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# Engineering Students' Generic Skills after Industrial Training: Employers' Perception

**Mohd Shahzuan Ghazalan, Fazlinda Ab Halim, Nur Izeanty Hamidon, Tun Ili Ayuni Ahmad Hariri, Shamim Asilah Sallehuddin, Khadijah Bahrol, Normah Zakaria & Rohayu Roddin**

Faculty of Technical and Vocational Education, Universiti Tun Hussein Onn Malaysia, 86400 Batu Pahat, Johor, MALAYSIA

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**Abstract:** This study aims to examine the employers' perception on the generic skills of the MTU engineering students after their industrial training. The related generic skills in this study are problem-solving skills, leadership skills, communication skills, management skills, entrepreneurial skills, critical thinking skills, decision making skills, teamwork skills and interpersonal skill. The sample of this study consists of 144 employers from EEE (Electrical and Electronic Engineering) field industries that has been chosen from whole Malaysia using random sampling. The design of the study uses quantitative survey approach specifically descriptive analysis where data analysis is done in the form of mean, frequencies and percentages. (The results show that employers' perceptions on the level for students' leadership skills is at a moderate low of 2.77. On the other hand, the students' communication skills is at a moderate low level of 2.83, management skills at a moderate high level of 3.34, interpersonal skills at a moderate high level of 3.37, problem-solving skills at a moderate high level of 3.70, critical thinking skills at a moderate high level of 3.47, decision-making skills at moderate high of 4.13 and teamwork skills at moderate high of 3.64 and entrepreneurial skills at moderate low of 2.59.) Referring to the findings that it can help the university to re-evaluate the industry training curriculum to improve the quality of the student's generic skills. Therefore, it is hoped that these research findings can be used by related authorities (Ministry Higher Education and Industry) to improve the students' overall generic skills and consequently produce quality graduates not only in technical skills but also in generic skills. This findings will be used as a guideline in the improvement of the industry training curriculum by looking at the weakest level of generic skills based on the employer's perception.

**Keywords:** Employers' perceptions, generic skills, self-development and industrial training.

## 1. Introduction

In this globalisation era, there are various challenges and competition throughout the world and these somehow also are affecting Malaysia especially in terms of employability. The problem of unemployment is a global issue that has become a major concern among countries all over the world (Esa, Suadi & Daud, 2013). The reason behind this issue is due to the issue of generic skills that are lacking in graduates (Rahman, Jusoh, Serji & Salleh, 2015). This issue needs to be tackled from the very beginning, before the students step into the real world of industry. Lublin (2003) states that generic skills or self-development skills are the skills that are required for graduates other than academic education, to make them more visionary and competitive enough to equip themselves in the job market. In addition, the feedback from the industry on the students' generic skills reveals that the employers are doubtful in hiring university graduates due to the inadequacy of generic skills (Alias, Hamzah, & Yahya, 2013). This statement is further justified with the result of debates of some researchers claiming that today's employers are more concerned with the characteristics of employees with high-level generic skills elements including those with leadership qualities, ethical and interpersonal skills (Quek, 2005) teamwork ability (Ariffin *et al*, 2008) and communication skills particularly in writing and speaking (Jamian, 2008). Therefore, it

\*Corresponding author: [gb150092@siswa.uthm.edu.my](mailto:gb150092@siswa.uthm.edu.my)

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can be concluded that the real problem comes from the lack of generic skills of students in IPTs (Higher Education Institutions) in meeting the needs of the industry. In addressing these problems, a framework for the implementation plan for Malaysian qualification has been set up, namely the Malaysian Qualification Framework (2017). MQF (2017) has outlined some guidelines in addressing generic skills competence issues. Among the intentions is the development of a curriculum based on MQF concerning social, thinking, and behaviour theory. MQF (2017) focuses on 8 elements in the learning outcomes of which are; knowledge, professional and ethical, social responsibility, practical skills, ability to communicate through various methods, working in groups and able to lead, able to think critically, capable of solving problems, scientific and systematic skills, management capabilities, lifelong learning and entrepreneurship (Alias, Muslim, Mansor, Salleh & Basir, 2012).

However, it does not achieve industry satisfaction in Malaysia. This can be seen through feedbacks from industries that reveal that the current university graduates' skills do not meet the employers' satisfaction focus on generic skill (Rahman *et al.*, 2015). In addition, this failure can be verified through the Labor Statistics Report from 2010 to 2017 which presents the percentage in unemployment increased by 1% annually (Department of Statistics Malaysia, 2017). However, the issue of failure to implement the MQF (2017) in Teaching and Learning (T&L) to address the problem of unemployment is not supported by some researchers as the issue involves several other factors, not only focusing on the curriculum developed by IPTs. This statement is supported by Kearns, (2001) who states that economic instability factors affect the unemployment of skilled workers in a country. Therefore, the IPTs have sought other approaches to establish an industrial training programme aimed at enhancing the technical skills and generic skills of students (IPT, 2010). Rodzalan and Mohamed (2012) state that industrial training programmes have a positive impact on generic skills. Generic skills can be enhanced through a developed curriculum based on training such as industrial training curriculum (Esa, Yunos & Kaprawi, 2004). This is because one of the objectives of industrial training implementation is to enhancement of student self-development skills, especially the student's soft skills or better known as the generic skills (Industry Training Policy Report, 2010).

However, the students' technical skills is not the main issue but it is the generic skills that is viewed as unsatisfactory by the industry (Makhbul, Yussof, & Awang, 2015). This statement is parallel to Phillip, Wan Hitam and Lan (2012) who state that current graduates have no issue in technical skills but the real problems of graduates are incompetency in generic skills. This statement is reinforced by the study conducted by Alias, Hamzah, and Yahya (2013) which reveals that current employers do not only focus on technical skills only but also demand generic skills so that the employees are equipped with various skills. That is why students who are only exposed to theoretical learning at the higher institutions could not meet the expectations of the real industry (Amiruddin, Ngadiran, Zainudin, & Ngadiman, 2016). This is because the real situation in the industry is totally different from what is taught at the IPTs (Patki & August 2015). As such, it is of utmost important for researchers to identify the employers' perceptions of the generic skills of the MTU engineering students after undergoing industrial training. Therefore, the main cause of weakness in generic skills is actually the implementation of the industry's own training curriculum has not yet reached the wishes of the industry (Rodzalan *et al.*, 2012). This can be seen through efforts from educational institutions that are at the helm of the curriculum training industry to meet the demands of the job market (DLI, 2010). In view of this, in order to meet industry demand as desired by the industry should play a role in helping produce graduates with high generic skills. One of the key aspects that needs to be enhanced is the implementation of training especially during training at the industry level. This is because there are weaknesses in implementation at the industry level in helping students to improve skills in generic skills during the training industry in progress. This situation occurs as there is no clear guideline that should be given to industry as a guide during the training industry (MTU Industry Training Report, 2015). In conclusion, if the implementation of the industrial training is implemented effectively it can help not only in improving technical skills but also in improving the quality of generic skills.

It is hoped to see whether or not the employers are satisfied with the quality of the students' generic skills. This is because it is from the industrial training programme that the employers will start identifying quality students to be employed. In addition, the employers will also give an opinion on the quality of the generic skills level among the students from three areas of engineering courses, namely; (i).Electrical and Electronic Engineering, (ii).Civil Engineering and (iii).Mechanical Engineering. The information is expected to assist the responsible authorities to identify the areas of engineering that need to be given extra attention in improving the students' quality of generic skills.

## 2 Model Generic Skills(GS)

This section describes two models of Generic Skills(GS) development process that is basic model of Generic Skills(GS) and model of Generic Skills(GS).

## 2.1 Basic model of Generic Skills(GS)

Basic model of Generic Skills(GS) is adopted as a fundamental model in job search by the industry in all fields including engineering. It aims to identify the strengths of the elements which is regulated in Engineering. Elements contained include Professional Knowledge (K), Skills(S) and Attitudes (A) (Young Foundation report, 2012). The basic model of Generic Skills is the foundation of skills generic skills that involve attitudes, skills and knowledge. Industrial training students are selected because when they undergo their industrial training they will be applied with knowledge, improving skills and directly helping to improve the professional attitude. The researcher described the implementation of industrial training would lead to increased knowledge, skills and attitudes. So it is clear that this model is very helpful to illustrate the industry's training curriculum which will effectively result in the improvement of the quality of the students' generic skills.

## 2.2 Model of Generic Skills (GS)

Model of Generic Skills (GS) has outlined nine domain generic skills which are (i).Leadership skills, (ii).Problem solving skills, (iii).Interpersonal skills, (iv).Management skills, (v).Entrepreneurial skills, (vi).Communication skills, (vii).Critical thinking skills, (viii).Decision making skills and (ix).Teamwork skills (MQF,2006 & MOE, 2010). The generic skills model used in this research is intended to be the benchmark for generic skills that are appropriately applied in industrial training. Besides, based on the following nine elements which emphasise the generic skill level. Hence, this generic skills model is important for identifying generic skills that fit the industry training curriculum and the dominant elements in industrial training. The researcher described the implementation of industrial training would lead to increased generic skills. So it is clear that this model is very helpful to illustrate the industry's training curriculum which will effectively result in the improvement of the quality of the aforementioned generic skills.

## 3. Methodology

This study used a quantitative approach survey design that examined employers' perceptions on the generic skills of engineering students after undergoing Industrial Training. The analysis using descriptive analysis where the data analysis is done in the form of mean, frequencies and percentages. The questionnaire was used as a research instrument. Quantitative approaches are chosen because they are relevant to the study, based on objectives and able to answer the research questions (Creswell, 2013). The total industry population in the manufacturing sector involving large firms is 1,808 firms. The sample of this study consists of 144 employers from Electrical and Electronic Engineering (EEE) field industries that has been chosen from whole Malaysia using random sampling.

### 3.1 Instrument

This study is a quantitative survey where researchers developed a set of questionnaire adapted from different sources by Esa,Md Yunos and Kaprawi (2005) and Ariffin, Najmudin, Idris, Badib and Rashid (2011). Survey methods are often used in educational research especially in entrepreneurship education research at IPTs. Questionnaire items used Likert scale consisting of 5 scores.. The questionnaire consists of two parts: Part A and Part B. Part A covers the level of students' generic skills from three (3) engineering courses. On the other hand, Part B consists items related to employer's perceptions on the generic skills of MTU engineering students after undergoing industrial training. Part B also includes 9 constructs comprising (i).Leadership skills, (ii).Problem solving skills, (iii).Interpersonal skills, (iv).Management skills, (v).Entrepreneurial skills, (vi).Communication skills, (vii).Critical thinking skills, (viii).Decision making skills and (ix).Teamwork skills items. In Part B only 9 contracts are selected because only 9 of these contracts are suitable to be applied in industrial training. Researchers simply choose 9 construct in this study because only 9 construct these generic skills appropriate only applied during the implementation of industry training. In addition, the selection of 9 construct generic skills has also been guided by Malaysia Qualifications Framework (MQF,2018).

For the pilot study, 33 employers in engineering-related industries were approached to answer the questionnaire. However, during the data entry process, data from three respondents' were discarded, namely Respondent 18, 28 and 32, as the questionnaires did not meet the researchers' criteria, making the data collected 30 only. The whole data were analysed using the Statistical Packages for Social Science (SPSS) version 22.0. Reliability analysis shows that Cronbach's Alpha value for each construct in the questioner whole item was above 0.80, which indicates the reliability (r) of the all questionnaires items used was very high. This result demonstrates that the reliability of the items distributed was relevant and could be applied in the study.

After the respondents answered the question in the questionnaire distributed, the collected data was analysed to determine the Cronbach Alpha's score. According to Nancy, Barrett, and Morgan (2005), Alpha Cronbach is a coefficient for reliability of pilot studies conducted. According to Cohen *et al* (2007), if the Alpha Cronbach value is below 0.60, reliability is said to be weak, while at 0.70 it is acceptable and if that exceeds 0.80 is good. Cohen *et al* (2007) also states that if the Alpha Cronbach score obtained is within the range of 0.6 to 0.7, the item in the instrument is still acceptable. The score below 0.6 shows that the items for the questionnaire should be improved by the researchers so that it can be distributed to the actual study. Table 1 report that, the Cronbach's Alpha value of the questionnaire items used in the pilot

test. The value of Cronbach's Alpha is 0.941. This shows the reliability of the items used was very high. This finding demonstrates that the reliability of the set of distributed questionnaire was relevant and applicable.

**Table 1 - Alpha Cronbach's value to determine item reliability (Cohen, Manion & Morrison, 2007)**

Alpha Cronbach Value	Statement
0.00 – 0.59	Low (change all items)
0.60 – 0.70	Medium (item acceptable)
0.79 – 1.00	High (accepted and good item)

### 3.2 Population

The population in this research was employers in the engineering-related industry whole of Malaysia. The total industry population in the manufacturing sector involving large firms is 1,808 firms (Economic Census Report, 2016). Researchers have limited the selection of respondents comprising industries in the manufacturing sector, not the entire engineering-related sectors. This is because only the industry in the manufacturing sector is the largest industry in the sector that uses the workforce in engineering. Therefore it is appropriate once the sector is selected. Hence, respondents from other industries from the engineering field involved will not be used in this research.

### 3.3 Sample

The population in this research was employers in the engineering-related industry whole of Malaysia. Researchers categorised as an employer who will hire graduates working such as managers, engineers and human resource executives. As it relates to industrial training and understanding of generic skills some of the characteristics of employers must exist to be made as respondents in this research. The characteristics of the employer are as follows; (i) have at least five years and above working experience, (ii) have sufficient knowledge in the field of generic skills, and (iii) have experience in supervising more than eight (8) industrial training students. Sample selection was made at random to provide an equal opportunity to individuals in the population to be involved as a sample of this study in representing the population studied (Nancy, Barrett & Morgan, 2005). The sample was industry-related employers of 144 targeted participants selected using a simple random sampling method based on sampling by refer table Bartlett, Kotrlik and Higgins (2001). According to Cohen, Manion, and Morrison (2007), by using simple random sampling method (RSM), each respondents' in the population has an equal opportunity to be selected into a sample. The selected sample had been confirmed to meet the following characteristics; (i) have at least five years and above working experience, (ii) have sufficient knowledge in the field of generic skills, and (iii) have experience in supervising more than eight (8) industrial training students. Meanwhile, the researchers also agreed to set the criteria for the representative of the employers in this study to three different criteria identified; managers, engineers and human resource executives. This is because it is important to choose the experts as the sample so that the objectives of the study can be achieved.

### 3.4 Analysis Method

To analyse the data, the researchers used SPSS v.22.0. The analysis of the findings used only descriptive analysis (percentages, frequencies and mean score). The mean analysis statistics was conducted to examine employers' perceptions on the generic skills level of MTU engineering students after industrial training. The researcher only chooses descriptive analysis because the researcher only wants to see the differences in the three categories of engineering field with reference to mean value only. In addition, to identify the perceptions of the quality of the students' generic skills, the descriptive analysis with reference to the mean value is needed.

Descriptive analysis was used to determine the generic skills level in this study, particularly from the perspective of the employers. Generic skills level elements were categorised into 9 main constituents which comprised of; (i).Leadership skills, (ii).Problem solving skills, (iii).Interpersonal skills, (iv).Management skills, (v).Entrepreneurial skills, (vi).Communication skills, (vii).Critical thinking skills, (viii).Decision making skills and (ix).Teamwork skills items. To elaborate on the findings of Part B, the items were analysed using descriptive statistics to obtain the mean. The mean interpretation used is as in Table 2.

**Table 2 - Mean Interpretation (Nancy, Barrett & Morgan, 2005)**

Mean Score	Level
0.00 – 1.00	Lowest (L)
1.01 – 2.00	Low (LL)
2.01 – 3.00	Medium Low (ML)
3.01 – 4.00	Medium High (MH)

4.01 – 5.00	Height (H)
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#### 4. Research Findings

The research findings will report below.

##### 4.1 Demographics

Table 3 shows, the descriptive statistics demographics of respondents for 144 employers from EEE (Electrical and Electronic Engineering) field industries that has been chosen.

**Table 3 - Descriptive Statistics Demographics of respondents**

Work Experience	Frequency (f)	Percentage (%)
< 10 year	60	42 %
11 year > 15 year	65	45 %
16 year > 20 year	10	7 %
> 21 year	9	6 %
Total	144	100 %

##### 4.2 The level difference in generic skills of students from three (3) engineering courses

Table 4 shows the distribution of employers who filled in the questionnaire to determine the difference of generic skills level among students from three (3) engineering courses involving (i).Electrical and Electronic Engineering, (ii).Civil Engineering and (iii).Mechanical Engineering. The findings show that the employers' perceptions on Electrical and Electronic Engineering students' generic skills after industrial training was the weakest (Level 1), followed by Civil Engineering students (Level 2 - Weak), and Mechanical Engineering at Level 3 – Less Weak.

**Table 4 - Distribution of level of weakness of generic skills in three (3) areas of engineering**

Course	Mean score	Level of Weakness
Electrical and Electronic Engineering.	2.76	1
Civil Engineering.	3.56	2
Mechanical Engineering.	3.62	3

(1 - The Worst Rank / 2 - Weak / 3 - Less Weak)

##### 4.3 Generic skills level

Table 5 shows the findings of employers' perception on the level of each generic skill of the MTU engineering students after industrial training. The findings show that employers' perception of generic skills level for students' leadership skills was at 'Moderate Low' level of 2.76. The students' communication skills was also at 'Moderate Low' level of 2.83, students' management skills was at 'Moderate High' level of 3.34, students' interpersonal skills was at 'Moderate High' level of 3.37, and the students' problem-solving skills was at 'Moderate High' level of 3.70. The students' critical thinking skills was rated as 'Moderate High' level of 3.47, students' decision-making skills at 'Moderate High' level of 4.13, teamwork skills at 'Moderate High' level of 3.64, while entrepreneurial skills at 'Moderate Low' level of 2.59.

**Table 5 - Findings for each generic skill level construct**

Construct	Mean Score	Level Of Weakness
Communication Skills.	2.83	Medium Low (ML)
Leadership Skills.	2.77	Medium Low (ML)
Management Skills.	3.34	Medium-High (ML)
Problem Solving Skills.	3.35	Medium-High (MH)
Critical Thinking Skills.	3.70	Medium-High (MH)
Decision Making Skills.	3.47	Medium-High (MH)
Interpersonal Skills.	3.37	Medium-High (MH)
Team Work Skills.	3.64	Medium-High (MH)
Entrepreneurial Skills.	2.59	Medium-Low (ML)

## 5. Discussion

The results show, that the weakest generic skills based on the three (3) engineering areas was reported to be among students of Electrical and Electronic Engineering (Level 1), followed by Civil Engineering as 'Weak' and Mechanical Engineering at the 'Less Weak' level. The findings of employers' perceptions show that students in the field of electrical and electronic engineering are at the lowest level of 2.76. Researchers think that while undergoing industrial industry training in electrical and electronic engineering is more focused on technical skills than students in the field of mechanical and civil engineering. it affects the imbalance between technical skills and generic skills. This statement is supported by Rodzalan and Mohamed (2012) which states that technical skills and generic skills should be balanced to enhance employer satisfaction. Therefore, as a solution, the implementation of special training in the field of electrical and electronic engineering should be developed to improve the quality of the students' generic skills.

The results report that employers' perceptions of generic skills levels for students' leadership skills, communication skills and entrepreneurial skills are at 'Low Moderate' level. This is because, according to the employers, the students showed less leadership qualities while undergoing industrial training. This indicates an increase during industrial training. However, some improvements in the implementation of industrial training should be undertaken to improve the quality of student leadership skills, communication skills and entrepreneurial skills in a better manner. This statement is supported by Singh, Thambusamy and Ramly (2014) that reported the results of several findings show that the generic skills related to leadership and communication are the sought after skills by the employers to determine their satisfaction in employing fresh graduates. In addition, students were less likely to master communication in spoken English although many employers use English at the workplace. This statement is supported by Hassan *et al.* (2013) and Ab Halim *et al.* (2018) that highlight strong emphasis on employees' communication skills among the employers in ensuring the smooth and efficient execution of a task. In addition, entrepreneurial skills was at the lowest level among the elements, as researchers think that students were less willing to be entrepreneurs. This statement is supported by Samad *et al.* (2018) who suggests that the level of preparedness in terms of knowledge, entrepreneurial motivation, the ability to be an entrepreneur, and the interest in becoming an entrepreneur will affect the students' venture into entrepreneurship. Generally, the level of generic skills for management, problem-solving skills, interpersonal skills, teamwork skills, and critical thinking skills of decision-making skills were at moderate level. Majority of the employers were satisfied at moderate level with the students' generic skills, including in management, problem-solving, interpersonal, teamwork, and critical thinking of decision-making skills which were at moderate level (Refer table 4). Most of the employers were satisfied at moderate level even though they did not reach the highest level (Refer table 4), as these skills can be improved from time to time. In conclusion, these skills need to be improved by the students. Therefore, the researchers hope that the findings of this research can be used as a guide to various parties involved in improving the quality of graduates' generic skills, as they will be the main thrust in the nation building and development.

## 6. Conclusion

In conclusion, the perception of employers on the generic skills for students' leadership, communication and entrepreneurial skills were at 'Low Moderate' level. Besides, the generic skills for management, problem-solving skills, interpersonal skills, teamwork skills, and critical thinking skills of decision-making skills were at 'Moderate High' level. The level of generic skills for leadership, entrepreneurial and student communication skills needs to be improved as the employers were still unsatisfied with the students' level of these generic skills. Based on the findings it is desirable that the framework for the implementation of industrial training to engineering students to improve the quality of generic skills should be improved. It can be implemented by looking at the weakest student generic skills and emphasising activities that are compatible with the weak generic skills. For example, to improve communication skills, students while undergoing industrial training should regularly present presentations to improve communication skills. Therefore, the related authorities (Ministry Higher Education and Industry) should play their role to plan and make continuous improvements to help students meet the requirement of their prospective employers on generic skills especially among the electrical and electronic engineering students who had shown the lowest level of generic skills. Therefore, the researchers hope that the research findings can be utilised in order to improve the engineering students' generic skills, and lead to producing more qualified graduates in future and indirectly increases the satisfaction of employers to the generic skills of engineering students.

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