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Bridging the Skill Gap between Information Technology Academy and Industry: Case of Identification of IT Skills needed in IT Undergraduates

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From last few decades, the Information Technology has been influencing every aspect of a country, including: industrial, e-governance, social, educational and related others. Sri Lanka, with the intention of realizing knowledge hub, as one of its national visions, has no exception in front of the influence of the Information Technology. Accordingly, business process outsourcing sector has become a competitive industry to the national economy, supplying foreign exchange to the country, creating numerous employment opportunities, being an influencing force for country's brain-drain. As a result, IT related academic and professional education sector became an intermediary industry to supply qualified people to the IT industry. However, meeting industry requirements and capabilities of graduates is found as not matched. It has discovered that, not only the knowledge that matters at the industry, graduates' skills, attitudes, personalities play a considerable role for them to be succeeded in the industry. This research focuses on identifying skill requirements need to be excelled by IT undergraduates as successful IT professionals. Depending on the diverse nature of the research a mixed methodology including both qualitative and quantitative methods has been used.

Keywords— Information Technology, IT, role models, skills

degree applicants to be a successful IT professional in the industry.

I. INTRODUCTION

Degree awarding academies in the field of Information Technology are now playing a major role in providing a significant contribution to the creation of IT graduates. Z-score mark of G.C.E. advanced level examination is not the main criterion for selecting candidates to such degree programs. On the other hand, students are selecting the degrees by fulfilling the basic requirements. Although the students satisfy the required pre-requisites to enrol for degree programs, the number of undergraduates who drop out without completing the degree program is increasing due to some reasons [1].

As revealed by the past literature, this could happen due to the lack of some necessary skills required from students. Sometimes, the students will graduate without acquiring the necessary skills. This will lead to unemployment in the long run.

Few attempts were in the existing literature researches carried out to identify the skills required from students to be a successful graduate. This study further specifically focuses on identifying the skills that which should be improved by the IT

II. LITERATURE REVIEW

A. Information Technology

The term “Information Technology” can be defined in two aspects; in the broadest sense, the term information technology is often used to refer to all of computing. In academia, it refers to undergraduate degree programs that prepare students to meet the computer technology needs of business, government, healthcare, schools, and other kinds of organizations [2].

B. Information Technology Degree Applicants

Information Technology degree applicant is a person who is in the process of gaining IT related knowledge and improve the skills to be an IT professional.

C. Information Technology Professionals

Among the variety of definitions, an Information Technology professional can be defined as a member of a profession with the particular IT knowledge and skills necessary to perform the professional role to provide IT related output. IT professionals must practice and participate collaboratively with other professionals. Governance, regulations, culture are only a few of the environmental aspects of Information Technology work. Professionals need to actively participate

in the local and global discussions which impact and concern the practice of Information Technology.

D. Competencies

Michael Armstrong (2006) defines the competencies as “It’s what people need to be to perform a job well”, Mirabile, 1995: 13 defines “Knowledge, skills, abilities, and behaviors required for successful performance of job duties” and Blancero, Boroski, and Dyer, 1996: 387 define Knowledge, skills, abilities and other attributes required to perform desired future behavior.” Though these are having some differences, all these definitions share common elements too. They must be observable and measurable [3].

E. Skills

An individual’s ability to do something well can be defined as a skill of that person.

F. Skills of Information Technology Degree Applicants

Skills of individuals differ from person to person based on the area specialized. Since this research focuses on teaching and learning, the learning skills need to be taken into consideration [4]. The learning skills are;

- Physical skills requiring practice and repetition to get things done.
- Memorizing facts and information, adapting new ideas and systems.
- Ordering, prioritizing and planning, which refer to the degree to which a role holder has any responsibility for and flexibility in determining the way a particular activity is performed, diagnosing, analyzing and problem solving, with or without help.
- Interpreting or using written manuals and other sources of information such as diagrams or charts.
- Complex procedures or sequences of activity that is memorized or followed with the aid of written materials

such as manuals.

G. Skills of Information Technology Professionals

There are some skills which are absolutely essential for every educated Information Technology professional. Information Technology professionals commit to professional excellence and ethics, and to the values and principles of the profession. Skills and values that enable practitioners to work effectively and contribute positively to their organizations, clients and profession. These skills range from being strong communicators, to demonstrating the values- add of their contributions, to remaining flexible and positive in an ever changing environment [5], [6].

III. OBJECTIVES

Studying and identifying the skills to be improved by the IT degree applicants in completing the degree successfully was the main objective of this research study. In order to achieve it, several steps have been identified to perform. The first step was, identification of the skills of IT degree applicants. Next step was, identification of graduate IT professionals who perform well in their companies (role models) and their skills of job specialization. Third, was an identification of the skills of role models when they started the degree program and the final step was an identification of the skill level gap between the IT professionals as undergraduates and the degree applicants. These four steps were successfully guided in suggesting a set of skills required to successfully complete the IT degree program.

IV. METHODOLOGY

This research identifies the skills needed from the IT degree applicants to be a successful IT professional in the industry. Therefore, the research area consists of two main parties; IT degree applicants and IT professionals. To gather data according to the qualitative approach, interviews and questioners were conducted.

Data about skills of the IT degree applicants of an institute and the skills of the graduate IT professionals of the same institute have been gathered in identifying their skills as professionals and that’s the expected skill level of the degree applicants when they graduate after four years.

Identified the skills of IT professionals when they were undergraduates using questionnaires. As they possess these skills, they have become established, competent top class professionals in their companies. If the IT degree applicants could practice these competencies and improve them, they could be able to reach to a position where the role models are in. Lecturers of IT institutes and some of the IT professionals were interviewed in getting their ideas of the skills that the industry is expecting from the undergraduates in doing academic activities related to their disciplines.

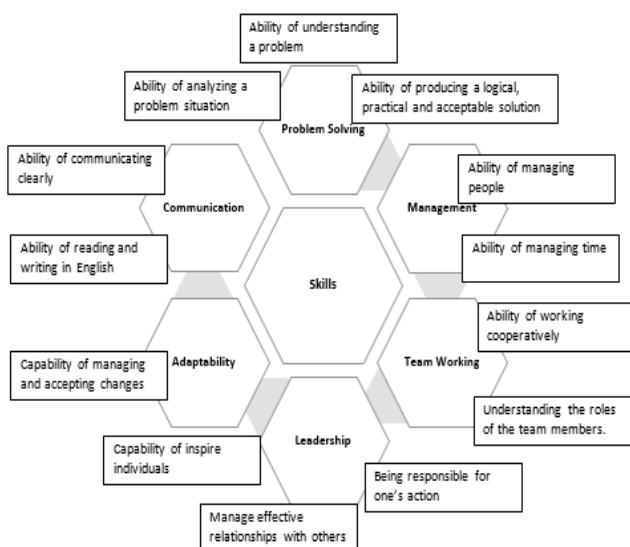


Figure 1: Skill Dimension of IT graduates

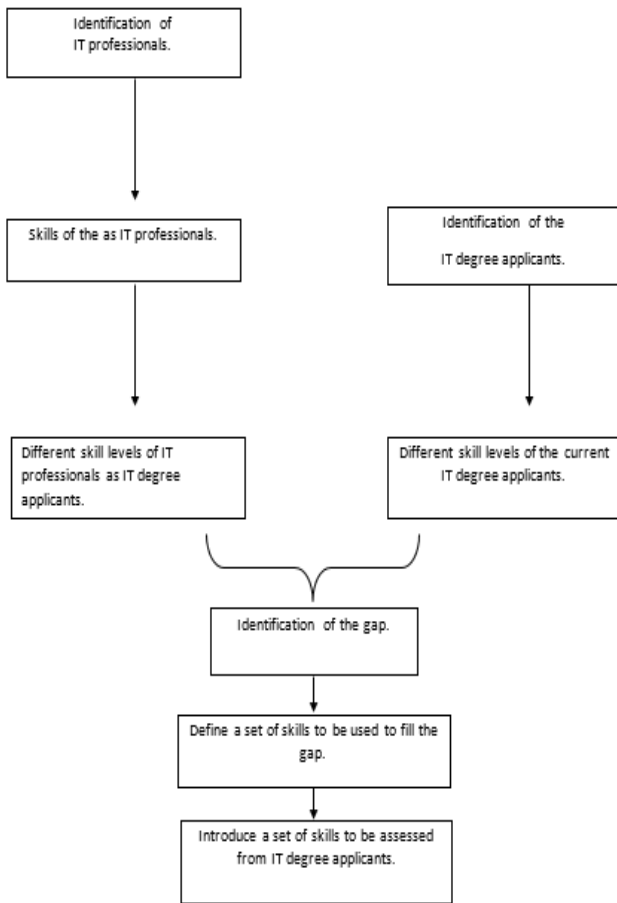


Figure 2: Modeling the Research

V. RESULTS AND DISCUSSION

According to the statistical method- inferential analysis and average and percentage, the skill levels of the IT degree applicants were measured over communication skills, problem solving skills, team orientation skills, management skills and leadership skills.

From the results of the analysis, it could be found as communication skills of applicants correlated with the fluency, participation for the group discussions and understand ability factors. Then the analysis extends to find which factors affect the communication skills most. The regression is significant with the 99% level of confidence (see figure 3). It can be seen that only the fluency and the understand ability – refer internet affects the communication skills with 95% level of confidence.

17% of the IT degree applicants agreed to talk with others in English language and 72% of them were using browsing technique in finding something. This implies that they have reading and understanding in English language.

Model	Coefficients ^a						Correlations		
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Zero-order	Partial	Part	
	B	Std. Error	Beta						
1	(Constant)	.765	.230		3.323	.001			
	Fluency	.325	.081	.240	3.996	.000	.269	.241	.236
	Understandability	.419	.160	.159	2.615	.009	.185	.160	.154
	Participation	.276	.223	.074	1.241	.216	.061	.077	.073

a. Dependent Variable: communication skills

		Correlations					
		Reading	Fluency	Recall Time	Participation	Understandability	communication skills
Spearman's rho	Reading	1.000	-.066	-.060	-.064	.162**	.097
		Correlation Coefficient	.276	.319	.303	.007	.108
		Sig. (2-tailed)	.276	.275	.273	.264	.276
Fluency		Correlation Coefficient	1.000	.106	.053	.160**	.406**
		Sig. (2-tailed)	.276	.081	.391	.008	.000
		N	.275	.275	.272	.283	.275
Recall Time		Correlation Coefficient	-.060	1.000	-.095	.160**	-.006
		Sig. (2-tailed)	.319	.081	.126	.008	.927
		N	.273	.273	.273	.261	.273
Participation		Correlation Coefficient	-.064	.053	1.000	-.138*	.174*
		Sig. (2-tailed)	.303	.391	.126	.025	.005
		N	.264	.263	.261	.264	.264
Understandability		Correlation Coefficient	.162**	.160**	.160**	1.000	.251**
		Sig. (2-tailed)	.007	.008	.008	.025	.000
		N	.276	.275	.273	.264	.276
communication skills		Correlation Coefficient	.097	.406**	-.006	.174*	1.000
		Sig. (2-tailed)	.108	.000	.927	.005	.000
		N	.276	.275	.273	.264	.276

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Figure 3: Correlation analysis of the communication skills of IT degree applicants

According to the problem solving skills, question understand time has the highest correlation with the problem solving skills and the second highest is the understand ability. The analysis has been extended to identify the root causes behind the variables. Understand ability consists of four variables and among them referencing as understanding method affects most to the problem solving skills with 99% level of confidence. Next highest comes to the helpdesk with 99% level of confidence.

77% of the degree applicants wanted to spend average of below 3 minutes to understand a question and 54.7% would expect the lecturer support other than the lecture time. Which means 54.7% of students were highly depend on the lectures.

The analysis has been proven that extracurricular activities, positions hold and work preference has the highest correlation with the Team orientation. Among them positions hold has the highest correlation with 0.698 for the sample.

86% of the fresh undergraduates have been involved in extracurricular activities at school. 57.6% of them in level 1 which means they have been hold some position in doing group activities. According to the work preference, 76.8% belong to level 3, which means they would like to work as a team.

From the results of the analysis, it could be found as time management of undergraduates correlated with the punctuality in doing academic activities and preparation factors. The regression is significant with the 99% level of confidence. It can be seen that only the fluency and the understand ability – refer internet affects the communication skills with 95% level of confidence. 96% of the fresh undergraduates were punctual and 30.1% of start to study for the examination when the first lecture starts.

Identification of the skill levels of IT degree applicants

The research results revealed that the fluency/ talking with the others in English language is very poor. Not only reading, speaking and writing of English is very much essential for an IT professional. Therefore, communication skills of them need to be improved. 54.7% of undergraduates willing to get the help of the lecturer to solve problems related to subjects. Only 39.1% of them do referring and access the library books. However, they are best in understanding questions. This implies that the problem solving skill of undergraduates needs to be improved. Otherwise they won't be innovative people in the future. Team work skill of the undergraduates in a satisfactory level.

Identification of the Skill Levels of IT professionals when they started the Degree Program.

Here, the skills of the IT professionals were measured when they were studying as undergraduates. The purpose of measuring this was, to identify the important skills that must be practiced by the applicants to be good IT professionals. In that case, the skills of degree applicants and the results were generated by this section. Therefore, the same skill framework is used for the IT degree applicants.

According to the results of the analysis of role models data, it can be stated that all the components of skills category exceed 50%, which implies that they were academically and personally good at the time they were doing academic activities.

Identification of the Skill Level Gap between the IT degree Applicants and IT professionals when they were Undergraduate

IT professionals were the best students of the institute and they have completed the degree successfully and presently perform well in their respective companies.

In order to be a role model or to complete the degree program successfully, current students could improve as the academic level of IT professionals. Therefore, the skill levels of IT professionals when they were studying and the skill levels of degree applicants could be compared and communication skills including speaking/ presentation in English and writing in English, analytically think and solve problems, team

orientation, leadership attitudes and time management skills must be improved by IT degree applicants.

VI. CONCLUSION

Based on the results found, it can be clearly seen that some of the vital skills which the IT degree applicants should possess were absent in them. Information Technology professional will find his/ her career paths more successful if one's possesses good communication skills. In presenting the software product that have been developed for the client organization, writing well-commented computer codes (someone else can figure out how the program works), writing memos to management about how a project is progressing, or writing articles for professional and trade publications; IT professionals must have good communication skills. Therefore, they should be groomed to good communicators through the degree program in the form of different kinds of written assignments and presentations. There exists a shortage of the communication skills of the present degree applicants compared to the communication skills of the undergraduate level competency of the IT professionals. By filling the gap, current undergraduates will be able to become role models by improving these skills.

It is a rare luxury for a computer professional to be able to work on only one project, or one problem, at a time. It is far more common to be required to work on several different things projects at once, often with similar deadlines. To handle this situation, computer professionals must be able to prioritize projects, switch from one project to another without losing focus, and plan milestones for each project so that each is completed on time. Therefore fresh students have to improve management skills. (Especially time management)

Most computer professionals must work as members of a team, collaborating to create solutions. Being team-oriented, willing to share both responsibility and recognition, is important to succeed in almost all computer careers. They must be aware of learning to work with people who may have different work styles and opinions. During the four years of the degree program, undergraduates will practice to work as a team player. The analysis revealed that the team work attitude of the fresh applicants is in a good level as compare with the role models.

In order to make the team a progressive unit, the leader must understand the process and dynamics changes. He/she must also know the appropriate leadership style to use during each stage of team development. The leader must also have an understanding of the different team players' styles and how to manage each of them at the proper time. Therefore leadership qualities are important for IT professionals. Therefore, by improving it, they will be able to be a skilful project team leader in the future

According to the results obtained in the research analysis, it has been proven that the improvement of communication skills, problem solving skills, team orientation skills, management skills and leadership skills will excel IT undergraduates as successful IT professionals.

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