Original Article

Assessing soft skills components in science and technology programs within Malaysian Technical Universities

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Abstract

The workforce is a social environment where particular skills are essential in order for workers to perform well, have a competitive edge and succeed in their careers. A soft skill is one of the skills needed in every type of workplace setting. Soft skills include communication skills, collaboration skills, entrepreneurship, and others. Workplace need workers who are competent not only with technical skills but who also have soft skills. There is lack of literature discussion on the perceptions of needed soft skills in the workplace. Therefore, this study aimed to close the gap in the literature concerning the perceptions of instructors and students in the area of soft skills especially in communication skills, collaboration skills, and entrepreneurship at the workplace. This study aims to decrease the divide in soft skills differences among instructors and students in higher learning institutions so that students have the opportunity to excel in their learning process. This study employs quantitative method specifically using survey as an instrument. The findings shows soft skills including communication, collaboration, and entrepreneurship skills are one of the aspects stressed by the students and instructors at higher learning institutions to ensure that graduates will be employable and competent in order to contribute to the nation development.

Keywords: soft skills, science and technology, workplace, higher learning institution,
Malaysian Technical University Network

1. Introduction

To compete in the competitive workplace of today jobs market, students in science and technology field must learn the high-level technical skills that are expected for positions in the workplace as well as soft skills that will increase the chances of employment and career development (Lippman *et al.*, 2015). Similarly, Garalis and Strazdiene (2007) stated that the important of soft skills reflects the view in the workforce where employee needs to develop soft skills not only to get a job, but also to keep them and to move from one job to another. Before the industrial revolution, physical labor was the requirement of quality worker. As today, a quality employee needs soft skill such as social skills, communication and higher-order thinking skills (Lippman *et al.*, 2015). In the past, the term skill solely referred to a specific manual operation. According to (Urciuoli, 2008), the term of soft skill now means any practice, form the knowledge, or way of constituting productive labor. Raj (2008) state that hard skills are the technical and administrative skills required in the workplace that are relatively easy to observe and measure. In contrary, soft skills such as communication, collaboration, problem-solving, entrepreneurship, learning to learn and other skills, are ingrained behavior patterns that are hard to quantify and to teach. Soft skills are necessary for university-bound students as well as for those who are seeking a position in the workplace directly out of training institution. Hard skills and soft skills are both important skills to have in the working world especially in science and technology areas.

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The concept and definition of soft skills has been discussed recently. However, the interest in finding the concept, definition, and important of soft skills around the world is still growing. The terms of soft skills has largely replaced the terms transferable skills, however different countries and organizations may still use different terms. According to the European Centre for Development of Vocational Training (2008), soft skills is the individual skills in which are relevant to complete the tasks, jobs or occupations other than the ones the currently have or have recently had. These skills may also have been acquired through non-work or leisure activities or through participation in education or training. Soft skills can be stated as generic and directly linked to basic knowledge, to behavior skills, cognitive skills and organization skills (European Commission, 2012). More generally, these are skills which have been learned in one context or to master a special situation or problem and can be transferred in another context.

In Malaysia, other terms that are associated to soft skills include transferable skills, soft skills, generic skills, employability skills, behavioral skills, enterprise skills, key competencies, core skills, common skills, work skills, essential skills, and people skills (Abdullah *et al.*, 2012; Ministry of Higher Education Malaysia [MoHE], 2009; Salleh *et al.*, 2010). Nevertheless, the terminology, commonly used in Malaysia is soft skills. In general, soft skill can be defined as having a wide variety of basic knowledge, values, and life skills that are necessary to obtain and keep a job it (Abbas *et al.*, 2013). In contrast, hard skills refer to the more specific, teachable skills, and are usually related to professional knowledge.

However, in workplaces, soft skills are complement to hard skills and these attributes include competencies, capabilities, and learning outcome of operational procedures or practical task. This is in accordance with Shakir (2009), who suggest that soft skills and hard skills are both complement each other. Similarly, a research by Salleh *et al.* (2016) indicates that soft skills are both demanded by the organization and industries. Therefore, the purpose of this study is to close the gap in the literature concerning the perceptions of instructors and students in the area of soft skills especially in communication skills, collaboration skills, and entrepreneurship skills at the workplace.

2. Soft Skills in Malaysia

In today's world of works, industries want and expect workers who can demonstrate not only hard skills but can provide the soft skills that are required in the workplace. Therefore, reflecting on the importance and the need to prepare higher learning institutions for workplace, soft skills have been seen as a justifiable part of education in Malaysia. Recent trends including in Malaysia show that soft skills have slowly become integrated into science and technology curriculum. As previously stated, soft skills are usually describe, as career attributes that should be possess by nearly graduate students in order to stay competitive in 21st century

workforce. The communication, collaboration, entrepreneurship skills are selected based on the current needs by industries in Malaysia.

2.1 Communication skills

Communication skills were identified as among, the top ten soft skills needed in today's workplace (Robles, 2012). On top of that, in Malaysia, communication skills are among the seven soft skills introduced by the Ministry of Higher Education. These skills are suggested to be implemented in institutions of higher education. The implementation of communication skills in higher education institution is done in some ways such as delivering through stand-alone courses in co-curriculum program, by embedding the communication skills in existing course, through the campus captivities and soft-finishing schools. Communication skills are divided into interpersonal communication and intrapersonal communication

Interpersonal communication involves a small number of individuals, between two or three people or more. Source and receiver are involved interact exclusively channeled messages adapted in line with the characteristics of the recipient. Easy to assess whether the message is understood, the message can be modified and adapted in line with the receiver. Through interpersonal communication individual can get the response and reaction of channeled messages can be defined as soon as possible because it involves a face to face relationship. In contrast, intrapersonal communication is an activity that occurs within our own body. Jemmer (2009) define intrapersonal communication as a processing of understanding themselves and their environment from a message characteristic that happens either in different levels including conscious, semi-conscious, or non-conscious. In world of work, classification of intrapersonal communication may vary and overlap such as internal discussions (monologue), communication individual vocal and written communication individually.

2.2 Collaboration skills

Collaboration skills are the specific ways in which individuals are expected to behave in order to achieve their objective. To put it the other way round, collaboration skills is the ability of an individual to work efficiently and effectively with others on a common task. This ability includes the behaviors of respecting the needs and contributions of others, building up a mutual beneficial relationship, and negotiating a win-win solution to achieve the goals of the team that cannot be met individually (D'Agostino, 2013). In the context of science and technology, collaboration skills involve two or more people or groups working together as equal partners through idea sharing and thinking to accomplish their tasks and making decisions that will lead to positive changes (Gentry, 2012). This definition can be interchangeably used within the sphere of workplace, where

collaboration skills incorporates teamwork skills and other skills such as communication skills, thinking skills, and problem solving skills in order to accomplish a common goal with equal participation from every team member.

The collaboration skills can be indicated and assessed in several aspects, such as attitude, focus on task, contributions, time management, quality of work, working with others, and preparedness (Hughes & Jones, 2011; Sulaiman, 2012; Wang *et al.*, 2009). The element of "Attitude" is conceptualized as the positive behavior toward the tasks. An example of positive behavior or attitude is that a team member does not publicly criticize the work of others. The next element "Focus on Task" means an individual stays focused consistently on the task and what need to be done. She or he is usually self-directed in accomplishing the given tasks. The element of "Contribution" is defined as ability to provide useful idea and effort to complete a task. This element can be assessed based on the level of participation in group discussion. The element of "working with others" is perceived as the ability to keep people working well together. This ability is inclusive of listening to, sharing with, and supporting the effort of other team members. The aspect of "Quality of Work" in collaboration skills can be seen as producing output with minimal fault and discrepancy. The quality of work is not satisfactory if the work needs to be redone by other group members. The aspect of "Time Management" is regarded as the ability to spend time wisely throughout the project to make sure the tasks get done on time. An efficient time management can avoid rearrangement of work responsibilities between team members and the team does not have to adjust the deadline. Finally, the element of "Preparedness" is understood as readiness to work together with others as a team. The preparedness in this context may include getting ready the needed materials for the given task.

2.3 Entrepreneurship

Entrepreneurship is a skill to develop a business and combine with an idea to turn the potential products or services in the hopes of making a profit. It is a process of being an entrepreneur, of gathering and allocating the resource including financial, administration, technological, and others necessary for success. Despite of general terms and understanding of entrepreneurship meaning, many scholars (Bruyat & Julien, 2000; Gartner, 1988; Maigida *et al.*, 2013) had agreed that there is no universal common definition of entrepreneurship. Maigida *et al.* (2013) defined entrepreneurship as process of carefully determining and analyzing unsuccessful needs through creativity and satisfying those needs that involves evaluating business opportunities, development of a business plan, and determination of the required resource. On the other hand, Gartner (1988) stated entrepreneurship as a process of creating valuable things combining skills, time and effort. According Bruyat and Julien (2000), entrepreneurship is a process of change, emergence, and new value creation.

In spite of difference in definition, many researchers (Badawi, 2013; Maigida *et al.*, 2013; Stevenson & Lundstrom, 2002) believed entrepreneurship in science and technology may serve as a tool for achieving graduates employability and can be transferred directly to industry. The key then to successful entrepreneurship is to identify, strategize, and develop resource through science and technology to help foster entrepreneurship in higher learning institutions. Currently, the interest in entrepreneurship education is increasing, specifically at higher learning institutions. It is believe that the more professional and applied programs especially in science and technology better equip students to succeed, and help to provide skilled labor. Therefore, the entrepreneurship education concept has become an important subject especially in science and technology. Lekoko *et al.* (2012) stated entrepreneurship education is critical for developing entrepreneurial skills, attitudes, and behavior that form the basis for economic growth of a country. Similarly, Charney and Libecap (2000) suggested graduates with added value of entrepreneurship are three times more likely than graduates with non- entrepreneurship to being hired and start new business ventures. Additionally, the study found entrepreneurship increased the probability up to 25 percent of graduates to be involved in a new business venture compared to graduates with non- entrepreneurship.

3. Methodology

This study was conducted using quantitative research design and uses survey to collect the data. The quantitative study provides a numeric description of opinion from the samples. Survey research provides a description of trends and opinions of a population by studying a sample of that population. In this study, the participants were selected in order to ensure that appropriate individuals, with relevant experiences, participated in this study. The participants were selected based upon predetermined criteria. Stratified random sampling was used as a sampling technique. The criteria included participants must be students or instructors at higher learning institutions. The higher learning institutions including from Malaysian Technical University Network (MTUN) comprising four technical universities, Universiti Tun Hussein Onn Malaysia (UTHM), Universiti Teknikal Malaysia Melaka (UTeM), Universiti Malaysia Perlis (UniMAP) and Universiti Malaysia Pahang (UMP) were selected as location for the research. The questionnaire was distributed to students and instructors using online survey; in total only 534 questionnaires were returned. An online survey was used for gathering the data and information in this study. Data then generalized from a sample to a population so that inferences can be made about the population characteristics. This survey design utilizes the cross-sectional design because the information was collected only at one point. All data were analyzed using descriptive statistic. Depending on the scale level of the variables, means, standard deviations, as well as either minimum or maximum

or absolute and relative frequency, was reported. Descriptive *p*-valued of the corresponding statistical test comparing related variables; together with the associated 95% confidence interval was conducted.

4. Finding

Descriptive statistical analysis including mean, standard deviation, and ranking were used to analyze and interpret the findings in this research. Descriptive analyses were used to summarize a collection of data in a clear and understandable way. Explanation of mean score is based on interpretation of Likert scale in the research instrument. Level of agreement was used to measure the perception from *strongly disagree* to *strongly agree*. Analysis of total mean score for each domain including communication, collaboration, and entrepreneurship skills are shown from Table 1 to Table 4. In overall, based on the research findings, the result shows high mean score values and are close to each other. Similarly, the standard deviation for all soft skill domains are low and reflect the distribution of responses did not deviate far from mean value.

4.1 Communication skills

The mean and standard deviation of domain communication skills are shown in Table 1. Based on the analysis, the findings obtained the highest mean (*M* = 4.01, *SD* = 0.78)

shows that the respondents agreed that communication skills provide clear explanations on the topic that they are familiar with. While the item which states produce written documents with the right style (*M* = 3.88, *SD* = 0.81) is in the lowest level. The findings show how important communication skill to be developed in teaching and learning process. In summary, most of respondents agreed the communication skills are important elements in pedagogical practices, thus this skill are also important in the workplace. Morreale *et al.* (2000) and Salleh (2012) stated that communication skills are required in most occupations, organizations, and one of the basic skills every graduated should have.

4.2 Collaboration skills

In Table 2, the research findings for collaboration skills domain show that the respondents agreed that individuals will treat group member with respect (*M* = 4.29, *SD* = 0.68). While the item which affirm develop ways to resolve conflict and reach agreement in a group (*M* = 3.81, *SD* = 0.77) is in the lowest level. Collaboration skills are the specific ways in which individuals are expected to behave in order to achieve their objective. Collaboration skills focused on activities formed in teaching and learning session. Long and Meglish (2013) suggested that in the future, most of higher learning institutions graduates will work in an environment where collaboration skills are essential because the impact of advancing technology and virtual workplace world.

Table 1. Communication skills (n=534).

Item	Mean (*M*)	Std. Dev. (*SD*)
Provide clear explanations on the topic that you are familiar with	4.01	.78
Communicate efficiently with others	4.02	.79
Present ideas orally	3.91	.84
Comprehend verbal message accurately	3.88	.81
Produce written documents with the right style	3.76	.80
Total	**3.93**	**.65**

Table 2. Collaboration skills (n=534).

Item	Mean (*M*)	Std. Dev. (*SD*)
Treat group member with respect	4.29	.68
Listen to what group member's think before make a decision	4.28	.68
Listen to ideas of others with an open mind	4.27	.66
Tell other group members when you think they are doing a good job	4.20	.72
Work on collaborative projects as a team member	4.19	.68
Focus on problem solving rather than who is to be blame	4.11	.75
Aware of feelings of other member of a group	3.96	.73
Develop ways to resolve conflict and reach agreement in a group	3.81	.77
Total	**4.14**	**.53**

4.3 Entrepreneurship skills

The mean and standard deviation of domain entrepreneurship skills are shown in Table 3. Based on the results, the analysis shows the respondents agreed evaluation proposal and planning are important in entrepreneurship skills in Malaysia, the results obtained the highest mean (M = 3.93, SD = 0.68). While the item which states identify new business-related opportunities (M = 3.77, SD = 0.79) is in the lowest level. The different between highest mean and the lowest mean are slightly small, shows the respondents perception on entrepreneurship skills in Malaysia are important. Evaluate proposal and planning are essential in Malaysia since it is a skills to understanding of the client's requirements. In the long run, the skills will provide lifelong learning capabilities that can be used in other areas as well similar to the entrepreneurship. The findings suggested it is a right time to deliver the entrepreneurship skills content in teaching and learning where by the students not only aiming to be hire for the specific job but they have the ability to create job opportunity to others. Garalis and Strazdiene (2007) argued entrepreneurship skills not only teach the students on starting and expanding business whilst it also emphasizes imagination, creativity, and risk taking in the workplace.

The overall analysis of the soft skills in Table 4 shows arrangement of the levels from highest to the lowest. Based on the table, it is found that the Collaboration skills (M = 4.13, SD = 0.53) is domain that obtain the highest agreement from the respondents. However, there is only small mean difference in between the highest and lowest domains which is the entrepreneurship skills domain (M = 3.88, SD = 0.57). This study revealed soft skills are important to ensure higher learning institution graduates meet the need of working envi-ronment and workforce demand. Table 4 shows the finding summary of imparting soft skills in teaching and learning process and also the overall mean and standard deviation domain for each of soft skills among students and instructors in Malaysian Technical University Network (MTUN). According to Beers (2013), collaboration and communications skills are among soft skills needed in workplace and also for success in the 21st century world.

5. Discussion

A skilled workforce is a basic requirement for driving industrial capability, economic growth, and structural change in Malaysia. Within the context of 21st century, a worker who is only equipped with technical skill is not qualified to be categorized as a skilled worker. The technical skill must be complemented with soft skills which are inclusive of communication skill, collaborative skill, and entrepreneurship just to name a few. Hence, soft skills are one of the aspects stressed by the Malaysia government to ensure that graduates will be employable and competent in order to contribute to the nation development. Soft skills hold the key to build a competent workforce. As a result, the soft skills including communication, collaboration, entrepreneurship, and others related skills are embedded direct or indirectly to the Malaysia policies such as Industrial Master Plan (IMP), New Economic Policy (NEP), Outline Perspective Plan (OPP), Malaysia Plan, National Higher Education Action Plan 2007-2010, Malaysia Education Blueprint 2013-2025, and other policies that cover the preparation of competitive workforce.

From the research findings, it is recommended that Malaysia government shall design and develop some policies and program especially in the areas of pedagogies in order to

Table 3. Entrepreneurship skills (n=534).

Item	Mean (M)	Std. Dev. (SD)
Evaluate proposal and planning	3.93	.68
Brainstorm ideas after goes through some options	3.92	.72
Choose right and written the information to the proposal	3.91	.68
Choose your own resources	3.87	.71
Identify new business-related opportunities	3.77	.79
Total	**3.88**	**.57**

Table 4. Overall soft skills (n=534).

No	Item	Mean (M)	Std. Dev. (SD)
1	Collaboration skills	4.14	.53
2	Communication skills	3.93	.65
3	Entrepreneurship skills	3.88	.57
	Total	**3.98**	**.22**

support the development, implementation and evaluation process of soft skills not only for the higher learning institutions but for whole learning institutions in Malaysia. It is also important for future researcher to develop a new curriculum that incorporates soft skills, as new approaches in pedagogies. As mentioned early on, soft skills integrated in science and technology curriculum has been mandated as an education policy specifically under the implementation of Malaysian Qualification Framework. The non-cognitive skills have become a standard and effective activity within formal education settings in Malaysia where it cultivates quality teaching and learning as well as develop better career prospects among science and technology students.

6. Conclusions

In conclusion, it is believed that the soft skills are as important as hard skills for Malaysian graduates before transferred in the workforce. Notwithstanding, soft skills take place when students are able to transfer what was learned to new situations. In Malaysia education system, it is believed that soft skills are essential for the learning development and can be used as an assessment tool in pedagogies. Thus, it shows how important soft skills not only to the graduates but also to the education systems. Soft skills could also be introduced by embedding it in their existing education programme. This is probably the most practical way in inculcating soft skills to students as these required no or minimal changes to the programme or course structure. Student centered learning, such as problem-based learning, case studies, mentoring, modular based, and others could be widely adopted to replace traditional teaching and learning strategies. Imple-mentation of soft skills based on support programs are arranged through the co-curricular activities that is non-academic in nature but indirectly assist students in developing their soft skills, personality, and characteristic. Based on the research findings, Malaysian Technical University Network (MTUN) which includes Universiti Tun Hussein Onn Malaysia (UTHM), Universiti Teknikal Malaysia Melaka (UTeM), Universiti Malaysia Perlis (UniMAP) and Universiti Malaysia Pahang (UMP) have committed in the implementation process and gradually improve the soft skills as added values for the students. A soft skill especially communication, collaboration, entrepreneurship skills are one of the necessary skills in every type of workplace setting. Workplace need workers who are competent not only with technical skills but who also have soft skills. Additionally, the soft skills also helps the graduates become more competitive when they enter the world of work.

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