Employers' perception on engineering, information and communication technology (ICT) students' employability skills

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ABSTRACT: This article is based on the findings of a survey of employers having Universiti Teknikal Malaysia Melaka (UTeM) engineering and ICT students undergoing industrial training at their organisations. The study seeks to explore the employers' perceptions of the employability skills that technical students need to possess, as well as assessing the employers' level of satisfaction with the students' employability skills. A 13-item scale of engineering employability skills adopted from the Engineering Accreditation Council (EAC) manual and the Future of Engineering Education Report 2007 were utilised as the main instrument to gauge the employers' perception of UTeM's students. The findings revealed that problem-solving, tool handling competency and presentation skills feature highly amongst the skills demanded of students by employers. The findings are useful for the University to understand how to equip its students and graduates according to the requirements of industry and to ensure they are highly employable after graduating from the University.

INTRODUCTION

The lack of knowledge and skills amongst graduates has been described as one of the reasons why graduates struggle to find employment after graduating [1]. Whilst some are good in their technical skills, most have been found lacking in their soft skills. As a result, they become one dimensional in identity as opposed to exhibiting the multiple identities as proposed by Hall [2][3], Hall and Mirvis [4], and Mirvis and Hall [5].

This creates unnecessary distractions to many organisations, where on one hand, they have to grapple with rapid changes of the world economy and the challenges that come with them, while on the other hand, they are handicapped by the inadequate competency of their future workforce. As such, they have to be selective in recruiting those that they want to work for them.

The Malaysia Economy in Brief 2008 report, which was published by the Statistics Department of Malaysia, indicated that there was an increase in the unemployment rate of 0.4% in the first quarter of 2008 as compared with the same quarter in 2007 [6]. Not surprisingly, the number includes some engineering and ICT graduates from local universities. Even though they are said to be well equipped with relevant technical skills, they still lack important soft skills, like communication, language, critical and creative thinking skills, leadership, etc. Several researchers in engineering education have discussed the ineffectiveness of the current engineering and ICT educational system in equipping the graduates with relevant employability skills as required by their potential employers [7].

These findings, unfortunately, have a bearing on how employers perceive local engineering and ICT graduates and whether these graduates will be employed by them. Thus, it is crucial to assess the employers' perception, especially in the context of UTeM as a focused public technical university in Malaysia, and how the perception impacts the employability of UTeM graduates in the job market.

LITERATURE REVIEW

Graduates' employability is one of the fiercely debated issues in the current economic climate. Rapid changes taking place in the economy create a pressure upon employers to identify and recruit graduates that possess critical employability skills relevant to current demands. Even though basic education and technical skills are two fundamental

requirements to be possessed by graduates, there are non-technical and intangible skills that must also be acquired by these graduates [8]. This notion has been supported by several scholars in this area either through empirical evidence or through theoretical discussions. Amongst the skills that are frequently highlighted are communication skills, critical and creative thinking skills, team working skills and lifelong learning skills [9-11]. One of the common reasons why these skills are required by the employers is that they need adaptable and flexible future employees who can easily learn, relearn and unlearn current and new knowledge to be able to make changes as required by the economic and technological environment at the time.

According to Andrews and Higson, academic scholars have various definitions of employability skills, which include a focus on graduates' abilities to adapt and use their personal and academic skills to more tangible educational outcome measures associated with graduate employability and employment [12]. For example, Knight and Yorke define 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 [13]. Thus, it can be said that having the required employability skills will enhance the chances of graduates to be employed when competing in the job market.

As a result, the issue of graduate employability affects every graduate, including engineering and technology-based graduates. Suleiman et al aptly sum up this issue, when they argue that current fresh graduates in engineering face more challenges and competition than before [10]. They say this can be attributed to the globalisation of the world economy that forces organisations to be competitive on several fronts, be it in technical areas or non-technical areas, such as management. Thus, it is not enough for them to hire technically competent engineers, but they also need engineers that are able to manage changes and adapt to these changes [14]. It is interesting to note that the ability to do this depends much on the non-technical and intangible skills of the engineers, which were mentioned earlier in this article.

It must be noted that there is empirical evidence indicating that employers are more inclined to hire graduates that possess both the non-generic skills, as well as the technical skills. Hagan in her research about ICT graduates in Australia surveyed 490 firms to determine whether these graduates were employed by them. It was found that 40% of the firms employing those graduates have reported that they are not satisfied with the level of mastery of at least two generic skills, i.e. their business management skills and communication skills [11].

Nguyen et al found that at least two research articles by Japanese researchers Kasahara and Owa indicated that Japanese graduates lack the initiative and problem-solving skills needed by the employers [15]. Similarly, Bloom and Saeki found that 64% of employers in India hiring fresh engineering graduates are only somewhat satisfied or worse with the quality of new hires [16]. However, it is interesting to note that despite these pieces of evidence, Suleiman et al reported that more than half of the employers in Malaysia are satisfied with the level of employability skills possessed by Malaysian engineering graduates [10]. Thus, this research is an interesting avenue to gauge and understand the perception of employers towards UTeM's students, both in the engineering and ICT areas.

RESEARCH METHODOLOGY

Sample of Population

The study sought the assistance of UTeM's Industry and Community Network Centre (ICNeT) in contacting the employers that accepted the University's students for four months of industrial training at their organisations. This was purposely done to ensure that the second part of the study that dealt with their level of satisfaction of the students' employability skills were given a more accurate assessment due to their familiarity with the University and its students.

Research Instrument

The study adopted a combination 13-item questionnaire related to the employability skills of engineering graduates derived from the EAC manual, as well as the Future of Engineering Education Report 2007 that acted as the core competency measured in this study. The questionnaire consisted of three parts. The first part asked about the profile of the employers' organisation; the second part asked the employers to rate on a five-point scale the employability skills they rate as important to be possessed by technical students, as well as their potential employees. Amongst the skills being assessed were a combination of hard and soft skills, including engineering and ICT skills, presentation skills and other related skills. Finally, the third part asked the employers to reflect on their level of satisfaction on the level of employability skills possessed by UTeM's students.

Research Procedure

The questionnaire started with a pilot study involving a few employers to elicit important and useful feedback to the researchers regarding the clarity and suitability of items in the questionnaire. Once their feedback was incorporated in the refined questionnaire, the researchers then proceeded with the actual data gathering. Questionnaires were sent through UTeM's ICNeT, which acted as the liaision office with the faculties' industrial training coordinator. A total of 365 organisations responded to the questionnaires.

FINDINGS

Organisation's Profile

As mentioned in the previous section, a total of 365 organisations responded to the questionnaire. They comprised 34 government agencies, 84 government-linked companies (GLCs), 108 multinational companies (MNCs), 73 small and medium enterprises (SMEs), 54 organisations that listed themselves as other organisation and 12 organisations that did not specific their category. The respondents can be grouped into two main areas of industries: engineering and non-engineering.

The engineering industry consisted of 107 organisations from manufacturing sectors, 64 from other engineering sectors, 55 from electronic and telecommunication sectors, 10 from automotive sectors and nine from oil and gas sectors. The non-engineering industry consisted of 34 organisations from the ICT sectors, 29 from service sectors and 52 from other sectors. In terms of employee numbers, 126 of these organisations had more than 1,000 employees and the rest of 239 organisations had fewer than 1,000 employees. 239 organisations indicated that they have operations outside Malaysia, outnumbering 159 organisations that only have local operations.

Employers' Perception of the Importance of Employability Skills

Table 1 shows the rank of importance attached to each employability skill as indicated by the employers. The ability to undertake problem identification, apply problem-solving, formulations and solutions (M = 4.33, SD = 0.735) are given a high priority, followed by the ability to use techniques, skills and modern engineering/ICT tools (M = 4.27, SD = 0.729), the ability to present ideas with confidence and effectiveness (M = 4.26, SD = 0.778), the ability to function effectively as an individual and in a group (M = 4.15, SD = 0.770), the ability to acquire and apply knowledge of engineering/ICT fundamentals (M = 4.13, SD = 0.757) and so on. The least important employability skills according to the employers are having competency in theoretical and research engineering/ICT (M = 3.84, SD = 0.861) and having basic entrepreneurial skills (M = 3.63, SD = 0.911).

Table 1: Perception of the importance of employability skills.

Rank	Employability Skills	Mean (M)	Standard Deviation (SD)
1	The ability to undertake problem identification, apply problem-solving, formulations and solutions	4.33	0.735
2	The ability to use techniques, skills and modern engineering/ICT tools	4.27	0.729
3	The ability to present ideas with confident and effectiveness	4.26	0.778
4	The ability to function effectively as an individual and in a group	4.15	0.770
5	The ability to acquire and apply knowledge of engineering/ICT fundamentals	4.13	0.757
6	The ability to continue learning independently in the acquisition of new knowledge, skills and technologies	4.12	0.767
7	The ability to design and conduct experiments, as well as to analyse and interpret data	3.98	0.793
8	The ability to utilise a systematic approach to design and evaluate operational performance	3.97	0.773
9	The ability to acquire in-depth technical competence in a specific engineering/ICT discipline	3.97	0.777
10	The ability to recognise the need to undertake life-long learning and possessing/acquiring the capacity to do so	3.94	0.808
11	The ability to understand the social, cultural, global and environmental responsibilities	3.90	0.787
12	Having the competency in theoretical and research engineering/ICT	3.84	0.861
13	Having basic entrepreneurial skills	3.63	0.911

Employers' Level of Satisfaction of UTeM Students' Employability Skills

Table 2 presents the level of the employers' satisfaction with UTeM students' employability skills. Generally, the employers were satisfied with UTeM students' level of employability skills. They indicated that they were mostly satisfied with the students' ability to continue learning independently in the acquisition of new knowledge, skills and technologies (M = 3.86, SD = 0.810), followed by the ability to function effectively as an individual and in a group with the capacity to be a leader and effective team member (M = 3.81, SD = 0.870), the ability to recognise the need to undertake life-long learning and possessing/acquiring the capacity to do so (M = 3.80, SD = 0.844), the ability to acquire and apply knowledge of engineering/ICT tools (M = 3.78, SD = 0.847), the ability to undertake problem

identification, apply problem-solving, formulation and solutions (M = 3.78, SD = 0.857) and so on. The ability to design and conduct experiments, as well as to analyse and interpret data (M = 3.68, SD = 0.883) and having basic entrepreneurial skills (M = 3.56, SD = 0.930) ranked last on the level of satisfaction of the employers.

Table 2: The level of satisfaction of UTeM students' employability skills.

Rank	Employability Skills	Mean (M)	Standard Deviation (SD)
1	The ability to continue learning independently in the acquisition of new knowledge, skills and technologies	3.86	0.810
2	The ability to function effectively as an individual and in a group with the capacity to be a leader and effective team member	3.81	0.870
3	The ability to recognise the need to undertake life-long learning and possessing/acquiring the capacity to do so	3.80	0.844
4	The ability to acquire and apply knowledge of engineering/ICT tools	3.78	0.847
5	The ability to undertake problem identification, apply problem-solving, formulation and solutions	3.78	0.857
6	The ability to present ideas with confidence and effective through oral and written modes	3.77	0.799
7	The ability to understand the social, cultural, global and environmental responsibilities	3.75	0.819
8	The ability to acquire in-depth technical competence in a specific engineering/ICT discipline	3.73	0.865
9	The ability to use techniques, skills and modern engineering/ICT tools	3.73	0.845
10	The ability to utilise a systematic approach to design and evaluate operational performance	3.72	0.845
11	Having the competency in theoretical and research engineering/ICT	3.70	0.854
12	The ability to design and conduct experiments, as well as to analyse and interpret data	3.68	0.883
13	Having basic entrepreneurial skills	3.56	0.930

DISCUSSION

The study found that the top five skills highly regarded by the employers are a combination of three soft skills and two hard skills. Ranked most important is the ability to undertake problem identification, apply problem-solving, formulation and solutions as the most important skills that employers needed in engineering and ICT students. The latter skill is the one that has been identified by Zaharim et al, who discussed the engineering employability skills required by employers in Asia [7] and is listed as important in Japan, Hong Kong and Singapore [7]. Thus, having the ability to think, reason and make sound decisions is crucial for employees determined to do well and advance into their respective career. An employee, who possesses the ability to think critically, act logically, and evaluate situations to make decisions and solve problems, is a valuable asset to the organisation [17].

At the same time, the ability to execute good and effective presentations, as well as leading and working as a team are deemed as important by the employers for the students, or any future employees, to master. This is due to the fact that without proper and effective communication skills, no amount of information can be shared effectively within the organisation, which affects the probability of productivity. Similarly, it is crucial for any employees to be able to work in teams due to the fact that every individual in an organisation are interconnected to each other, thus, requiring sharing of ideas and expertise in pushing the organisation forward.

In terms of the level of satisfaction, the employers indicated that they are generally satisfied with UTeM students' level of employability skills. The skill that they are most satisfied with is the ability to continue learning independently in the acquisition of new knowledge, skills and technologies. However, upon analysing what has been perceived as highly important in terms of employability skills needed to be possessed by technical students and future employees, there appears to be a critical gap. Hence, UTeM as a technical institution of higher learning must take notice of this important issue. This is because, it could have a serious impact on the University's graduates' chances to compete in the competitive job market.

One recommendation that the University could take up is to equip UTeM students with the skills identified by the employers. Amongst the initiatives that could be implemented urgently is to embed techniques and methods of problem identification and problem-solving in every subject taken by the students. Most importantly, the students must be made aware of the need to master concrete-logic, as well as abstract logic in order for them to not only possess the knowledge

of the subject, but more importantly possess the understanding of what they learn in class. Besides students, lecturers must also be exposed to various critical and creative thinking techniques to enable them to teach their students to identify and solve problems. This could be achieved by having consistent engagement with the industry in understanding their evolving requirements with regard to solving industrial problems. Finally, the engagement should not be focused on technical cooperation alone, but must be complemented with constant dialogue in identifying what industry needs from their future employees.

CONCLUSION

This study has provided some information about the employability skills needed by employers, when recruiting their future employees, especially, related to engineering and ICT graduates. First, it must be noted that equal attention is given to hard or technical skills, as well as to soft skills. Without this combination, employers will end up recruiting one-dimensional employees thus denying them a workforce that is multi-tasking and able to execute their responsibilities well.

Second, there is an urgent need for universities to measure constantly employers' level of satisfaction with regard to the quality of graduates that universities are churning out every year. This is crucial due to the fact that if universities fail to produce the competent graduates required by employers, it will reflect badly on universities and their ability to understand the needs of industry.

Third, universities must ensure that they have constant engagement with industry in order for them to be able to detect changes in industry quickly. The ability to do this will enable universities to react proactively instead of reactively to any changes taking place in industry. Universities may not be able to implement all the changes immediately, but should be able to adjust progressively, thus, ensuring that their graduates are relevant to the needs of industry.

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BIOGRAPHIES

Mohd Shamsuri Md Saad is a lecturer at the Centre for Languages and Human Development, Universiti Teknikal Malaysia Melaka (UTeM). His educational background revolved around communication that saw him graduate at the Bachelor level from the International Islamic University Malaysia (IIUM) taking organisational communication as his major. Later, when studying at Universiti Putra Malaysia (UPM), he further pursued his interest in the area undertaking his Masters in corporate eommunication. His experience working with the university's top management has led him to venture into the area of leadership and innovation with emphasis on small and medium enterprises (SMEs). To him, leadership plays an important role in an organisation, especially, in the SMEs due to its influence in the whole organisation; hence, making it an interesting subject matter to be researched on together with communication.

Anidah binti Robani holds a BA and MA in history and civilisation from the Kuliyyah of Islamic Revealed Knowledge and Human Sciences (KIRKHS) at the International Islamic University Malaysia (IIUM). She worked with IIUM in the Department of History and Civilisation as an assistant lecturer and lecturer from 1998 to 2002. She is currently a lecturer in humanities at the University Technical Malaysia Melaka (UTEM) and is Coordinator of the Soft Skills Unit. She attained her PhD from the Department of Science and Technology Studies, Faculty of Science, University of Malaya (UM). Her main research interest is in the field of science and technology policy and management studies.

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Associate professor Dr Izaidin bin Abdul Majid currently holds the post of Director of UTeM's Centre for Continuous Learning, and at the same time is attached to the Faculty of Technology Management and Technopreneurship. He obtained his PhD in entrepreneurship from the Hunter Centre for Entrepreneurship, University of Strathclyde, UK. He teaches a number of subjects relating to entrepreneurship at various levels from Diploma through to MBA at UTeM, as well as supervising postgraduate research students at the MSc and PhD levels. He is also conducting a number of research projects, and has assisted UniMap and KKTM in programmes relating to entrepreneurship.