

Expectations and Influencing Factors of IS Graduates and Education in Thailand: A Perspective of the Students, Academics and Business Community

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Abstract

As academic we have always been entrusted with developing the knowledge, skills, and capability of our IS students. In the strive for excellence in education, there is always the question of what has been implemented is appropriate and finally achieves its ultimate goals of delivering quality, capable and intellectual students as workforce for the business. To this end, this exploratory research tries to discover what knowledge, skills and capability are expected of an IS graduate, the facilities expected to develop these qualities and what influencing factors make the students go for an IS education. The research will be based on the perspectives of the student, academic and business community. The major findings highlight the overall tendency of higher mean expectation of the business community in most of the fundamental expectations of the type of knowledge, skills and capability and the facilities essential to the development of these attributes. The academics are normally supportive of the business community's perspectives except in the dimensions of skill expectation and attitudinal factors. Overall, it also appears that the students show a lower average means on most attributes as compared to the academics and business community. Based on this research, there appears to be distinctive expectations of an IS graduate. Based on the balanced technology approach of looking at the development of the IS graduate from degree of sophistication of the Technoware (T), Humaware (H), Inforware (I) and Orgaware (O), it is hoped that the following can be achieved: 1. A newly revised and revamped IS curriculum, 2. A linkage of the THIO to develop the IS graduate and 3. A linkage of the academia-industry THIO linkage to develop the IS graduate.

Key words: IS Education, Knowledge Expectation, Skill Expectation and Capabilities Expectation.

PART I: INTRODUCTION

1.1 Background of Study

The revolution that Thailand is experiencing has occurred largely during the past 35 years from agricultural based society to industrial era and the eventual transition towards the new millennium - the Information Revolution. In the face of intense competition and other business pressures on organizations in 1990s, quality initiatives and continuous, incremental process improvement, though still essential, will no longer suffice. Today, firms must seek not fractional, but multiplicative levels of improvement with countless opportunities and

challenges for millions of individuals. In particular, the challenges to managers responsible for introducing information-based technology have been exceptionally high.

The concept of computerization has advanced tremendously in terms of hardware, software and people-ware, which has evolved significantly to sophisticated Information Technology ("IT"). The application of information technology as a strategic competitive lever is based on the premise of attaining maximum information utilization as an enabling tool to create value and differentiating factors for superior advantage over competitors. [Benjamin et. al (1984), McFarlan (1984), Parson (1983), Porter et. al (1985), Cecil et. al (1990), Jackson (1989)]. Effective use of computers in business today is therefore an evolving art, not a science. The formula that worked for businesses yesterday might not be so effective today - and could succumb to demise by tomorrow.

Many individuals entering the workplace today have directly experienced this technological phenomenon. Employees completing their careers have seen the whole spectrum of events unfold during their lifetimes. For many people, information technology has been a complicating factor, perhaps something

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to be feared, or at least to be viewed with apprehension. For others, the growth of information technology has been an unmitigated blessing. The technology was a major part of their formal education; it forms the basis of their employment. It is a platform on which their future depends. For nearly everyone, it has brought change.

The National Economic Development Plan 8 has therefore embraced the direction to tune up the undeniably attention on IT personnel development in the contemporary educational system in Thailand. This aim to lay down the human-ware foundation for the future economic development as well as to capture the appreciation of impact information technology and the transitioning revolution will have on Thailand.

1.2 Problem Statement

As Thailand moves forward into the next century with fluid business environment that is changing dynamically, the entire economy calls for the imperative of recognizing the important role of information technology to keep pace with the new millennium revolution. This rapid pace has meant an unprecedented growth of job opportunities, fueled by an ever increasing need for skilled IT managers, which is driven by the growth of computer applications such as decision support systems, expert systems, computer-aided design, computer aided manufacturing and information based business process.

IT managers must anticipate these changes to prepare executives in the firm with their technological vision in formulating corporate strategies and future structural changes. To this end, it is indisputable that opportunities for skilled IT managers are bright. Therefore, it is important to systematize pertinent "Information Technology" curriculum course to prepare the profession for future challenges, which forms the major thrust of this research to understand the knowledge, skills, capability expected of an IS graduate and the influencing factors that could encourage IS education.

The problem statement of this research is thus to understand the requisite expectation of knowledge expectations, skill expectations, capability expectation of an IS graduate and the facilities expectation that can contribute to the development of an IS graduate. The other aspect is to identify the influencing factors in terms of interest, attitudes and value that can contribute in influencing a person to pursue an IS education. Based on the understanding of the findings, it is hoped that a better IS education plan can be developed to equip the potential IS students with the knowledge, skills and capability as expected by the students, academic and the business community.

PART II: LITERATURE REVIEW

Introduction

For IT professionals to be successful within their organizations, they must not only be prepared to cope with business issues as they arise; they must also take a leadership position in formulating and shaping them (SriSa-an, 1985). Their vision of future technology is valuable in enabling the firm to anticipate future readjustments to gain competitive advantage over the competitors and market place. Their vision must be presented to inspire the executive team with a realistic and practical view of IT future. This is essential for providing the CEO and others with information upon which expectations can be built.

As the research objective is to determine these knowledge, skills and capabilities expectations of an IS graduate held by business firms, students and academics in Bangkok (Melone, 1990), some of the relevant literatures are reviewed to establish a conceptual framework of this study.

2.2 Dimensions for IT Education Expectation

2.2.1 Knowledge Expectation

Knowledge is an integrated collection of facts and relationships which, when exercised, produces component performance (Rosenberg, 1976). It is having familiarity with language, concepts, procedures, rules, ideas, abstracts, places, customers, and associations, coupled with an ability to use these notions effectively in modeling different aspects of the world. These knowledge notions can be translated into functional units in a variety of ways, which can be categorized into five sub-sets of knowledge expectations:

General business knowledge - in terms of fundamental knowledge in various business functions of organization platform including general management, marketing, accounting, finance, product development, manufacturing, service, sales and administration.

General technical knowledge - the fundamental knowledge in the analysis and design of computer system hardware and software for maximum effective information technology utilization.

Specialized business knowledge - the expertise knowledge in various business functions of organization platform including general management, marketing, accounting, finance, product development, manufacturing, service, sales and administration.

Specialized technical knowledge - the expertise knowledge set in computer science or IT studies such as software and

hardware engineering, advanced IT applications, system programming and architecture.

Inter-discrepancy knowledge- the psychology and sociology of information system that is crucial for system design and implementation.

2.2.2 Skill Expectation

For an organization to be successful in the competitive area, success in the utilization of technology at the individual and the organizational level, an assortment of skills critical to such success must be developed. Therefore, it is imperative to identify the skills that an IS graduate should be identified and equipped with. The skill expectation in this research is derived from sources aimed at defining a comprehensive set as below:

(a) Foundation Skills

According to Roblyer, M.D in "Integration of education technology into teaching", 1997, Prentice Hall, foundation skills is classified as follows:

- Basic skill - Reading, writing, arithmetic and mathematics speaking, and listening capabilities.
- Thinking skills - The ability to learn, reason, think creatively, make decisions and solve problems.
- Personal qualities - Individual responsibility, self-esteem and self-management, sociability and integrity.

(b) Managerial Skill

According to Boone and Kurtz in "Contemporary Business" 8th edition (1996), managerial skill can be classified as follows:

- *Technical skills* - refer to the ability to understand and use techniques, knowledge, and tools of a specific discipline or department.
- *Human relationship skills* - refer to the ability to work effectively with and through people, communicating, leading and motivating workers to accomplish assigned activities.
- *Conceptual Skills* - refer to the ability to view the organization as a unified whole and to understand how each part relates to other parts.

2.2.3 Facility Expectation

(a) Technology facilities

According to Milone M. (1989), in "How to decide which is the best classroom computer Learning", 10(1), page 34-43, facility expectation is classified as follows:

- Stand-alone computer in class room (for tutoring and drills: whole class pair or small work group)
- Classroom workstation (for tutoring and drills; whole class demonstration; promote productive tasks for cooperative learning group and group interaction between student and teacher)
- General-use computer center open to all to student groups
- Library (extensive reading and research material)
- Multi-media laboratories
- Computer laboratory (for programming courses; vocational courses (CAD/Robotics); multi-media production courses and activities)

(b) Other facilities-include Internet access facility

2.2.4 Capability Expectation

Based on the researches by Kim (1980 and 1998), TDRI (1989), and Sharif, N. (1995) capability expectation can be comprehensively classified as follows:

- *Capable of using available technology* - to monitor changes and improve operation
- *Capable of using technology in marketing perspective* - to improve the market driven aspects (distributing, selling, servicing) to increase customer convenience and utility.
- *Capable of using technology to continuously improve the activities* - to incorporate the technology component with all activities of the organization to carry out incremental improvement.
- *Capable of using technology in product development aspects* - to improve the product development processes in product design, product modification and the creation of new product.
- *Capable of acquiring technology* - to prepare for upgrade of the existing system.
- *Capable of pursuing technology* - to carry out research and development for product and process innovation in order to compete in the face of rapid technological changes.

2.2.5 Interest Factors

Walton (1990) defined the interest attributes that can influence a person to take up certain area of study can be classified as:

- Personal preference
- Previous experience
- Growing role of IS
- Previous schooling
- Family & Relatives counseling
- Employment requirement from business community

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2.2.6 Attitude Factors

To develop certain attitudinal factors on the learning environment that can influence education, Ephraim et. al (1996), Chaiken and Stangor (1987), Milar and Milar (1990) and Oskamp (1997), these attributes can be classified as:

- Positive feeling toward instructor
- Conducive classroom environment
- Availability of educational facility
- Accessibility of educational facility
- Structure of course outline
- Positive feeling toward university & educational institution
- Positive feeling toward career in IS
- Importance of IS role in real life

2.2.7 Value Factors

As students must join the workforce, factors that can influence the rationale of taking up a specific area of study for the preparation of a career in certain profession, Loh et. al. (1995) highlighted some of these value attributes as:

- Monetary value (salary) and monetary benefits
- Career opportunity
- Career stability
- Acceptance in social community
- Respect in social community
- Self-fulfillment

All of the above forms the basic attributes to be determined under the 2 major dimensions of expectations and influencing factors relevant to the IS graduate. These basic attributes will form the major research variables in the research framework discussed in Fig. 3.1.

PART III: RESEARCH FRAMEWORK

3.1 Theoretical Model of Study

In this research, the 2 major dimensions to be measured are the expectation attributes of the knowledge, skills and capability that one would expect an IS graduate to be identified and equipped with. The facility expectation attribute looks at the facilities that an academic institution is expected to have in place as they form the main vehicle in the development of the above 3 mentioned attributes.

Another dimension of interest is to look at the factors that serves as key influencing agents of a student in taking up IS education whether it is in a specialized or generalized area. The major attributes are the interest that an IS student has in IS education and the value that can serve as motivators of derived gains from pursuing an IS career based on their interest. The other attribute is the type of personal qualities that an IS

graduate should have in developing a good IS system as just looking at the interest and value motivators attributes might not suffice.

The basic rationale of developing a good product or service is to design it based on the input parameters of the needs and requirements of the customer. This is done in the belief that in a market oriented economy, the customers knows best what they need to appease their requirements and ultimately derive satisfaction from the product or process. The same rationale is applied in this research in that a good comprehensive IS curriculum should be developed based on these input parameters from those stakeholders. The stakeholders in this research are represented by the perspectives of the:

- Students (who are the direct consumer of the IS education) as they represent the future workforce to develop an IS system. As such, developing and understanding a profile of the students is necessary,
- Academics (who are the medium of the source of knowledge, skills and capability development of an IS graduate) as the teachers and mentors of the future workforce and do assume a lead role in knowing the constituents of appropriateness of certain curriculum, and
- Business community (who are the potential and future employer of the human resource) as their experience with past performance in the organization and industry context and content which do need certain qualities that could be overlooked and can serve as important areas to be developed.

As such, the rationale behind this research framework is that a balanced approach in understanding the profile of an IS graduate based on the perspectives of the students, academics and business community is an imperative for the development of an appropriate IS curriculum. These perspectives will serve as the input parameters to review, revise and revamp the existing IS curriculum to develop the IS graduate of the new millennium.

Based on this framework (Fig. 3.1) the 7 major research questions can be construed as:

- “Do you expect an IS graduate to have the following knowledge?”
- “Do you expect an IS graduate to have the following skills to develop a good information system?”
- “Do you expect that the following facilities can contribute to the educational development of an IS graduate?”
- “Do you expect that an IS graduate to have the following capabilities?”
- “Do you agree that each of the following factors can influence your interest in pursuing an IS education?”
- Do you agree that your attitudes towards the following factors can influence IS study?”

- Do you agree that each of the following factors act as motivators in your IS study?"

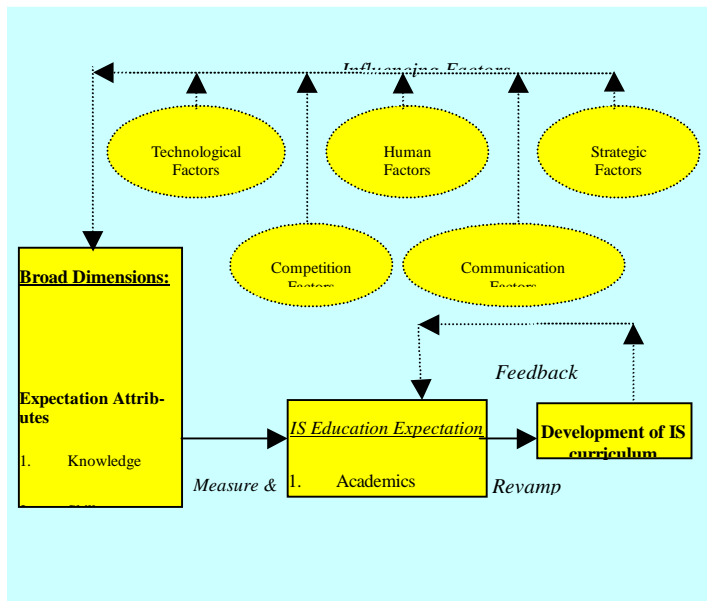


Figure 3.1 Conceptual Framework of Different Dimension of Expectations and Influencing Factors of the IS Graduate for IS Education Curriculum Course Planning.

PART IV: RESEARCH METHODOLOGY

4.1 Research Design

Based on the above research framework, the study consists of three major phases with the purposes of each phase as follows:

Phase I : Field survey for Students at 7 public and 4 private universities in Bangkok to study from the chosen variables as depicted in Literature Framework. A total of 400 questionnaires were distributed and the response rate was 58%.

Population : (i) Graduate students with a specialized computer information degree in Engineering, Computer Information System and Computer Science.

(ii) Graduate students with general business degree.

(iii) Undergraduate students with a specialized computer information degree in Engineering, Computer Information System and Computer Science.

(iv) undergraduate students with general business degree

Phase II : A Field Survey for 400 Academics at selected public and private universities in Bangkok to be studied and 204 responded.

Population : (i) Instructors with Bachelor or Master or Doctorate degree in Information Technology and has experienced in teaching Information Technology course (ii) Instructors without Bachelor or Master or Doctorate degree in Information Technology and has no experienced in teaching Information Technology course

Phase III: Field survey for Business Firms from four major type of organizations being (a) financial institutions, (b) manufacturing based firms, (c) engineering firms and (d) retail businesses. The total who responded was 300.

Population: (i) Employees in the four business organizations at officer level;

(ii) Employees in the four business organizations at middle management level;

(iii) Employees in the four business organizations at top management level.

4.2 Sampling Method and Frame

A simple random sampling method was used to select the instructors and students who are in the general and specialized field of education in the academic institutions that have IT or IS education programs at the graduate level. In the field survey, 3 teams were set up to approach the respondents directly based on the availability of the respondents as it was during the term break. For the business community, they were stratified into the above-mentioned classification of the type of business. The students who were trained in the distribution of the questionnaires will approach the respondent to seek cooperation and whenever possible to complete the questionnaires on the spot.

PART V: DISCUSSION OF FINDINGS

5.1 General Discussion

In Table 5.1, it can be seen that the business community has a higher expectations of the knowledge, skill, facilities and capability of the IS graduate as compared to the students' and academics' as their overall means of 3.76, 4.13, 4.14 and 4.05 are higher in all aspects. It is also interesting to note that the academics have higher expectations on the above except for knowledge expectation but there is minimal difference.

This could be implied that the business community has a higher expectation of the type of knowledge, skills and capability and the facilities that is needed to develop the above than the academic or the students themselves. This does highlight the importance of the role the academics and the curriculum or the mode and means of instructions that fulfils the high expectations of the business community as the future and potential employers of the students.

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Table 5.1 Means of the general expectation of an IS graduate

Expectation	Students	Academics	Business firms
Knowledge Expectation	3.37	3.54	3.76
Skill Expectation	3.76	4.08	4.13
Capability Expectation	3.76	3.73	4.05
Facilities Expectation	3.88	4.04	4.14

This does raise the fundamental question as to whether the existing IS education system and practices delivers and lives up to the delivery on the expectations of the business community. This calls for a review and revision to streamline the existing practices to deliver on the specific knowledge, skills and capability as discussed in the following section.

5.2 Discussion of the attributes of the Expectation dimension

a. Knowledge Expectation Attribute

Table 5.2 Means of Attributes of the Knowledge Expectation Dimension

Expectations	Students		Academic		Business Firms	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
General Business Knowledge	3.33	0.83	3.67	0.79	3.63	0.79
General Technical Knowledge	3.79	0.91	3.95	0.73	4.09	0.76
Specialized Business Knowledge	3.09	0.91	3.24	0.92	3.48	0.88
Specialized Technical Knowledge	3.60	0.90	3.66	0.87	3.95	0.93
Interdisciplinary Knowledge	3.05	0.91	3.18	0.92	3.67	0.88
	3.37		3.54		3.76	

In terms of the type of knowledge expectation in the general business (GBK), general technical (GTK), specialized business (SBK), specialized technical (STK) and interdisciplinary knowledge (IDK), it is not surprising that the business com-

munity's expectation in all of the knowledge area have higher means in all aspects. This could be implied that the business community does expect an IS graduate to be equipped in all these knowledge area especially GTK and STK which underlies the technical knowledge that an IS graduate should be equipped with as IS is deemed to be a technical subject area.

The expectation that an IS graduate should excel in technical subject area is also supported by the fact that the means in the GTK and STK of the students and academic as they also placed a higher expectation in these two areas rather than business knowledge. This could be consistent with the traditional perception that IS is a pure technical subject area and should not relate with the business area.

It is thus not surprising to learn that for all three groups the business knowledge and the inter-disciplinary knowledge is still ignored based on the traditional perspective of IS being a technical subject area, and IS graduates need to be trained only in the technical knowledge. Under such a circumstance, it is not surprising that the IS function in Thailand is still relegated to being a support and staff unit. This could highlight a future potential problem as the issue of using IT as the enabler to achieve the business strategies and to leverage IT for competitive advantage to be relegated to secondary support role.

b. Skill Expectation Attribute

Table 5.3 Means of Attributes of the Skills Expectation Dimension

Expectation	Students	Academics	Business firms
Basic Skills	3.53	3.90	4.01
Thinking Skills	3.91	4.12	4.28
Personal Qualities	3.74	4.08	4.02
Conceptual Skills	3.84	4.21	4.20
	3.76	4.08	4.13

In terms of the four skills of basic skills (BS), thinking skills (TS), personal qualities (PQ) and conceptual skills (CS), both the academic and the business community appears to have higher expectations. When compared with the academic, it appears that the business community has a higher expectation on the basic skills and thinking skills. The reverse can be said of the academic whereby they placed higher expectation on the personal qualities and conceptual skills. This could be implied that the business is more pragmatic in the expectation that an IS graduate should have the basic and thinking skills as being the more objective of the skills requirement as compared to the subjectivity of the personal qualities and conceptual skills. This could also be interpreted that the academics in

their role as teachers and mentors aim on developing the subjective skills to have good personal qualities and for the student to be creative. Both the academic and business community do agree that thinking skills and conceptual skills are highly desired of an IS graduate. This could imply the need for analytical and conceptualization of the fundamentals of the problem to be solved.

b.1 Attributes of Basic Skills

Table 5.4 Means of Attributes of the Basic Skills Expectation

Basic Skills	Students		Academic		Business Firms	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Reading Skills	3.68	0.82	4.06	0.64	4.02	0.74
Writing Skills	3.51	0.81	3.98	0.69	4.03	1.84
Speaking Skills	3.40	0.85	3.87	0.71	3.83	0.85
Listening Skills	3.50	0.88	4.01	0.65	4.04	0.79
Mathematics Skills	3.57	0.89	3.59	0.83	4.06	0.91
	3.53		3.90		3.99	

For an IS graduate, the business community again does place higher expectation on most of the basic skills re-affirming their higher expectation level from the employers' perspective. The 3 groups do agree that reading skills is slightly more important than the other skills. This could imply that the nature of the job does require a degree of reading of the inforware part of the system components (manuals and standard operating procedures, software, etc). It is not surprising that both the business firms and academics place importance on the listening skills as this highlights the value of being a good listener which is important in the determination of the needs and requirements and specifications when communicating with the users. This represents the business aspects of the system to be designed for leveraging it as a competitive enabler. It is also not surprising to see that the students as a whole place minimal expectations to the development of these basic skills as they still do not see the relevance of these basic skills critical to the design of a good and successful system.

b.2 Attributes of Thinking Skills

On the thinking skills, it also appears that the business community places the highest emphasis on all aspects of the thinking skills. This could be implied that the business community, in their role as future employer, expects an IS graduate to be

Table 5.5 Means of Attributes of the Thinking Skills Expectation

Thinking Skills	Students		Academic		Business Firms	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Learning Skills	3.85	0.75	4.20	0.64	4.25	0.65
Reasoning Skills	3.89	0.86	4.12	0.72	4.21	0.69
Creative Skills	3.96	0.82	4.01	0.77	4.34	0.76
Decisional Skills	3.88	0.78	3.98	0.79	4.20	0.73
Problem Solving Skills	3.96	0.85	4.27	0.69	4.39	0.69
	3.91		4.12		4.28	

capable of having a rational and creative approach in their decisional and problem solving responsibilities in the organizational context based on the skills in learning of the factors contributing to the decisional and problem solving situation.

On the overall, the academics do appear to support the business community in all of the thinking skill aspects with the exception of decisional. This could be attributed to the fact that the academics do not perceive the importance of the contribution of the IS graduates in decisional roles as most of the decisions are made by parties other than the IS people themselves. This is also most probably the view of the business community also when they gave the decisional skills aspect the lowest means as compared to the other aspects.

Regardless of what, it appears that of the four major skill category, the most important emphasis is still on the thinking skills. This can be implied that the business community do expect that a potential and future employee should develop and refine their skills logically and rationally to support the organization in problem solving.

b.3 Attributes of Personal Qualities

This set of personal qualities highlights the type of individual qualities of an IS graduate that are expected to be important to the developing of a good information system. It appears that both the business community and the academic are of similar opinion that personal qualities of the IS graduate is important. They do see eye to eye that the IS graduate integrity, individual responsibility and self-management are to a certain extent a highly expected quality as compared to the other two qualities of self-esteem and sociability.

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Table 5.6 Means of Attributes of the Personal Qualities Expectation

Personal Qualities	Students		Academic		Business Firms	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Individual Responsibility	3.89	0.77	4.21	0.72	4.17	0.77
Self-esteem	3.63	0.75	3.77	0.67	3.81	0.75
Self-Management	3.72	0.75	4.05	0.68	4.01	0.81
Sociability	3.67	0.83	3.97	0.72	3.76	0.88
Integrity	3.77	0.90	4.22	0.71	4.38	3.33
	3.74		4.04		4.03	

Table 5.7 Means of Attributes of the Managerial Skills Expectation

Managerial Skills	Students		Academic		Business Firms	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Technical Skills	3.79	0.68	4.15	0.64	4.25	0.72
Human Relation Skills	3.88	0.70	4.03	0.72	4.01	0.71
Info. Acquisition Skills	3.77	0.67	4.21	0.69	4.16	0.68
Analytical Skills	3.89	0.67	4.16	0.66	4.26	0.67
Interpretation Skills	3.87	0.71	4.25	0.70	4.17	0.75
	3.84		4.21		4.20	

This could imply that an IS graduate should be responsible in managing their own work performance and the system to be designed with minimal supervision or guidance and also to ensure that the system designed is not biased towards any major claimants groups. This could also imply that they are responsible for developing an IS that can fully be leveraged as a competitive enabler which can be used by the people in the organization.

Personal qualities like self-esteem and sociability are relegated to lower positions by the academic and business community which could imply that the success of the system is a

Table 5.8 Means of Attributes of the Capability Expectation Dimension

Expectations	Students		Academic		Business Firms	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
	3.79	0.80	3.96	0.65	4.15	0.71
Capable of using technology to improve the market driven aspects to increase customer convenience and utility	3.68	0.81	3.66	0.74	4.04	0.70
Capable of continuously improving and incorporating the technology component with all activities of the organization	3.74	0.84	3.69	0.78	4.11	0.71
Capable of using technology to improve the product development	3.73	0.87	3.62	0.79	3.95	0.75
Capable of acquiring and preparing specification for upgrading to existing system	3.74	0.84	3.69	0.82	4.05	0.69
Capable of using technology to carry out research and development for product and process innovation in order to compete	3.85	0.89	3.74	0.86	4.01	0.73
	3.76		3.73		4.05	

team responsibility and not an individual event whereby the individual unnecessarily holds high regards on himself or herself. It can also be implied that the work environment is not a place for socializing but to main civil etiquette is part and parcel of social etiquette.

b.4 Attributes of Managerial Skills

In terms of managerial skills, the business community and the academic again do agree that managerial skills are highly expected of an IS graduate. In terms of the importance given to

Table 5.9 Means of Attributes of the Facilities Expectation

Expectations	Students		Academic		Business Firms	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Stand-alone Computer	3.67	0.97	3.96	0.77	3.99	0.89
Classroom Work-station	3.84	0.87	3.98	0.72	4.13	0.73
General Use Computer Center	3.87	0.85	4.01	0.77	4.11	0.83
Library	3.83	0.91	4.28	0.77	4.25	0.83
Multi-Media Laboratory	3.87	0.96	3.79	0.81	4.02	0.82
Computer Laboratory	3.89	0.93	3.96	0.85	4.22	0.91
Internet Access	4.20	0.92	4.31	0.70	4.26	0.84
	3.88		4.04		4.14	

these managerial skills, the business community places higher expectations on the technical and analytical skills rather than the academics' expectations of information acquisition and interpretation skills. This could imply that the business community expects an IS graduate to have the analytical and technical skills to determine the needs and requirements and specifications of the users to be able to apply their technical skills to develop a good information system. On the other hand, it can be implied that the academic expect the IS graduate to be skilled in the acquisition and interpretation of the reliable and relevant information that are deemed necessary in the development of a good IS to be used by the users based on their needs, requirements and specifications.

c. Capability Expectation Attribute

In terms of the capability expectation it appears that the business community again placed the highest expectation in the development of all the different levels of capability of an IS graduate as compared to the academics and the students. It is not surprising that all of the 3 groups agree that the IS graduate should have the minimum Level 1 (L1) capability in using available technology to monitor changes and improve operation which constitutes the most basic utilization capability.

This could be implied that all groups agree that the L1 capability is the minimum capability that must be attained. In terms of other capabilities, there is little consensus as to what other level of capabilities should be developed by an IS graduate. It can be implied that both the business community and the students placed a higher expectation on the develop-

Table 5.10 Means of Key Influencing Factors Dimension

Influencing Factors	Students	Academics	Business firms
Interest Attributes	3.57	3.51	3.72
Attitudinal Attributes	3.80	3.90	3.74
Value Attributes	3.81	3.76	3.90

ment of the L3 capability of incorporating the IT with the activities of the organization highlighting the need of process innovation and leveraging the IT to support its critical processes.

Both the students and the academic are of the view that the IS graduate should be able of using the IT to carry out research and development for product and process innovation in order to compete. This constitutes the highest level (L6) of the capability curve which is not that highly expected by the business community.

c. Facility Expectation Attribute

As expected, it appears that the business community placed the highest expectation on most types of facilities that are critical to the development of the knowledge, skills and capability of the IS graduates. It appears that both the business community and the academic placed the highest expectation of the traditional library facilities as the foundation of the knowledge, skills and capabilities development. This is followed by the general use computer center. This could imply that the classes should be conducted in a practical environment rather than the traditional classroom environment whereby it could be difficult to illustrate the practical aspect of the IS education, skills and capabilities development process.

Another crucial difference is that all groups placed lower expectation on the use of stand-alone computers as compared to the computer laboratory and the general use computer center. This could be implied that the learning process could be enhanced through group learning in a conducive environment rather than on individual or secluded learning.

It is surprising to note the unanimous agreement on the use of Internet access (with the highest means of 4.20, 4.31 and 4.26 for the students, academic and business community respectively) as one of the key facilities to develop the knowledge, skills and capability expectation. This could imply and highlight the need for the IS graduate to expand their horizon for the search for knowledge through their access to worldwide resources rather than on the traditional and local library delimited by the organizational and regional boundaries.

Table 5.11 Means of Attributes of Interest Factors

Expectations	Students		Academic		Business Firms	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Your Preference	3.96	0.85	3.95	0.80	4.00	0.81
Previous Experience	3.51	0.87	3.62	0.76	3.78	0.78
Growing Role of IS	3.87	0.81	3.93	0.84	3.91	0.88
Previous Schooling	3.17	0.92	3.25	0.92	3.33	0.92
Family and Relative	3.06	0.90	2.76	1.03	3.31	0.99
Employment Requirement from Business Community	3.86	0.85	3.54	0.92	3.98	0.85
	3.57		3.51		3.72	

5.3 General discussion of the Influencing Factors

As compared to all the expectations attributes, it appears that the business community has overall higher means for expectations in terms of knowledge, skills, capabilities and facilities rather than on the key influencing factors of interest, attitude and value of IS graduates study. This applies for the students and the academics who placed higher emphasis on the attitudinal factors that can influence IS study especially for the students with the highest means of 3.80 of all the 7 major attributes except for the value attribute. In contrast to the students, the academic placed the attitudinal factor with a high means of 3.90 after the skill and facilities expectation of 4.08 and 4.04 with the business community placing a means of 3.74 after all the expectations attributes.

This could be implied that the students appear to feel strongly in terms of the attitudinal factors influencing IS study as compared to the academic and the business community. This is also supported by fact that the academic and business community also places high score on this attribute. This could further be implied that the feeling towards the instructors, course curriculum, educational institution, availability and accessibility to a conducive classroom environment and importance of IS in the real life are important influencers of IS study.

The business community does place a higher means on the influencing factors of value as the key influencers whereby the monetary and career aspects plays a high role as the main

Table 5.12 Means of Attributes of the Attitudinal Factors

Expectations	Students		Academic		Business Firms	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Positive feeling toward instructor	3.82	0.82	3.75	0.77	4.20	0.37
Conducive classroom environment	3.71	0.81	3.83	0.75	3.91	0.86
Availability of educational facility	3.85	0.83	4.07	0.72	4.18	0.79
Access of educational facility	3.78	0.88	4.08	0.75	4.12	0.82
Structure of course outline	3.72	0.88	4.02	0.83	1.07	0.83
Positive feeling toward university and educational institution	3.59	0.87	3.64	0.79	3.99	0.96
Positive feeling toward career in IS	3.90	0.82	3.82	0.87	4.23	0.87
Importance of IS role in real life	4.04	0.75	3.99	0.82	4.20	0.92
	3.80		3.90		3.74	

influencers. This could be implied that the business community places do view the importance on monetary and career factors in influencing IS study rather that attitudinal or interest attributes which is in contrast to the students’ and academics’ perspectives.

5.2 Discussion of the Attributes of the Influencing Factors:

a. Interest Factor

It appears that from the interest attribute as the key influencer towards pursuing an IS education, there is quite a consistent agreement by all the groups that do influence the choice of an IS education. These major factors are personal preference, growing role of IS in the normal and work life and employment requirement of the business community, all of which have consistently higher means than the other factors.

This could be implied that part of the interest attribute comes from the role and requirement of the pervasive influence of information technology in the life of a human being. This

Table 5.13 Means of Attributes of the Value Factor

Expectations	Students		Academic		Business Firms	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Monetary Value and Monetary Benefits	3.89	0.81	3.98	0.77	4.21	0.80
Career Opportunity	4.07	0.75	4.09	0.73	4.38	0.76
Career Stability	3.83	0.80	3.83	0.87	4.23	0.86
Acceptance in Social Community	3.66	0.81	3.56	0.82	3.86	0.92
Respect in Social Community	3.53	0.80	3.40	0.81	3.82	0.96
Self-fulfillment	3.88	0.86	3.72	0.81	4.12	0.86
	3.81		3.76		3.90	

does highlight the recognition that IS education regardless of being having general or specialized technical knowledge is part and parcel of the future of the human daily environment. This is also supported by the fact that the means of the general and specialized technical knowledge expectations also came out high.

b. Attitudinal Factors

From the attitudinal attribute, it appears that there are fewer consensus as to the type of attitude the IS graduate toward IS education between the academic and the other two groups. The academic places higher means on the availability and accessibility of educational facilities and structure of course out line. The students do agree with the academic that the availability and accessibility of educational facilities do contribute to the influencing IS study. In contrast, there is higher agreement between the students and the business community on the issue of the importance of IS role in real life and an IS career, and the feeling towards the instructor.

This could be implied that those who are directly involved in the IS education in itself place higher emphasis on the accessibility and availability of the educational facilities. As students, upon completion of their studies they have to join the main stream of employment, there does appear to be consistency between the employers and future employees that the role of IS in real life and the career opportunity are important influencers of attitudes towards IS study.

A not surprisingly outcome was the high means of 3.82 and 4.20 given by the students and the business community in recognizing that the feelings towards the instructors do have a potentially high influence on IS study. This factor is sidelined by the academics by downplaying the issue that the instructor place a very important role in the knowledge and skill development and that their performance as the mentors are important. This does confirm the traditional beliefs of the conservative and passive role of the students as recipients of knowledge and not questioning the fundamentals of knowledge in the learning environment.

c. Value Factors

From the value attributes, it appears that there is quite a unanimous consensus across the 3 groups that the monetary benefits and the career opportunity and stability represents the key motivators in taking up an IS education. This is evidenced by the higher means as assigned by all the 3 groups in these 3 major motivators. As to the other motivators of acceptance and respect in the social community and self-fulfillment, they are given lower means as key motivators.

This could be implied that the lower order of the Maslow's hierarchical needs are some of the key practical motivators for people to select a specific area of study rather than on the more ideal higher orders of acceptance, respect and self-fulfillment. The only exception is the higher mean of 4.12 of the business community which could imply that as the students venture into the work environment and are capable of relating their knowledge and skills to their work requirement, they lean towards the higher order needs to explain the motivating factors of taking up an IS education.

Conclusion

1. **Knowledge Expectation:** It can be concluded that the business community appears to be the group that has highest expectation in the majority of the 2 main dimensions of expectation and influencing factors. The rationale is that firms need human resource in terms of high quality people or worker to generate, interpret and utilize the information under the real life constraints. Based on the experience in hiring the IS graduates and in developing the organization's information systems, the firms appear to be in a better position to place a higher expectation of the profile of the IS graduate. The academics and students, due to their non-involvement or indirect involvement in the pragmatic issues of the real life business environment underline that their knowledge expectation being lower because they do not see the importance of IS/IT as much as firms do. For the students, rote memorization in the traditional and conservative

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learning environment has reinforced their perspectives of lower level of expectations.

2. **Skill Expectation:** Firms are more concerned with skill expectation among the three groups of respondents because they need people who already have the skills without giving them any training as these represents additional cost investment. Workers in the business firms should also possess basic skills, personal skills, personal qualities, and conceptual skills, but most of all they should have thinking skill, which is, considered the most important factor to the firms. In order to be supportive of thinking skill, workers should also possess learning, reasoning, creative, decision making, and problem solving skills. In other words, they should have the ability to gain understanding through case study or experience, to understand the relationship between cause and effect, to generate new ideas, to be analytical and be able to determine things or alternatives leading to solutions of the problem.
3. **Facilities Expectation:** Mostly, all the respondents groups are of the opinion that facilities place a very important role in the development of the knowledge and skills and capabilities of the IS graduate. The rationale could be the technical aspects of the IS study whereby practical and hands-on experience is important in the learning environment of a technical subject. This does explain the higher tendency of the facilities expectation. Firm scores again on this expectation as the highest factor among three respondent groups. As the firm deals directly with the business situation, the firm needs and has access on utilizing IT/IS facilities to support the processes of the organization. With the development of the institutional facilities, the potential workforce can go to work immediately without wasting any time in re-learning the facilities.
4. **Capability Expectation:** The success of an information system lies not in having the technology but in the utilization and leveraging of that resource for competitive advantage. In this expectation, all respondent groups highlighted the most basic level of the technology capability that is the utilization capability, the capability of using available technology to monitor changes and improve operation. The next level of capability of using is in using the IT equipment to improve and increase organization productivity. This is highlighted by the importance of the second important sub-variable that is the capabilities of continuously improving and incorporating the technology component with all activities of the organization to improve on product and process innovation.
5. **Interest:** As compared to the other expected and influencing factors, overall all the 3 groups place lower means of importance to the attributes of the interest factor. This can be construed that interest is plays a smaller role in influencing the students to take up the IS education.
6. **Attitude:** It appears that academic still maintain the conservative learning environment of the structure of course curriculum, accessibility and availability of educational resources and downplaying the active relational learning environment. In addition, the main objective of most universities is to effectively educate its students by concentrating on the theoretical content of IS that will be disseminated to the students so that those students could apply this knowledge to the real situation after graduating. Comparing the three groups of respondents, students and academic rank the "attitude" as the third important factor. In other words, firms give less important of "attitude expectation" because they are concerned more with the real work situation, which is the way to make profit. They do not worry much about the feeling toward instructors, the structure of education facilities, feeling toward universities and educational education institutions. From the firms' attitudes, they would care more about the positive feeling toward career in IS, and the importance of IS role in real life.
7. **Value:** Not surprisingly, the business community, students and academics places importance on the career opportunity and stability rather than monetary or self-fulfillment attributes as key motivators. This supports the traditional foundation of satisfaction of the lower hierarchical needs whereby the human seeks job stability.

PART VI: RECOMMENDATION

As information technology has be so pervasive in the Thai business environment to fully understand the role that information technology can play and affect the organization is very important. In Thailand, it is found that the most serious problem about information technology is dealing with human resource problem in utilizing the information technology- in both the quantitative and qualitative aspects.

As this research has indicated that the Skill expectation, Facility expectation, Attitude expectation, Value expectation, Capability expectation, Knowledge expectation, and Interest ex-

pectation are important when developing the IS graduate. Under such a circumstance, there are four major components which could be considered to develop the degree of sophistication of the technology which are – Technoware (T), Humanware (H), Inforware (I), and Orgaware (O).

Technoware encompasses all the physical equipment and facilities such as computers, library, multi-media equipment, Internet access and so on. From the research, it is the second most important factors that the groups agree plays a critical role in the development of the knowledge, skills and capabilities. Facility constitutes all mean of education a conducive learning environment in studying IS. Inadequacy of the facility and low degree of sophistication of the technoware can affect the development of these attributes.

Humanware is the degree of the sophistication of the human resource whereby the skill expectation or human abilities such as managerial skill, thinking skill, personal quality skill, and basic skill in the development, design and utilization of the system must be human focused (Davenport, 1984) and (Delone and McLean, 1992). From the research, this component is the first priority (important) factor that needs to be considered seriously by all strata of expertise as this form the foundation of the success of an organization operationally, tactically or strategically.

Inforware constitutes the software in the knowledge expectation whereby the dissemination and learning mechanism and system must be developed. This constitutes the form and format, modes and means of the instructions context and content. This serves as the software whereby the development of the skills and capability of the IS graduate are dependant on.

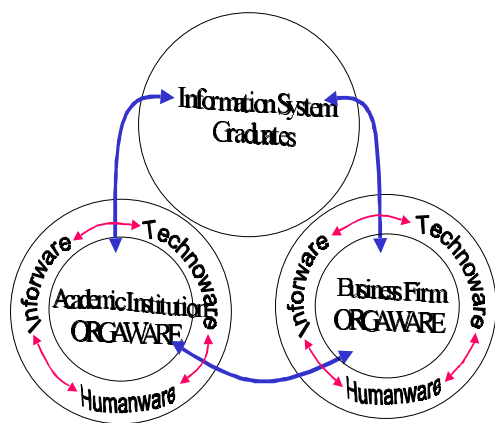


Figure 5.1: Academia-Business THIO linkages to support the development of IS education.

Orgaware constitute the organization structural and cultural environment in terms of its methodology, management techniques, value systems, standard operating procedures

etc.,(which are relevant from both the academic and the business institutions) to ensure a conducive learning environment to instill the double loop learning process in a learning organization [Argyris (1982), Senge (1990) and Garvin (1993)]. This orgaware aims at creating a learning environment whereby the academia-business linkage is set up to ensure cooperation in the development of the IS curriculum fine tuned based on the findings of this research to develop the knowledge, skills and capability development of the IS graduate of the millennium. This linkage could also support the facilities set up and the channel of smooth transition from the academic institution to the market place of the IS graduate.

Based on the balanced technology approach of looking at the development of the IS graduate from degree of sophistication of the technoware (T), humanware (H), inforware (I) and orgaware (O), it is hoped that the following can be achieved: 1. A newly revised and revamped IS curriculum, 2. A linkage of the THIO to develop the IS graduate and 3. A linkage of the academia-industry THIO linkage to develop the IS graduate

In conclusion, in recommending the use of the THIO framework as the basis of review and revision of the fundamentals of the IS education, it highlight the 4 major respective issues of the human and technology utilization in the organization for competitiveness. This in fact, has been the fundamental issue that through the decades has been looked at independent of each other. To fully develop the successful graduates and the successful utilization, the organization which serves as the foundation for the learning organization to develop the sophisticated human utilization of the inforware and technoware for competitive advantage must be established. This degree of the organization's sophistication of its THIO is also dependent on the linkage with the academia's THIO as the academia's THIO serves as the designer and developer of the knowledge, skills and capabilities to be utilized by the organization's THIO.

This highlights the fact that a successful IS education master plan is dependant on the linkage and the supportiveness of the academic-business THIO linkages. With this in mind, it is recommended that the above framework be used as a basic framework to determine the requirements of the IS education and the type of IS graduates that we expect to develop to lead the new organizations into the 21st century millennium.

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