

INDUSTRIAL INTERNSHIP PROGRAMME AT UNIVERSITI TEKNOLOGI PETRONAS – A COLLABORATION STRATEGY THAT ENHANCED STUDENTS’ SOFT SKILLS IN THE EVER-CHANGING TECHNOLOGY

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Abstract $\frac{3}{4}$ The Universiti Teknologi PETRONAS (UTP) curriculum was designed to contain substantial practical experiences. ‘Learning-by-doing’ approach is used allowing students to apply the theories into applications. This ability is known as hard technical skill. The university also provide opportunities for students to develop their soft skills through normal curriculum structure and through extra-curriculum activities. Both skills are important for students to master in the nowadays ever-changing world. In the recent years, there have been great industry demands for students to have more soft skills than technical. However, since industry is using real life setting, there are soft skill components that university cannot provide. To overcome this problem, university has to establish simulated environments, but this approach unable to effectively instil the necessary soft skills. Collaboration is the proposed solution, where students are sent to industry to gain real soft skill experiences. This paper presented UTP’s Industrial Internship Programme as a strategic partnership with industry to produce well-rounded graduate students in anticipating the ever-changing technology.

Index Terms $\frac{3}{4}$ Collaboration, ever-changing technology, industry demands, hard skills, soft skills, strategic partnership.

INTRODUCTION

To prosper and succeed in the knowledge-based economy, individuals and organisations must be able to develop and adopt new skills and approaches to cope with the ever-changing business strategies. This is particularly true when the technology used to implement the k-economy keeps changing every day at a rapid pace. For example, customer service which was previously handled by human has now changed and being manned by an automated or at least by computer-assisted call centre. In this case, new knowledge and know-how has to be acquired. However, ability to apply soft skills to handle the change is important to guarantee continuous and smooth operation of the new set up. These include project management, interpersonal communication, customer relation, reporting, problem solving and decision making.

While hard technical skills are important, there have been increasing demands from industry in the recent years

for their employees to have excellent soft skill abilities to confront with any new changes. Thus, ability to change has now becomes vital in nowadays very competitive world. This fact was supported by a survey conducted in the U.S. that more than two thirds (68%) of the 1,400 CIOs interviewed in 1998 rated soft skills as very important, compared to less than half (46%) of CIOs rating soft skills as very important in 1996 [1]. Hard skills can be simply acquired by training. The soft skills, however, require different blend of exposures so that an employee can gather the experiences and finally mastered in a number of abilities.

In an effort to fulfil such current requirement, UTP has designed its curriculum to contain technical skills together with the necessary soft skills. The technical skills part is accompanied with the supporting theories in the ratio of 60:40 – 60% practical and 40% theory. Students would gain their hard skills through ‘learning-by-doing’ approach and this has been provided with the establishment of a number of laboratories, as well as by other hands-on practical facilities. This provides opportunities for students to apply the concepts and theories they have learned in classes into applications. For example, a database designer must have the skills to design a database system using specific tool and technique. Generally, hard skills are technology dependent and training can be given for students to master them [2]. At the same time, students’ soft skills can be developed in either of two ways: through normal structured curriculum and through extra-curriculum activities. With the normal curriculum structure, the soft skill elements are embedded within each of the offered courses. Soft skills are difficult to acquire but once mastered it is usable to different settings. For example, an experience gained in managing a project in a setting can be used to manage other projects somewhere else. Indeed, it is an added value for an employee to know more about tips and tricks of a specific soft skill. As reported by Jonathan Poe (2002), rapid change in technology, markets and vendors create increased for highly skilled IT personnel [3].

It is the intention of UTP to produce well-rounded graduate students who possess technical competence, lifetime learning capacity, critical thinking, communication and behavioural skills, business acumen, practical aptitude and solution synthesis abilities that meet those industry demands.

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PROBLEM STATEMENT

Industry is using real life setting and environment in running their businesses. In order to comply with the curriculum requirements and to follow the technology trend, however, a university can only provide its students with smaller scale and mocked-up settings. This is partly due to cost constraints, which may lead to mismatch of the acquired skills - the hard and soft skills. The differences will be more critical when the technology is changing too fast. The implication is that there will be certain parts of the hard and soft skills that could not link between what the university has provided to its students with that of the industry demands.

Technical skills indeed improve an employee's employment prospects but do not protect individual from the changing economic conditions, customer demands, technical innovations, productivity improvements and the like [4]. Thus, what is more important is to have sufficient soft skills within a future employee. However, the soft skills that a university setting can provide are limited and confined to only that of the simulated environment, thus not the real skills being acquired. How could this missing linkage be rectified and subsequently be established, thus producing better equipped of UTP graduate students?

One foreseeable way in answering this question is to have a kind of industrial collaboration with industry. However, industrial collaboration approach has been a common establishment in any institute of higher learning. Then the issues here are about:

- What are the differences between the UTP collaboration programme with that of the others?
- How do this industrial collaboration would enhance students' soft skills?

These two questions will be answered in the Implementation section.

OBJECTIVES

The objective of this paper is to discuss the unique set up, implementation and experience of the UTP's industrial collaboration programme. It can be used for the purpose of information sharing. The discussion would focus on two of the following points:

- Industrial collaboration as strategic partnership by which UTP and the host companies would enjoy the 'win-win' benefits.
- The acquisition of the soft skill abilities by the students of UTP in anticipating the ever-changing technology.

To see the effectiveness of the industrial collaboration programme to UTP students with respect to the acquired hard technical and soft skills, two hypotheses were developed and the results of the hypotheses testing were presented in Data Analysis section.

LITERATURE REVIEW

Oliver, the founder of Execume, a career management firm defines soft skills as the skills that show that you can change the environment, such as communication, prioritisation, and management. Soft skills are transferable to other settings and situations. Hard skills, on the other hand, are technical capabilities that tied to specific technologies or work experiences but are not necessarily adaptable elsewhere [5]. The definitions indicate the power of soft skills in a workplace that an employee should possess.

Walden (1995) said that productivity improvement depend heavily dealing with the soft side (human behaviour) issues in addition to hard side issues [6]. This was further supported by Murnane and Levy (1996) that the skills needed to succeed in the workplace have changed significantly from technical skills to more of soft skills for the last two decades [7]. The reason is that in the information-based economy, the day-to-day business operation keeps changing to meet the customer demands, technology advancement, as well as to be always competitive. Thus, while the technology changed, the soft skills must be appropriately acquired. A study conducted at PepsiCo has revealed that division leaders with strengths such as adaptability, empathy and influence outperformed their target by 15 to 20%, while those who lacked these soft skills underperformed by almost 20% [8].

In 1959, jobs were classified as 20% professional, 20% skilled and 60% unskilled. By 1997, the percentage for skilled jobs is 60% and the percentage for unskilled jobs is only 20% [9]. Therefore, the demands now are for potential employees with high performance capabilities, which include the necessity to have soft skill abilities. However, many employers have expressed their dissatisfaction with the applicants' quality. It is not on the basis of their technical skills but rather because of their competencies in other areas. The trend of the changing business led to a new definition of the essential skills needed by current and future employees. The following skills are mentioned most frequently (Clagett 1997; McNabb 1997; Murnane and Levy 1996; Oliver et al. 1997):

- Knowing how to learn new knowledge
- Competence in reading, writing, and computation
- Effective listening and oral communication skills
- Adaptability through creative thinking and problem solving
- Personal management with strong self-esteem and initiative
- Interpersonal skills
- Ability to work in teams or groups
- Leadership effectiveness
- Basic technology skills

With all these supporting facts, it is indeed necessary for UTP to implement the industrial collaboration with industry to solve the problem of the missing linkage.

IMPLEMENTATION

As suggested, industrial collaboration is proposed and it is now part of the UTP curriculum. It was named Industrial Internship Programme, which requires students to go for industrial training in selected companies for a period of eight months. However, a student can only be considered to go for industrial training when he/she has completed the third year study. Its purpose is to expose UTP students to the world of work so that they can relate theoretical knowledge with applications in industry. It is also expected that the students would acquire an amount of essential soft skills [10].

This approach, however, has also been used by many other institute of higher learning, not only in Malaysia but also throughout the world. The differentiating factors lie in the implementation strategy as discussed below.

- Longer industrial training period. With the eight months time frame, a student can effectively strategise his/her work plan from feasibility study to implementation.
- Specialised function of Industrial Internship Unit. This unit is dedicatedly provides logistic supports such finding potential companies for collaboration, students placement, managing supervisors' visits, and keeping students' performance records.
- Responsibilities of the host companies. The success of the programme is determined by the commitment of the host companies. To achieve this, major portion of the roles, responsibilities and authorities are given to host companies to manage UTP students. Plant Training Coordinator is the person in-charge of the training.
- Continuous reporting. A number of reports have to be produced indicating the progress achieved in a day, week and month with respect to the given assignment of work
- Live presentation. A student has to regularly present the progress and finding to the management committee of the host company.
- The scope of works. The works given to a student are not limited to only specific task of assignment. It can cover anything as long as it provides opportunities for students to acquire some amount of skills.
- Evaluation weightage. Major proportion of the evaluation scores is in the hand of the supervisor from the host company, which reflect his/her direct supervisory and controls over the students.

The Industrial Internship Programme has been recognised as a strategic partnership with industry for various reasons. The followings explained the strategic linkage:

- Management of the programme. Both parties will have to play their roles and to shoulder the responsibilities according to the rules and regulations as outlined. This provides an opportunity for mutual understanding.
- 'Win-win' benefits. Many benefits can be projected such as staff exchange, technology transfer and research and development initiatives.

- Strategic applications. The works in which a student was assigned can be used for strategic purposes of the host company. These applications may be operational or business products.
- Resource sharing. Duplicated facilities can be avoided once a requirement has been identified, thus reducing costs and other operational overheads.
- Resource allocation. Appropriate funding and other resources can be appropriately asked and allocated for a project that has high potential returns.

While industry collaboration introduced many strategic benefits to both parties, the students' hard and soft skills were significantly improved. The emphasis, however, is on the soft skill part. These were achieved in a number of ways:

- Work ethics. Similar work ethics, rules and regulations are applied to the students once they have entered into and worked with the host companies.
- Responsibility and integrity. Students are allowed to involve in the development of real life applications or products, thus challenging their ability and responsibilities.
- Communication skills. Regular presentation provides opportunity for students to improve their communication skills and learn the technique for an effective presentation.
- Timeliness. Meeting the deadline is common phenomenon in business, by which students may apply time management.
- Deal with other business entity. Provides opportunity for students to negotiate and sell ideas, such as business deal and contract negotiation.
- Sales and marketing. Businesses cannot survive without sales and good marketing strategy. Involving with these activities will make students more defensible.
- Operational and technical supports. Give operational and technical support for business, such as resource management and the day-to-day operation.
- Reporting and documentation. Documenting the business activities and system processes that permit students to understand better how a business is being run and how a system is being developed.
- Leadership. This provides a platform for students to develop their skills and characteristics as a leader in a project and group organisation.
- Teamwork. The spirit and support from others can be developed to achieve a common goal.
- Adaptability. Ability to learn, adjust and adapt to a new technology and working environment in order to be always competitive, otherwise the business may fail.
- Decision making. Ability to decide in the execution of the given task.
- Safety consciousness. Adherence to the host company's safety procedures and safety precaution to ensure safety.

With the industrial collaboration programme, students' competency in their field of study was improved and their confidence level in dealing with real life problems was developed incrementally. At the end of the training time frame, a student would have sufficient technical expertise in his/her area of specialisation and also has the necessary soft skills to deal with whatever problem size and complexity - confidently. Specifically, the soft skills that students gained have significantly influenced their appearance as well as their attitude. This was about behavioural skills.

HYPOTHESES

As discussed above, Industrial Internship Programme is one possible solution to the problem of missing linkage. To see the usefulness of the collaboration programme to UTP students with respect to their skills development, we have theorised the following two hypotheses. (Measures of 1 and 2 are interpreted as not sufficient/not effective, 3 as average, and 4 and 5 as sufficient/effective).

As discussed in earlier sections, hard skills are easier to impart, acquire, and master than the soft skills. Therefore, our emphasis is to see the contribution of the collaboration programme to the students' soft skills improvement.

- i. University has sufficiently provided the students with the necessary hard skills before they go for industrial training.
 $H_0: \mu \leq 3$ (hard skills are not sufficiently provided)
 $H_1: \mu > 3$ (hard skills are sufficiently provided)
- ii. Industrial collaboration is an effective programme for students to gain the necessary soft skills.
 $H_0: \mu \leq 3$ (soft skills are not effectively gained)
 $H_1: \mu > 3$ (soft skills are effectively gained)

METHODOLOGY

A survey was conducted to 40 students from the Programme of Information Technology (IT) and Information Systems (IS) of UTP who have undergone industrial internship programme. In particular, the survey was designed to measure two important points: the sufficiency of the hard skills that university has provided to students and the effectiveness of collaboration as a method to gain the required soft skills. Students were asked to rate their opinion with respect to each of the hard and soft skill components they have gained from the industrial training programme using Likert scale (1 as the lowest score to 5 as the highest score). The collected data were then analysed to conclude as whether to accept or reject the two stated hypotheses.

In our methodology, however, we have to limit the scope of the study to cover only IT and IS students of UTP. This is because these are the two areas where technology most rapidly changed when compared to engineering

disciplines. The survey form was also designed to contain questions that are closely related to hard technical skill requirements of IT and IS, while the hard skill components for engineering would be different.

DATA ANALYSIS

TABLE 1 shows the result of hypothesis (i) testing based on each of the identified hard technical skill components.

TABLE 1
RESULT OF HYPOTHESIS (i) TESTING

One-sample t-Test

Test value $\mu = 3$, $\alpha = 0.05$

Procedure: Reject H_0 if t-value falls in the rejection region

Hard skill components	Sample mean	Standard deviation	t-value (right-tailed)
1. Application	4.1	0.81	8.593
2. Network	4.225	0.83	9.351
3. Database	4.05	0.84	7.954
4. Multimedia	4.2	0.82	9.302

1=Extremely insufficient, 2=Insufficient, 3=Average, 4=Sufficient, 5=Very sufficient

The obtained t-statistic value falls in the rejection region. Thus, H_0 is rejected and accepting H_1 .

This result indicates that UTP has sufficiently provided its students with the necessary hard technical skills before they go for industrial training. At the host company where we placed the students, they are confidently coping with the technicality of the problems for the given work of assignment.

TABLE 2 shows the result of hypothesis (ii) testing based on each of the identified soft skill components.

TABLE 2
RESULT OF HYPOTHESIS (ii) TESTING

One-sample t-Test

Test value $\mu = 3$, $\alpha = 0.05$

Procedure: Reject H_0 if t-value falls in the rejection region

Soft skill components	Sample mean	Standard deviation	t-value (right-tailed)
1. Communication	4.025	0.89	7.321
2. Project mgt	4.15	0.89	8.214
3. Interpersonal	4.05	0.87	7.664
4. Critical thinking	4.125	0.72	9.955
5. Problem-solving	4.275	0.81	9.960

1=Extremely not effective, 2=Not effective, 3=Average, 4=Effective, 5=Very effective

The obtained t-statistic value lies in the rejection region. Thus, H_0 is rejected and accepting H_1 .

It indicates that industrial internship programme is a good collaboration strategy with industry in providing students with the required soft skills. Exposure to real life businesses has helped them to better understand the requirement to keep changing and stay competitive. This indeed will become an invaluable asset when they join the

workforce once they have graduated from UTP. With the acquired soft skills, they would be able to adapt to the ever-changing technology more easily and with full confidence.

RESULTS AND DISCUSSION

The result from the first hypothesis testing indicated that university has the ability to sufficiently provide the necessary hard technical skills for students to master before sending them for industrial training. The concepts and theories provided are sufficient for them to handle the technicality of the workplace. Furthermore, the curriculum, the course structure, and the practical facilities could be upgraded to reflect the current industry requirements although their implementation may be a bit delayed, particularly due to cost constraint. The result of the second hypothesis showed that soft skills are best gained through collaboration and strategic partnership with industry. The university alone cannot provide the complete set of the required soft skills. This simply because industry has the real settings and running the real businesses, in which the real soft skills are embedded with. Practically, soft skill abilities would not be powerfully acquired from a simulated environment.

Therefore, the emphasis now must be on the development of the soft skills, which is a prime requirement in anticipating the ever-changing technology. With the early preparation that UTP students have made during their undergraduate study, it increases their market value and would have greater employment opportunity when they enter the job market.

CONCLUSION

The research objectives have been met. It explained the need to have industrial collaboration as an effective platform to embed the necessary hard technical and soft skills to students of UTP. The results of the hypotheses testing support this argument, which indicate the direct benefits that the students, the sending party and receiving party would gain from the strategic collaboration. However, future work is required to test the hypotheses to engineering students as to validate the results and findings of this research work.

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