

A Measurement Tool For Determining Information Technology Literacy of Thai Graduates (Part I)

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Abstract

The main objective of this research project is to develop a measurement tool for determining information technology literacy (ITL). In past studies and researches, the ITL of individuals was determined through the subjective perception of the individuals themselves. This research aims to develop an objective measure. The study consists of two parts. The first part identifies the components of ITL by analyzing the requirements that business organizations have for job applicants. ITL in this study is categorized into three components: fundamental knowledge, skills, and applications. The second part deals with the construction of a measurement tool for determining ITL and the implementation of that tool for measuring ITL of Thai graduates. The measures obtained will then be compared to the ITL requirements of business organizations as identified in the first part of the study. Based on the results of the comparison, recommendations will be developed for revision of the curriculum. This paper explains the framework of the study and reports the findings of the first part. A plan for the second part of the study is also presented.

1. Introduction

Information technology (IT); consisting of computers, communication, and computer networks [14]; has been one of the significant factors affecting and shaping the development of many aspects of Thai society since the beginning of the 1980s. Many Thai organizations, both in public and private sectors, have adopted IT for improving their management, efficiency, and competitive advantage. IT is also used in innovative projects. Trends show increased use of computers and IT for enhancing quality and production. The importance of computer technology to the country's development was firmly stated in the latest report of Thailand's National Economic and Social Development Plan (2002-2006), (Office of the National Economic and Social Development Board [11].

It is widely recognized among Thai institutions, social educators, and leaders that the development of human resources capable of using computers and IT technology

effectively in their work is vital to the economic growth and well-being of both the country and individuals [11]. The most common places where Thai people acquire their computer and IT knowledge are in educational institutes and the workplace. Universities play an important part in supplying the labour market with the number and quality of new employees. Thai graduates in computer and IT are often inadequately prepared for the work they must do after entering employment. Therefore, many Thai organizations need to spend significant amounts of time and money to train them in IT competency sufficient to meet the requirements of the workplace. It is; therefore, essential for Thai educational programs to adjust their curriculum and course content to make them more relevant to the labour market's needs.

Many countries have conducted studies which assess the ITL of their university graduates. Many studies and tests on ITL have been conducted by researchers and institutes in the U.S. [1],[2],[3],[5],[7],[8],[10],[14], and [15]. ITL in the U.S. studies includes an understanding of computer software and hardware, telecommunications and computer networks, the selection of different computer configurations, artificial intelligence, and database and Internet use. One of the purposes of the researches was to develop benchmarks for improving educational programs in IT. In Singapore, ITL is constantly monitored by the national institute. "The 2002 Information Literacy Survey", a study carried out in Singapore in 2002 [8], is an example of the significance of this type of research and how it can contribute to a country's development. The research investigates the level of information and communication literacy of Singapore resident population and workforce in IT for carrying out electronic transactions, communication, and access of services. The research findings were consequently used for identifying the country's development areas.

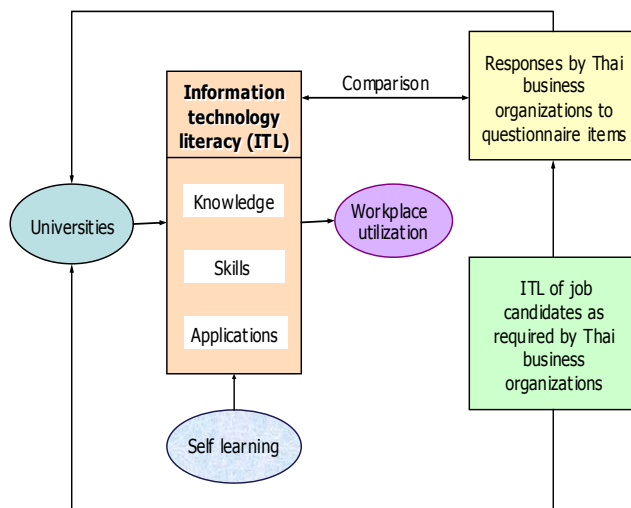
The literature review summarizes past studies that focused on measuring ITL. Even though these studies deal with many similar aspects of ITL, their

definitions of ITL do not include the same components. Based on a review of past researches, this research categorizes ITL into three components: fundamental knowledge, skills, and applications. Moreover, many studies evaluate literacy through self-assessment methods. This research aims to develop an objective measure of ITL that will be used with Thai graduates. It appears to be the first study of its kind in Thailand. The findings of the research can be used for two main purposes. Firstly, they can be used by Thai universities in refining their curriculums to make them more appropriate to the IT needs of the Thai labour market. Secondly, the measurement tool of ITL created for this study can be used in further studies in this area.

2. Research Objectives

1. To develop a measurement tool for determining the ITL of Thai graduates in the areas of fundamental knowledge, skills, and applications.
2. To examine the accuracy of the tool by comparing the results obtained with actual performance using a computer.
3. To assess the ITL of recent Thai graduates, from both public and private universities, whose major was not in IT.
4. To measure any significant discrepancies between the ITL of Thai graduates and the entry level ITL requirements of Thai business organizations.

3. Research Framework



The target population of ITL measurement is Thai graduates who are completing the last year of their bachelor's degree in non-IT subjects and who will enter the Thai labour market soon after their graduation. ITL in this research consists of three components: fundamental knowledge, skills, and applications. Fundamental knowledge is the basic understanding of computer

hardware and software essential for using computers at work and for learning how to use and apply new technology. Skill is the ability to use recent technology in work responsibilities. And application is the ability to learn and use new technologies. Thai graduates usually acquire their ITL through formal education in the university and through self-study. The ITL of Thai graduates at the time they enter employment may or may not meet the ITL requirements of their employers. This depends on job characteristics and employers' expectations. If the ITL of Thai graduates is insufficient for performing their jobs, Thai universities will need to revise their curriculum in order to make it more appropriate to the needs of the Thai labor market.

4. Methodology

4.1 Sample

There are two groups of participants in this research: (a) Human resource (HR) managers of Thai business organizations listed on the Stock Exchange of Thailand (SET), and (b) Thai students of both science and liberal arts disciplines who are completing the last year of Bachelors' degrees which are not in IT. The students will soon graduate and enter the Thai labour market. The HR managers provide information on ITL required by job candidates. The students provide measures of ITL considered indicative of the ITL of Thai graduates in general.

Fifty Thai business organizations on the SET were selected based on two considerations. Firstly, they are representative of companies and the range of business areas on the SET list. Secondly, each company is among the top companies in the industry in terms of performance. It is assumed that the performance of top companies is the standard to which other companies aspire.

There are two groups of Thai graduates participating in this research. The first group consists of 120 participants from 3 universities. These students will take part in the evaluation of the "skills part" of ITL measurement. The results of ITL obtained through actual practice on a computer will be compared to the results obtained from the "paper-and-pencil" test. The second group consists of 2,000 students from 10 public and private universities. The ITL of this second group is assessed through the measurement tool, "a paper-and-pencil test", developed for this study. Two hundred students from each university will complete the test, 60 students who major in science and 140 students who major in fields other than science. In this second group, non-science majors, 60 are majoring in liberal arts and philosophy and the remaining 80 in business administration, political science, and economics.

4.2 Measurement

The research methodology consists of four steps: (1) a survey of Thai business organizations; (2) forming the ITL framework; (3) developing a measurement tool; and (4) measuring the ITL of Thai graduates.

Step1: A survey of Thai business organizations

This step assessed the ITL requirements of Thai business organizations for job applicants. The participants were HR managers of the fifty selected business organizations listed on the SET. The questionnaire sent to the HR managers consists of 97 questions categorized into three components: fundamental knowledge, skills, and applications. It was designed by the nine researchers who conducted this research and was based on the literature review of past local and international research on ITL. Of the total 97 questions, 40 related to fundamental knowledge, 49 related to skills, and 8 related to applications. Participants responded by choosing one of four choices for each question. Each choice indicates the extent to which the item is essential to the ITL required for new employees in the company. The four choices are: essential, somewhat essential, not essential, and not sure. Table 1 details the major topics of ITL covered in the questionnaire.

The questionnaire was pre-tested by 10 HR managers who were studying in the Master's Program in Human Resource Development (HRD) at the National Institute of Development Administration (NIDA). After this pre-test, the questionnaire was sent to the selected 50 companies.

Step 2: Forming the ITL framework

The responses to the questionnaire provided by HR managers of fifty Thai business organizations were used as a basis for developing a measurement tool for assessing the ITL of Thai graduates. If more than 50 per cent of responses were either essential or somewhat essential, the item was included in the measurement tool. If more than 50 per cent of responses were either not essential or not sure, the item was not included in the measurement tool. Of the total 97 questions in the questionnaire, seven were deleted based on the criteria described above. The remaining 90 items were reviewed again by the research advisors to decide whether those items were appropriate for ITL measurement (see Table 1).

This paper reports the research findings up to this step.

Step 3: Building a measurement tool

After items from the questionnaire were selected and validated as described above, they were re-written in question form; each question having four possible responses. These questions are then used in a "paper-and-pencil" test for evaluating the ITL of Thai graduates. The purpose of building a test in paper form is because the

research has its objective to find a measuring tool that is valid, practical, and also cost-and-time saving. There are 90 questions divided into three components: 33 in fundamental knowledge, 49 in skills, and 8 in applications. For the fundamental knowledge and applications components, assessment of ITL through questionnaire appears adequate. However, the research team has reservations about the adequacy of the paper test format for measuring skills.

To validate the skills part of the ITL measurement tool, a group of 120 students from one private and two public universities will be evaluated through both their responses to the paper-and-pencil test, and through actual use of the skills on a computer. The results of these two tests will then be compared by the Chi-square and paired t-test statistical methods. If no significant differences between the two tests are discovered, the questions in the paper test will be considered appropriate for measuring ITL skills of the complete sample (2,000 students) and there would be no need for a practical test on a computer. However, if statistically significant differences between the two tests are found, the questions in the paper test will need to be adjusted and validated until the two tests provide equal measurements of ITL.

This report does not include information on the second part of the research which is being carried out in three universities at the time this report was written. The results of the second part will be reported later along with the research findings of the whole project.

Step 4: Measuring the ITL of Thai graduates

This step will be conducted after it is confirmed that the questions in all three components of the paper test are appropriate for measuring the ITL of Thai graduates. The research findings in this step will be compared to the results obtained from the questionnaire sent to HR managers. Comparisons will be made according to the topics shown in Table 1. Particularly important for this research would be discrepancies between what employers, as represented by the HR managers, feel are essential but in which Thai graduates perform poorly. These items can be used as benchmarks for improving the current curriculum in Thai universities.

5. Research Findings

This paper reports the research findings of the first two steps of the research: a survey of Thai business organizations; and forming the ITL framework. Table 1 summarizes (a) the major topics of each of the three components of the measurement tool, (b) the questions in the questionnaire sent to HR managers, and (c) the questions that will be used as a basis for building the ITL measurement tool. Seven questions from the fundamental knowledge section were deleted because, as earlier described in Step 2, at least 50 percent of the responses from HR managers where “not essential” or “not sure” to the ITL required for job candidates. The number of questions in the two other components of the ITL measurement tool remain unchanged.

Table 1: Results of survey regarding the ITL required for job candidates by Thai business organizations

Item	Major topics	Number of questions	
		A questionnaire to HR managers	A measurement tool
Section I: Fundamental knowledge		40	33
1	Computer	2	2
2	Components of computer systems	2	1
3	Functions of computer components	10	6
4	Computer system operations	2	1
5	Computers available in the market	2	2
6	Management of computer performance	8	8
7	Software	8	7
8	Communication systems and computer network	6	6
Section II: Skills		49	49
1	Use of basic equipment	3	3
2	Use of peripherals	4	4
3	File fundamental management	8	8
4	Applications of trouble-shooting strategies in solving hardware and	4	4

Item	Major topics	Number of questions	
		A questionnaire to HR managers	A measurement tool
	software problems		
5	Use of word processing	7	7
6	Use of spreadsheets	6	6
7	Use of power-point	7	7
8	Use of E-mail	6	6
9	Use of the Internet	4	4
Section III: Applications		8	8
1	Use of IT in daily life	1	1
2	Use of IT in various job assignments	1	1
3	Use of IT in professional area	1	1
4	Use of multimedia and computer	1	1
5	Keeping pace with IT advancement	1	1
6	Ability to analyze the impact of IT use	1	1
7	Ability to make risk analysis of computer crime	1	1
8	Being ethical in IT use	1	1
		97	90

6. Conclusions

The findings of the first part of this research show every item in the skills and applications parts of ITL measurement was identified by the business organizations as essential or somewhat essential to ITL. The findings may indicate the increasing importance for Thai graduates to be efficient in having their skills and applications of ITL. Furthermore, the findings may reflect the implications that even though individual countries have unique characteristics, data on ITL obtained from studies in some countries can be applied in ITL studies in other countries as well. The ITL measurement tool in this research is based on a combination of: (a) the findings of ITL researches

conducted in countries outside Thailand, and (b) the experience in IT and ITL research in Thailand of the research team. The majority of the items in the questionnaire to HR managers prepared by the researchers for assessing the ITL requirement of Thai business organizations, 90 out of the total 97 were retained. This may be because IT is a subject of universal relevance. In order for the technology to be effective, it must be compatible and applicable worldwide. Therefore, the findings of the second part of this research may be useful for further ITL researches, both locally and internationally. The second part of this research will cover the development of a measurement tool and the ITL measurement of Thai graduates. The tool will be in paper-and-pencil form. If this tool is appropriate for measuring the ITL of Thai graduates, the findings should be a practical means for ITL measurement. It would save on both time and cost. Moreover, the research findings could be valuable for Thai universities which want to improve their curriculum and make their courses more effective in meeting society's needs. The second part of this research should be completed in September 2005.

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(Titles listed in square brackets [] were published in the Thai language; the titles provided are English translations.)

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