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INFORMATION SYSTEMS SKILLS REQUIREMENTS IN MALAYSIA

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ABSTRACT

This paper is based on the findings of a survey carried out on more than 70 organizations in the private and public sectors to investigate the current requirements of information systems (IS) skills in the Malaysian IT community. The survey data was analysed pertaining to seven categories of IS skills. A comparison is made with a similar study carried out in Hong Kong. The findings show that there is an increasing demand for non-technical skills as well as technical skills for IS professionals. Degree programs in the public universities, however, are giving more emphasis on courses, which are more technically oriented. Recommendations are made to these institutions to review their IT curriculum to produce graduates more suited for the industry needs.

Keywords: ***IS skills, Interpersonal skills, Business skills, IT curriculum***

1.0 INTRODUCTION

Malaysia is considered as one of the fastest growing developing countries in Asia. With the rapid change of technology and fast growing economies, there is a compelling need to produce graduates with sufficient IS skills and knowledge to meet the needs of the industries. Presently, most computing programs offered by the institutions of higher learning in Malaysia emphasize the technical aspects of information systems and very little on the other types of skills such as interpersonal and business skills [1, 2]. This raises the question of whether the institutions of higher learning are producing graduates with the right kind of skills required by the industries. To date no study had been carried out in Malaysia to answer this question. It is timely to examine the requirements of the industries in terms of the IS skills of the IT professionals.

The objective of this study is to identify current IS skills, which are perceived to be important for the IT personnel to possess. The findings of this survey will be helpful to educational institutions to come up with suitable IT curriculum to produce suitably qualified manpower to fill the needs of the local IT industry.

The following section will briefly review the status of IT education in Malaysia and a description of the survey conducted. This is followed by an analysis and discussion of the data gathered, and a comparison is made with a similar study in Hong Kong. The paper concludes with recommendations to the institutions of higher learning in Malaysia on the need to review their IT curriculum to meet the current needs of the industries.

2.0 IT EDUCATION IN MALAYSIA: THE PRESENT SCENARIO

Currently, there are eleven public institutions of higher learning in Malaysia which offer computer science programs at the certificate, diploma, degree and post-graduate levels. Formal education in Computer Science in the country started in 1969 when a three-year diploma course was offered by the Mara Institute of Technology (ITM). The first bachelor's program in Computer Science was started by University of Science Malaysia (USM), followed by the National University of Malaysia (UKM), University of Technology Malaysia (UTM), University Putra Malaysia (UPM) and University of Malaya (UM) [3].

There are about 500 private colleges in Malaysia, with at least 36 of them offering various information technology programs and courses. These institutions offer both local diploma programs and various twinning degree programs with established universities in the United Kingdom, United States and Australia. For example, Kolej Damansara Utama offers diploma in Computer Studies and a twinning degree program with the University of Lincolnshire and Humberside, United Kingdom, in Computing and Information Systems. The Asia Pacific Institute of Information Technology offers local diploma courses in Information Technology and a Bachelor of Computing twinning degree program with Monash University from Australia.

3.0 THE SURVEY

To achieve the study objectives, a mail questionnaire survey was conducted in October 1999. The questionnaire consists of four sections. The first section collects information on the respondents background such as gender, qualification, age, organizational sector, size of their organizations and number of years in the IT field. The second section requires the respondents to rank the importance of 50 skills, categorized into seven types. They are interpersonal skills, business skills, programming and software engineering skills, environment/platform skills, computer language skills, analysis and design skills and application skills. These information systems skills were adapted from the study by Ng Tye [4]. Four skills, which are considered less important now are dropped. They include the ability to build systems in a mainframe environment, ability to use the operating system Job Control Languages, ability to build applications for the SAA environment and ability to build applications for the SNA environment. The ability to program in ADA has been modified to the ability to program in Java, as Java programming is becoming more important with the emergence of Internet technology. The third section of the questionnaire collects information regarding the ways and activities that the respondent perceived to be important for their competency development. The fourth section asks the respondents to rank the critical factors, which contribute to their job satisfaction.

This study was undertaken specifically to answer the following research questions:

1. What are the IS skills required by the Malaysian IT community?

2. Is the present IT curriculum emphasizing the right skills required for the graduates?

The questionnaires were sent to 300 companies and government departments in Malaysia. These organizations comprise those that accept our students for the industrial training module. These companies were chosen because their addresses and the companies' background are already known by the researchers. Besides, these companies are heavy users of information technology and have a sizeable number of IT personnel. We consider these 300 companies to be representative of the IT community in Malaysia. Three sets of the questionnaires were sent to each company and 110 usable sets were returned. Only 98 of these returns were considered to be valid responses. The response rate was 10.8%, which is acceptable given the inaccuracies in the mailing lists and the length of the questionnaires. Table 1 summarizes the respondents' profiles. The participants came from various sectors including 19.4% from the government, 14.3% from Software Development, and 7% from the finance and insurance sector. The rest comes from a variety of sectors including agriculture, wholesale, manufacturing, real estate and telecommunication. The participants' age ranges from 23 to 57. Table 2 summarizes the size of the participants' organizations. Eighty-eight percent (88%) of the participants come from organizations with 50 or more employees, and 27% of them are from very large organizations with more than 1000 employees. The participants' experiences in the area of information technology range from 1 to 24 years with a mean of 8.86 years. Table 3 summarizes the current job titles of all the respondents. IT managers makes up 36.7% while programmers are the least in number, making up only 5.1%.

Table 1: Profile of respondents

Attributes	**Number**	**Percentage**
Age		
Maximum	57	
Minimum	23	
Mean	33.6	
Sex		
Male	55	56.1
Female	43	43.9

Table 2: Organization's size of the respondents

Number of Employees in Organization	**Number**	**Percentage**
Less or equal to 50	11	11.2
Between 51 and 100	20	20.4
Between 101 and 200	14	14.3
Between 201 and 500	16	16.3
Between 501 and 1000	10	10.2
More than 1000	27	27.6

Table 3: Current job titles of respondents

Job Titles	**No.**
Programmer	5
System Analyst	21
Systems Engineer	10
IT Executive	19
IT Manager	36
Others: Tutor, Researcher	7

4.0 RESULTS AND DISCUSSION

Table 4 shows the ranking order of the seven categories of IS skills required of IS professionals. The measure of relative importance was set on a 5-point Likert scale with 1 being "not important", 3 being "moderate" and 5 being "most important". We can further group the seven categories of IS skills into technical and non-technical skills. The *Business and Interpersonal skills* can be grouped as non-technical skills and the other categories, which are; *Programming and Software Engineering*; *Environment/Platform, Analysis and Design, Applications* and *Computer Languages* can be grouped as technical skills.

The finding shows that the highest rated skill is *Programming* and *Software Engineering* skills. These skills are perceived to be the most important even though the majority of the respondents are not programmers. This is an interesting finding. The previous table shows that only 5 out of 98 respondents are programmers. There are several explanations in the light of the current IT scenario in Malaysia. The launching of the Multimedia Super Corridor project and the Government's move towards the implementation of E-Government, had propelled Malaysia through a phase of tremendous change. This transitional phase requires a large number of It workers who are skillful in the area of software development and programming. According to the latest statistics [5], Malaysia's IT Industry has a deficit of 22,405 programmer analysts who contribute the highest number of IT personnel required compared to other IT occupations such as technical support and system/hardware engineer. This figure strongly supports the claim that the current demand for IT personnel with programming and software-engineering skills in Malaysia is very high.

The second and third highest rated skills are the *Interpersonal* and *Business* skills, respectively. These rankings are well supported by the current literature regarding skills required by IS professional [6,7]. There are many reports in the literature that show a strong, continuing emphasis on *Business* and *Interpersonal* skills besides the technical skills [7, 8, 9, 10]. IS professionals are expected to know a lot more than just technical know-how. They need to be negotiators, deal-makers, astute business people and sometimes counselors to facilitate in extenuating disputes among internal and external customers. In particular, the success of any software projects depends largely on the communication and coordination among the team members [11]. IS professionals need to be able to work competently in a team and this requires them to communicate effectively with each and every member of the team [11]. Therefore, interpersonal skills and knowledge on the business are seen as contributing factors in the career advancement of IS professionals [7]. Consequently, it is not surprising that these skills are perceived to be of increasing importance for the IS professionals in Malaysia.

The fourth, fifth and sixth rated skills are *Environment/Platform* skills, *Analysis and Design* skills and *Applications* skills. These skills are perceived to be less important as they are changing very fast due to the rapid change of technologies. The current IS professionals are expected to have knowledge on various hardware platforms and systems integration. The *Analysis and Design* skills are apparently the core skills for IS professionals [12]. These skills enable the IS professionals to analyze business or organizational problems and design the appropriate solutions utilizing the current and accessible technologies. The seventh and lowest rated skill is *Computer language* skill. This is mainly due to the current technological advances and trends. With the proliferation of CASE tools and integrated development environments, acquiring computer language skill, is not as difficult and intimidating as before. Emerging CASE tools have been designed to be user-friendly and the learning curve to master these tools is getting shorter. Many IT personnel realize that there are more important phases in software development besides the coding process. The analysis and design phases should be given adequate emphasis in order to ensure the quality of the software. The language skill of individual programmer easily gets out-dated due to the rapid emergence of numerous new languages in the market. This explains the current shift in importance from computer language skill to programming skill by the IT professionals.

Table 4: Ranking of the seven categories of IS skills required in Malaysia

Ranking	**Skills**	**Means**
1	Programming and Software Engineering	3.933
2	Business	3.904
3	Interpersonal	3.881
4	Environment/platform	3.738
5	Analysis and design	3.695
6	Applications	3.635
7	Computer language	3.322

Table 5 shows the top 10 skills out of 50 IS skills listed in the questionnaires. They are ranked according to their mean values which are perceived to be the most important skills for IS professionals. *Interpersonal* and *Business* skills dominate the other skills in the ranking. Four of the skills are from *Business* skills and two skills are from *Interpersonal* skills while the rest are from *Programming and Analysis* skills. This further supports the increasing needs of other skills besides the technical skills. The study by Rahman [7] also highlights the importance of *Interpersonal* skills expected from fresh computer programmers.

Table 5: Ranking of the top ten skills

Ranking	Category	Skills
1	Interpersonal	Ability to work with others to accomplish some goals.
2	Business	Have an understanding of a specific business function.
3	Interpersonal	Ability to listen to others.
4	Programming and Software Engineering	Ability to design program data structures.
5	Business	Ability to do project planning and control.
6	Application	Ability to design relational databases.
7	Programming and Software Engineering	Ability to apply structured program design.
8	Business	Ability to foresee problems that would result from introduction of new technology.
9	Analysis	Ability to do an adequate feasibility study.
10	Business	Ability to create a formal conceptual design for an application

Table 6 shows the comparison between our findings and a similar survey carried out in Hong Kong in 1998 [4]. There are similarities as well as differences in the findings of the surveys. In Hong Kong, *Interpersonal* skill is ranked as the most important, followed by *Business* skills and, *Analysis and Design* skills. The authors attributed this to the respondents' background, who started off as programmers, and at the time of the survey, hold the positions of systems analysts or IS managers. These positions require them to acquire better *interpersonal* and *business* skills rather than having technical skills alone. In our study, the respondents come from a variety of backgrounds and their perceptions are more open. It is interesting to note, however that other technical skills, especially *computer language* skills, are perceived to be the same by both studies. This comparison further strengthens our conclusion that the IS skills needed by the IS professionals today are shifting towards the non-technical skills. Therefore IS professionals should no longer be confined to the IS departments alone anymore. Their jobs require them to be more communicative with other members of the organization and they need to understand the organization's business goals in order to contribute to its success.

Another notable difference between the two studies is the higher mean observed from our study from each of the categories. This can be attributed to the different environments in which the studies were carried out. To spearhead Malaysia towards becoming an industrialized nation, the government has initiated many IT projects to accelerate the change process. As a consequence, there is a greater demand for more skilled manpower in IT. This has directly influenced the IT professional in the country, towards acquiring the IS skills required by the nation.

Table 6**:** Comparison with HK study in 1998

Ranking	Our study (1999)	HK study (1998)
1	Programming 3.933	Interpersonal 4.15
2	Business 3.904	Business 3.82
3	Interpersonal 3.881	Analysis and Design 3.31
4	Environment/Platform 3.738	Programming 3.29
5	Analysis and Design 3.695	Environment/Platform 2.88
6	Applications 3.635	Applications 2.88
7	Computer Languages 3.322	Computer Languages 2.66

To answer our second research question, we analyzed the curriculum for a degree course in Information Technology and a degree in Computer Science offered by the public universities in Malaysia. A summary of the findings is shown in Table 7. We found that emphasis given to technical courses is much higher in all four of the degree programs. However, the skills emphasized by each course may include the mixing of both technical and non-technical skills and abilities. The emphasis on each skill is difficult to measure. From this general observation, we can infer that there is an apparent emphasis on the technical courses compared to the non-technical courses.

Table 7: Number of technical and non-technical courses offered in the Malaysian public universities

University	Degree	Technical courses	Non-technical courses
University Malaya	Information Technology	21	13
University Malaya	Computer Science (Information Management)	26	8
University Putra Malaysia	Computer Science (Software Engineering)	26	9
University Malaysia Sarawak	Information Technology	24	13

5.0 CONCLUSION

From this study, it is found that the skills required of IS professionals for the 21st century in Malaysia is ever increasing and changing. Emphasis should be given to *programming* and *software engineering* skills, *inter-personal skills* and *business* skills. These finding offer us a more integral view on understanding the needs of the industry and providing input to the institutions of higher learning to tailor their curriculum to meet the changing needs. Three recommendations are offered to the institutions of higher learning in Malaysia, offering programs in Information Technology.

Firstly, IS curriculum should give a comprehensive emphasis on the *programming* and *software engineering* courses to ensure that graduates have a strong programming foundation in order to meet the current and future demands of the nation. Although the present IS curriculum places emphasis on most of the technical skills, more focus should be on the *programming* and *software engineering* skills, as these are necessary to meet the needs for good software developers.

Secondly, institutions of higher learning should include more business and communication subjects in the curriculum. *Business* and *interpersonal* skills are required, not only within the IS teams, but with clients and organizations. *Interpersonal* skills are also required to develop self-responsibility and internal integrity in order to work more competently. Values, such as openness, integrity, and honesty, are essential for individual development as well. A solid understanding of technology with equal balance of functional, technical and interpersonal skills was perceived to be the crucial characteristics of any exceptional IS professionals [13]. In order to nurture these kinds of characteristics, IS students should be given the opportunity to acquire extra interpersonal and communication skills through more group work and teamwork, and be exposed to additional real-world case studies to gain real-world knowledge.

Thirdly, IS graduates should be equipped with the ability to cope with the changing environment and demands and to accept the evolutionary nature of information systems design [5]. Students must be made to realize that the training, which they receive in colleges or universities, is merely to prepare them with a good foundation and background in IT. They need to always keep abreast with the ever-changing technology. Therefore, the best training that university education can provide for them is the ability to learn in whatever area necessary, especially in the technical aspects.

In summary, there is an increasing need for institutions of higher learning to be sensitive toward the needs of the industry and to improvise their curriculum to meet these fast-changing needs. Closer collaboration between IS educators and IS practitioners must be emphasized. This collaboration can contribute towards enhancing the curriculum and lead to producing suitably-skilled manpower to meet the priorities of the country.

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BIOGRAPHY

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