

Soft Skills in Pedagogical Practices with Different Curriculum for Engineering Education

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Abstract. The rapid growth of the economy in Malaysia is a benchmark for the country's progress. The demand for skilled worker has started to increase from year to year resulted in the implementation of reforms and necessary skills will be applied to each of the graduates who will step into the nature of work. Therefore, a study was conducted to identify the level of soft skills among students in higher education institutions. The study was conducted at the Universiti Tun Hussein Onn Malaysia (UTHM) and involved 302 samples of final year students from Faculty of Civil Engineering, Faculty of Mechanical Engineering and the Faculty of Electrical Engineering. There are several types of soft skills have been viewed on the students such as creative thinking skills, teamwork skills, communication skills, decision-making skills, interpersonal skills and leadership skills. The analysis results show that all of the soft skills are on the high level. Furthermore, the results of ANOVA showed a significant difference in soft skills mastery among Civil Engineering students and Mechanical Engineering students. As a conclusion, the overall level of soft skills mastery among Faculty of Civil Engineering, Faculty of Mechanical Engineering and the Faculty of Electrical Engineering students is on the high level. The soft skills elements are very important in order to produce skills workers that suitable with the industry.

1. Introduction

The industrial sector becomes the benchmark of the country's economic development. This has indirectly attracted numerous investors from several countries. The increase in investment in the industrial sector in Malaysia provides pressure to the industry in acquiring skilled and semi-skilled who can give the commitment to work. The number of graduates produced by public and private higher education institutions is increasing from year to year, however mismatch issue was found between skill provided by institutions and industrial need. Although the number of graduates produced by public higher education institutions and also private sector increasing from year to year, it still have issues of mismatch skill provide by institutions and industries need. The mismatch of skills has created of unemployment rate seen increasing apparently among new graduates (Hairi, Toe, Nazuir & Razzaly (2011). A study carried out by Abdullah (2012) also stated that the views of the public often refers the failure of graduates in obtaining employment was due to the lack of the skills required by industry. In other words, the industry is seen more interested in graduates with a high level of mastery in soft skills such as teamwork skills, leadership skills, critical thinking skills, communication skills and entrepreneurial skills (Hassan, Ahmad & Bahari, 2009).

In accordance with the requirements of the mastery of skills among future graduates of higher education institutions, public and private sector to be the best platform in the implementation of soft skills. This is important in order to create human capital needed by industries not only possess good technical skills but also have private services (Esa & Mustafa, 2010). Therefore, the application of soft



skills should be implemented as a whole by the University with the rest of the parties who have a relationship with students. Robles (2012) stated that institutions saw less soft skills as needed in the education and industry sectors. A study conducted by Yanaze (2014) in Soft skills Competencies of Electrical and Computing Engineers showed that there are three soft skills required by industries; communication skills, team work and leadership skills. The findings allow institutions know the current needs as well as restructure learning modules according to the industries demand. A study conducted by Rahman (2011) shows the quality of interpersonal and ability to work in the group is soft skills elements of concern in the industry. According to Hairi et.al (2011), there are five key skills important in the employment sector was detected i.e. communication skills, work skills, skills in the group think creatively and make decisions and project management skills. In addition, Hairi et.al (2011) also mentioned the collaboration between industry and educational institutions should be improved to reduce the unemployment rate. Towards inculcating and improving soft skill, different curriculum subjects can be integrated through co-curricular activities along with academic across different disciplines. Haron et.al (2010) also suggested, co-curriculum activities expected to develop leadership skill. Therefore, a high level of mastery allows an individual to compete in challenging jobs.

2. Analysis of Soft Skills

The education nowadays not just academic learning, but also the development of professional and vocational skills, and the soft skills that will allow these to be used productively (Wijensingha, 2010.) It's also capable of preparing the leader and leadership skills to all graduate students. Cole (2011) says the leader is required to be adept at soft skills, commonly known as interpersonal or social skills. Cole recommends five soft skills every leader should practice: sensitization to follower expectations, inspiring others, building positive effects, communicate and listen and individuation. It is observed that different authors adopt different types of soft skills in their studies to measure the degree of soft skills competence. The selection of soft skills needed for a particular profession depends on the nature of the profession and the culture (Ketter, 2011). The types of important skills could be numerous and training in these could be tedious and time-consuming. Hence, when training of staff, it is important to identify a few most important types to simplify the task. Clayton et.al (2003) stated the soft skills needed by industries divided into six categories; Figure 1 shows the categories of soft skills suggested by Clayton, Blom, Meyers and Bateman (2003). Attitude and values are the elements of honesty, ethical and responsible. Systematic management is brave, competent and punctual; smart work management is how individual be able to manage working organisation and manage in very good system; aware of industry surround needs is how far workers alert and concern about work environment; manageable customer service is how workers deal with communication tools to serve the clients and responsibility of self-learning is the responsible for improving the quality of job-based on career development progra

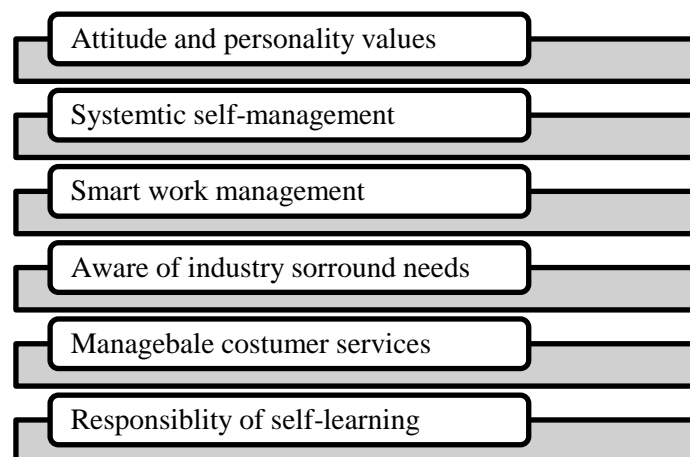


Figure 1: Categories of Soft Skills

Table 1 shows the various research types of soft skills need by industries mentioned by numbers; 1) Leadership skills; 2) Decision making skills; 3) Communication skills; 4) Thinking and problem solving skills; 5) Teamwork skills; 6) Interpersonal skills and 7) Entrepreneurship skills.

Table 1: Analysis Soft Skill from Industries

	Researches	1	2	3	4	5	6	7
1	<i>Are soft skills important in the workplace? A preliminary investigation in Malaysia (Seetha,2014).</i>		/	/	/		/	
2	<i>Employers perception on soft skills of graduates: a study of intel elite soft skill training (Hairi et.al 2011).</i>	/	/	/	/	/		
3	<i>Enhancement of technical- cum- generic skills through design experience in laboratories (Hayati,& Mir 2004).</i>		/	/	/		/	
4	<i>Transversal competencies of electrical and computing engineers considering market demand (Yanaze et.al,2014).</i>			/	/		/	
5	<i>Implementation of information competencies as key employment skills at the faculty of humanities and social sciences (Sonja et.al 2014).</i>	/		/	/			
6	<i>Skills of engineer in knowledge based economies: a comprehensive literature review , and model development (Mahmoud et.al,2013)</i>		/		/			
7	<i>Technical skill & non technical skill: Predefinition concept (Nasir et.al, 2011).</i>	/		/	/	/		/

3. Problem statement

The implementation of soft skills for academic programs are very important in shaping competent labour high. However, in recent times many of the graduates produced by higher education have no work skills required by the industry as if there exists a gap in the preparation of graduates who meet the needs of the industry. This statement is supported by Robles (2012) in which graduate education institutions saw less soft skills as needed in the education and employment sectors. Furthermore, a study carried out on students' final year Bachelor of engineering in the university in identifying the level of mastery of soft skills student mastery of the skills in line with the skills required by industry. Figure 2 illustrates the research conceptual framework applied to identify the soft skills in pedagogical practices for engineering students in Universiti Tun Hussein Onn Malaysia. The faculties involved are Civil Engineering, Electric and Electronic Engineering and Mechanical Engineering. Seven soft skills investigated; leadership, communication skills, thinking skills and problem solving, decision making, teamwork and interpersonal. The elements of soft skills investigate are based on practices in their programs.

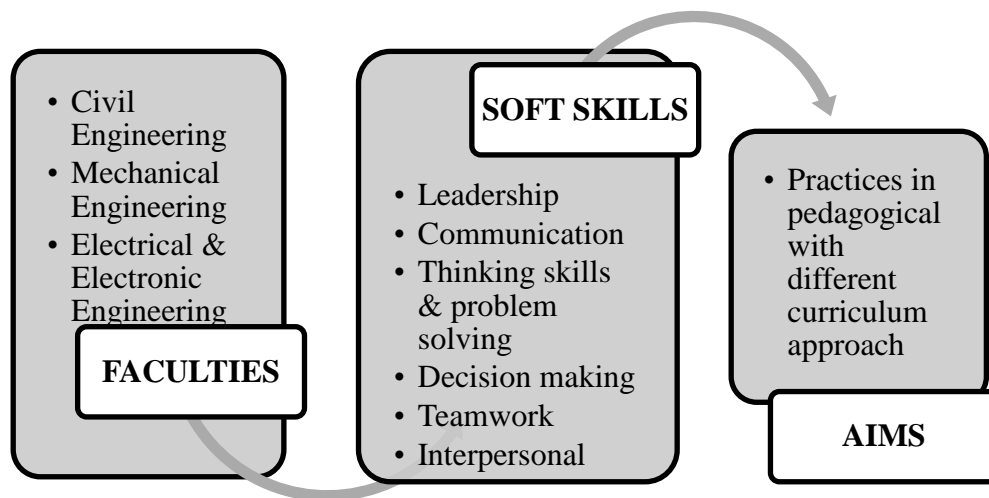


Figure 2: Research Conceptual Framework

4. Research objectives and methodology

This research conducted to achieve the objectives below:

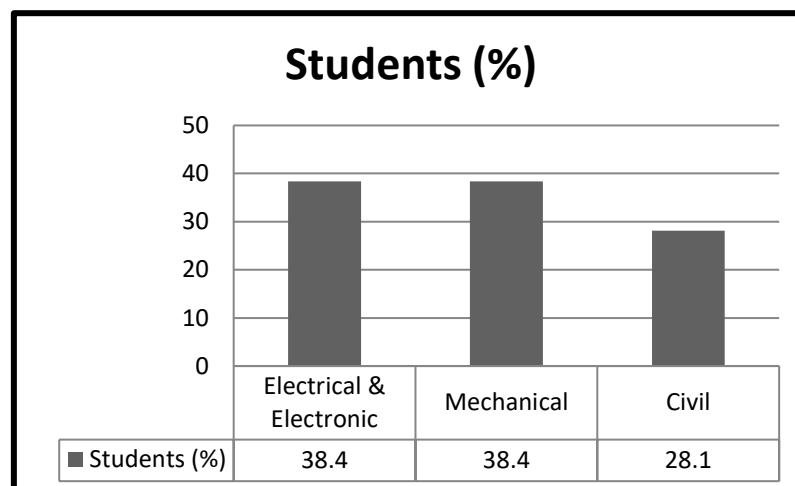
- 4.1 To identify soft skills level for engineering students
- 4.2 To know students' perception what are soft skills needed by industries
- 4.3 To identify differences of soft skills embedded in pedagogical practices within engineering faculties

In this study, surveys method was applied to obtain information about soft skills mastery of final year engineering students in UTHM. Selection of the method of data collection is carried out using a questionnaire to get a real response from the sample as well as to save time the respondents to respond to each statement in the questionnaire. The populations in this study are 1418 final year undergraduate students in engineering faculties. 302 students involved as research samples from three faculties; Civil Engineering, Mechanical Engineering and Electrical and Electronic Engineering. The questionnaires were developed as instruments for collecting the data. The questionnaires contained 73 items based on three parts, namely, student background, soft skills mastery among final year students and students' perception of elements of soft skills required by employers in the industry. To ensure that the questionnaire items in accordance with the objective of the study, researchers had held discussions and get feedback from three experts in the development of the questionnaire items. Through validity process the modification of items conducted to make sure the sentence structure understands by respondents. Data were analysed by using two methods of analysis which are descriptive statistics and ANOVA analysis. A descriptive statistics analysis is to analyse the distribution frequency, percentage and mean score while the analysis of ANOVA is used to assess the differences in the level of mastery of soft skills among students at three faculties involved.

5. Research findings

5.1 Demographic analysis

302 students from engineering faculties involved in this research. Figure 3 shows the distribution of students from each faculty. 8.4% respondents are from Electrical and Electronic Engineering, 38.4% Mechanical Engineering and 28.1% is Civil Engineering.

**Figure 3: Respondents Distributions**

5.2 Soft skills level for engineering students

Descriptive analysis conducted to identify soft skills level embedded in pedagogical practices among engineering students. The items specifically in soft skills contained thinking and problem solving, teamwork, communication, decision making, interpersonal and leadership. Table 2 shows the mean and standard deviation from findings.

Table 2: Soft Skills Analysis

Soft skills	Mean	Std.Deviation (SD)
Thinking and problem solving skills	4.19	0.37
Teamwork skills	4.28	0.27
Communication skills	4.28	0.31
Decision making skills	4.25	0.33
Interpersonal skills	4.23	0.38
Leadership skills	4.23	0.36

5.3 Students' perception in soft skills needed by industries

Items no. 51- 69 are the items based on what industries needs and students' perception were asked either they aware what are the actual situation required by industries. Table 3 present the soft skills needed by industries.

Table 3: Soft skills needed by industries

Soft skills suggested by industries	Mean	Std.Deviation (SD)
Give new idea	4.23	0.523
Good communication in organization	4.27	0.502
Capable to conduct presentation	4.23	0.498
Leadership skills	4.31	0.556
Creative and critical thinking	4.26	0.536
Think positive	4.28	0.543
Good in management skills	4.28	0.525
Capable to think critically	4.30	0.541
Expert in communication	4.27	0.507
Capable in problem analysis	4.26	0.552
Teamwork	4.33	0.573

Responsible and ethical	4.29	0.548
Flexible	4.26	0.576
Skills in new technology	4.20	0.606
Good in information analysis	4.20	0.545
High motivation	4.24	0.539
Independent	4.29	0.536
Capable in risk taking	4.36	0.527

5.4 Soft skills embedded in pedagogical practices within engineering faculties

One-way ANOVA test show that there are significant differences in soft skills mastery embedded in pedagogical practices. The null hypothesis not accepted and results shows different courses have different perception in soft skills. Table 4 and Table 5 show the analysis of ANOVA and post-hoc test.

Table 4: One-way ANOVA analysis

	<i>df</i>	Mean square	<i>F</i>	Sig
Between groups	2	0.531	6.061	0.003
Within groups	299	13.097		
Total	301	13.629		

Table 5: Post-hoc Test

Faculties		Mean Difference	Std.Error	Sig
Civil	Mechanical	.1050	.0308	.002
	Electrical & Electronic	.0393	.0298	.387
Mechanical	Civil	.0149	.0308	.002
	Electrical & Electronic	.0656	.0284	.057
Electrical & Electronic	Civil	.0393	.0298	.387
	Mechanical	.0656	.0284	.057

6. Discussions

Lecture classroom is easier part of teaching compared to equipping students with soft skills so that they will succeed in their career. In classroom activities students should understand the relevance soft skills when the curriculum assessment distribute into few parts will cover the soft skills element. The soft skills level achieved by engineering students in this research are more to teamwork and communication skills. Elements of communication skills showed high mean score value which is 4.28. Communication skills is the main soft skills required by industries. Furthermore, the teaching and learning activities in the classroom such as presentations are able to improve the quality of communication skills as well as presentation of students especially in accurate and feedback when discussions take place. It is supported by Buntat and Hassan (2010) stated the communication skills in learning activities able to increase students 'self-esteem. Teamwork is related in communication skills when conducting classroom activities. Most of respondents agree with the team work elements will fix in all soft skills practices. This finding is in line with Ghani (2014) showed that with team work with others and respect other people's view and opinion where indirectly interpersonal relationship with others. Creative thinking skills also can be applied through the working in group because the group assignment given by a lecturer more challenging than individual assignment. This situation requires that each student discussing with a friend the group in solving the assignment. Through group learning methods, lecturer indirectly apply creative thinking into student (Esa et.al, 2010). Creative thinking skills will also be one of the criteria in obtaining jobs. Interpersonal skills require student very high internal motivation, courage and independent for their self development. It also relates to decision making skills and it will create very effective working environment. The study carried out by Ismail et.al (2009) show that interpersonal

skills such as able to do negotiations and are able to work in a different culture to be one of the most important criteria in the selection by the employer's workforce.

Students' should know what are soft skills needed by industries. Based on research findings, the elements of capable in risk taking is priority of students' perspective. Nevertheless, the findings obtained by Ismail (2012), show that the selection criteria of employees more to aspects of personality, self confidence and personal appearance. The context of teamwork also important elements in student centered learning to achieve a process of discussion group. The ability to build good relations, interact with others and work effectively together with the group members are able to improve the value of the group work skills in students. Ghani (2014) says that a critical thinking skill in solving a problem is very important because someone with critical thinking is said to be clever to submit constructive criticism and to make an assessment. Aspects of leadership are also stressed by students as one of the elements of the skills important in getting a job. The leadership aspect is third choice from students' perception. However, the study conducted by Seetha (2014) on the importance of soft skills at work shows element of leadership lacking compared to communication skills.

Soft skills embedded in pedagogical practices also investigated in this research. On the basis of test ANOVA undertaken in identifying the mastery of skills between the Faculty of engineering, the result of the test shows that there are differences in students' mastery of soft skills between the Faculty of Civil Engineering with the students of the Faculty of Mechanical Engineering. These differences can be seen when the value $p < 0.05$. This significant difference between the students of the Civil Engineering and Mechanical Engineering students. Researchers thought that differences in the level of mastery of soft skills among both Faculty this happens as a result of different methods of application of creative lecturers as well as the diversity of the level of intelligence of students in mastering the soft skills. This view is in line with the findings of Esa, Padil & Selamat (2013) where the level of mastery soft skills among engineering students is different due to teaching and learning method by lectures.

7. Conclusion

In the context of work, the skills that individuals need meet the organisational and personal goals to achieve all the factors of quality workers. The consensus curriculum in engineering education programs should be more than providing the requisite skill for effective work performance it also help students to think well and prepare themselves with high quality of soft skills. Based on the studies successfully implemented, the findings showed that mastery of soft skills which students to think in critical skills and creative, collaborative group skills, communication skills, decision-making skills, interpersonal skills and leadership skills are at a high level. This research shows that the institutions in particular lecturers have successfully implemented soft skills in pedagogical practices. The increase in the number of graduates will result in stiff competition, especially in finding employment commensurate with existing approval. The advantages of the soft skills as well as academic results added value to someone in seeking employment opportunities. If the soft skills not mastered well, prospective graduates are experiencing difficulties in finding jobs as a result of low confidence to develop them. In conclusion, the mastery of soft skills among students should be imbued to produce graduates who are not only proficient in technical fields but also high value of soft skills in producing workforce to develop the country in the future.

Acknowledgement

This paper is part of findings from the research grant, FRGS (Vot 1502) Ministry of Higher Education and Universiti Tun Hussein Onn Malaysia.

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