24 percentile point gains for each). Organizational, basic numeracy, personal, and

comparative skills increased by 20, 14, 12, and 11 percentile points each. Lowest increases, 9 percentile points in each case, were found in job procuring and computer skills.

"Aeroplanes are not designed by science, but by art in spite of some pretence and humbug to the contrary. I do not mean to suggest that engineering can do without science, on the contrary, it stands on scientific foundations, but there is a big gap between scientific research and the engineering product which has to be bridged by the art of the engineer"

British Engineer to the Royal Aeronautical Society, 1922.

Quoted by Walter G. Wincenti in "What Engineers know and how engineers do it" (Bristol University)

The researcher feels strongly that the gap between scientific research and the engineering product can be bridged by a high acquisition of generic skills.

A report titled "Submission to the review of the Bachelor of Engineering" in the University of Western Australia recommend that an engineering course in its first year should:

- Inform students about the range of study and career pathways open to them and what these would actually involve.
- Prepare students for entry or specialisation in any of several different streams
- Diagnose the need for and provide effective training in generic skills such as time management, written communication and problem solving.

The report also stated that attainment of generic skills should be seen as a priority learning outcome throughout Engineering courses and this should be clearly articulated to students. Teaching of generic skills should be integrated as much as

possible with other content rather than concentrated in specific units (Juniper and Goldflam, 1998).

Jackson (1997) in a survey titled "Tracking the Development of Generic Skills: the experience of 1987 and 1992 St. F.X. Graduates commented that a sensitive point in universities is whether more attention should be paid to the training of students to make them more suitable for employment in the corporate world. While some faculties are nervous about universities abandoning their traditional emphases on the liberal arts, other faculties argue that unless universities cater more to the employment needs of students and to the needs of employers for suitably trained individuals, universities will become less vital as students opt for training programmes in other educational institutions.

Interestingly and relevantly, Jackson added that universities should argue by demonstrating that in studying a variety of disciplines, students develop precisely those talents which will make them adaptable and relevant in a fast changing occupational world. And while universities do not always set out consciously to nurture such general skills (working with others, making formal presentations, learning how to acquire information, learning how to write thoughtful analyses of problems, and developing critical thinking abilities), acquiring a university degree is almost certain to enhance these skills.

Jackson, feels that by writing a carefully reasoned paper in a Philosophy course or in preparing an honours thesis in Geology provides the student with knowledge of the particular discipline but also helps develop generic skills which enhances the student's employability. The researcher agrees with Jackson in this aspect, but strongly feels that rather than just relying on the hidden curriculum phenomenon which embeds generic skills in learning indirectly, universities should also increase generic skills subjects in the curriculum to create awareness. The study concluded that by looking at the overall means for each skill, and comparing the 1987 graduates to those of 1992, it is noted that the initial generic skills levels reported, and the skill levels reported at graduation, tend to be slightly higher for the 1992 graduates.

The greatest area of perceived growth in skills among respondents are in the areas of “finding information and using it” and in the acquisition of computer skills. In addition, reading skills changed the least of all the generic skills measured. Writing skills were particularly enhanced in the Humanities and Social Sciences. Computer use were enhanced in all programmes and continued to grow post-university. In conclusion, in 9 of 7 generic skills measured, respondents report a greater growth in the skill areas while at university than in the growth experienced after university including writing skills, using time efficiently, working with others, reading, quantitative skills, making oral presentations and in finding information and using it.

Palmer (1999) in a report titled " Student Responses to Activities Designed to Develop Generic Professional Skills" has reported on student responses to a range of assessment activities in a final year engineering unit. The aim was to develop a range of generic skills important in professional engineering practice. The activities conducted in the assessments were group work, case study investigation, report writing, oral presentation, group self-assessment, industrial interviews, and written reflective journals. Palmer comments that the responses indicated that engineering students value a range of assessment activities, they value highly visits to real engineering organizations and contrary to popular belief, value and enjoy oral presentation exercises.

2.1.2 Employers Perception of Generic Skills

According to a paper titled "Generic Skills Development in Undergraduate Engineering Education in Australia" by Briggs and Hodgson (1999) engineers are required to think creatively and critically, to communicate effectively with all sections of the community, to work well in teams in various roles, and to define and solve complex problems. In addition, the paper stated that a recent Department of Education, Training and Youth Affairs of Australia commissioned survey discovered that employers perceive engineering graduates to be poor in:

- Problem solving skills
- Oral business communication skills
- Interpersonal skills (DETYA 1999, p.21)

Furthermore, graduates in all disciplines are also:

- Deficient in creativity and flair
- Unsuccessful job applicants
- Lack the capacity for independent and critical thinking

The findings in the DETYA survey are consistent with earlier surveys which reported that employers want graduates who:

- Can think creatively and analytically
- Who are good communicators
- Good team workers
- Adaptable life long learners

Briggs and Hodgson also stated that recent discipline reviews of engineering reached conclusion as stated below:

- Graduate engineers are poor oral communicators
- Are inadequately prepared to solve problems in the workplace
- Show a low level of understanding of business systems and the broader social context of the work

Furthermore, a conference on the future of engineering in Australia concluded that modern engineers require:

"A capacity to assemble and integrate diverse strands of knowledge, to lead multi-disciplinary teams, often linked through electronic networks, and to communicate at all levels in the community"

A report titled "Essential Skills for Young People Project" by Lina Libroaperto 1998 commented that communication skills, ability to work in teams and problem solving skills are continually identified by business, industry and school personnel as essential for improved employment prospects. Phase two of this project which was conducted in Australia, titled "survey of skill needs in the Northern Region of Melbourne", Enterprises in the northern region of Melbourne across all industry sectors were involved and approximately two thirds of those surveyed rated interpersonal skills and ability to work cooperatively as part of a team as essential attributes of an employee.

The Business Council of British Columbia surveyed 92 large British Columbia employers in 1995 who employ over 200,000 men and women to determine their ideas about employability skills. The survey findings determined that employers are looking for these top ten attributes and additional five :

1. Communication skills such as the ability to speak, write, read , listen, use appropriate body language, includes teamwork and interpersonal skills.
2. Positive attitude such as a given-give support, constructive feedback
3. Flexible and adaptable
4. Sets high performance standards
5. Good work ethic- hard work, produce useful outcomes
6. Accepts responsibility - take responsibility for assigned work, actions
7. Productive - quality and quantity - give good value for pay
8. Honest and reliable - loyalty, trustworthy
9. Willingness to keep on learning - concept of life long learning
10. Ability to analyze and evaluate- identifying and solving problems
11. Demonstrate common sense - self explanatory
12. Creative/innovator- finding new ways
13. Intelligent - mental capacity
14. Well educated - higher levels of education
15. High energy/stamina - self explanatory

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