

# OPPORTUNITIES OF VIRTUAL UNIVERSITIES IN THAILAND

by

Mr. Tinnakorn Sirithanaratanakul

A Final Report of the Three - Credit Course  
CE 6998 Project

Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Master of Science  
in Computer and Engineering Management  
Assumption University

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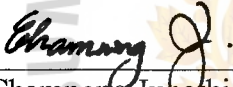
Project Advisor                 Dr. Chamnong Jungthirapanich

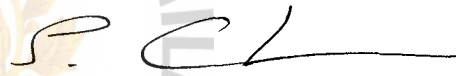
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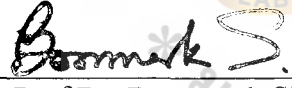
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The Graduate School of Assumption University has approved this final report of the three-credit course, CE 6998 PROJECT, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer and Engineering Management.

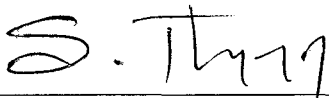
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## ABSTRACT

Virtual University is the new reformation of higher education by using "World Wide Web" (WWW) to provide a new opportunity for distance students to study via Internet technology. Ministry of University Affairs (MUA) established the center of distance university system called "UniNet" by using leased line cable.

The purpose of this project is to assess the possibility of higher education to create Virtual University via Internet in Bangkok, Thailand. The main subjects were UniNet and Ministry of University Affairs (MUA). The data were collected with the use of both primary (UniNet) and secondary sources (journals, textbooks, and web sites), including the questionnaire about Internet user profile of Thailand from NSTDA and NITC's book. It took 3 months to complete all data collection procedures. And using all related data to analyze the new model of university system for Thailand and explained the real situation, both past and present, in Thailand.

This project indicated that all master plans in Thailand were ready and interested to reform the education system, but still have problems in aspects of system structure and operation toward students. Finally, as I concluded all the things that we already created are not lost for reformation, but only thing that we make is the plan. Current situation of Thailand was collapsed after Thai Baht crisis until now like this, we must implement the plans because we already passed the phase of planning. So this reformation of higher education will help us make the possibility of concept "Plan to Do and Do as Planned". So, government must support one-time cost of high-speed unity networking and more budgets in any aspects of education sector, especially for higher education that will directly effect the development of the country.

## ACKNOWLEDGEMENTS

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I wish to express my sincere gratitude to my parents who supported my future in any aspects. I thank all my friends who blessed me.



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## I. INTRODUCTION

Nowadays, worldwide changing brings the new environment and technology into the unbounded world. Education must also find out the new way to create the higher quality and non-traditional way to satisfy the needs of the learner on demand and increase motivation of learner in any possible ways that they can, as other businesses want to stay competitive they need to find more effective and efficient ways to train and educate their workforces in the range of skills.

Education development provides a process and structure for systematic planning, developing, and adapting instruction based on learner's needs and content requirements. The American education systems were challenged with providing increased educational opportunities with minimized budgets. Many educational universities were solving this challenge by developing distance education.

Basically, distance education takes place when a teacher and students are separated by physical distance, and technology (audio, video, data, and print), often in concert with face-to-face communication, is used to bridge the educational gap. These types of projects can provide adults and workers with a second chance at a college education, reach those disadvantaged by limited time, distance or physical disability, and update the knowledge base of workers at their places of employment.

The best solution at present is the use of "Information Technology" (IT). We admit that IT is essential for development in any countries. It will constantly change equipment in an effort to keep pace with the newest technology that is the Internet.

Internet is the world's largest, most powerful computer network connecting personal computers (PC) around the world. It offers powerful teaching and learning tools that can reform the educational process in universities and demand a new set of skills from educators. This technology multiplies the power of modern computers by the

power of connectivity, creating as a result a potentially new approach to teaching, called "Virtual University", using "World Wide Web" (WWW) to provide an new opportunity for education via homepage of Internet including the courses, exercises, resource references, and communications.

Finally, traditional education will concern about changing to Virtual University in the next few years. Many nations tried to build the Virtual Universities to support the requirement of educators in the future. Thailand is the one country in the world that realized the importance of distance education ("UniNet" project in 1995) but limited budget in almost all projects after Thai Baht crisis since August 1997 has slowed the process. The Virtual University can solve this problem, one-time cost, progress to reach the global trend, and spread education out to all parts in Thailand.

This project will be an information and guideline to reform traditional education of higher education in Thailand to the Virtual University. Take a glance at Bangkok, and explain the real situation, both past and present, in Thailand. All information will help you to clearly understand about problems and opportunity to make Virtual University. After that, I will recommend about how to improve the possible way to successfully construct the Virtual University and suggestion of chances toward this new distance education for Bangkok, Thailand.

This project uses historical research (Gay and Diehl 1996) to collect data both primary sources (actual participants in Thailand) and secondary sources (reference international books) about projects, plans, and any available information related to higher education, and Internet in the past of Thailand (Chapter 2) for 3 months. Then, analyze all data to determine past and current situations of higher education in Thailand (Chapter 3) and briefly explain about how to use Internet toward Virtual University.

And in the last Chapter, I will show you the opportunity and benefit of creating Virtual University in Bangkok, Thailand with the suggestion to make it successful (Chapter 4).

### **1.1 Objectives**

The objectives of the study were to assess:

- (1) Guidelines for developing the Virtual University in Bangkok, Thailand.
- (2) Guidelines for improving main components involved with a Virtual University in Bangkok, Thailand.
- (3) To provide information for educators and all people who are interested in this project.

### **1.2 Statement of Problems**

Virtual University is the challenging way to improve education in Thailand, but it brings questions that we must answer.

If we feel that the Virtual University is the possible way in Thailand, what is the problem to create Virtual University in Bangkok, Thailand? This will concern with past and current situations to define problems and the weakness of Thailand's education that are found in the present. An opportunity is required to create Virtual University for success in Bangkok, Thailand.

### **1.3 Scope**

This project will only explain about problems and opportunities to create Virtual University in Bangkok for higher education that involved with the Ministry of University Affairs' plan and IT-2000 master plan of Thailand. And the resources of this project will only concern with aspects of Internet situations and Thailand's situations.



## **II. LITERATURE REVIEW**

### **2.1 History of Technology in Education**

The first step on the road to the electronic classroom was taken when the world's first electronic digital computer was developed by American electronics engineers in 1946. I.B.M. introduced its 700 line of giant computers for business, the military, and government in 1955. But computers were not within the budget or expertise of consumers until Apple Computer introduced the first personal computer in 1976. This achievement, in America's bicentennial year, started what has become known as the information revolution, which was advanced when I.B.M. followed with its own PCs five years later.

Ten of thousands of Americans began buying personal computers and by the end of 1983, 68 percent of junior and senior high schools and 53 percent of elementary schools had one or more computers. The majority of teachers who first employed computers in their curriculum were mathematics and science instructors. To a large degree, this remains true today, although teachers of music, art, history and the social sciences are steadily becoming more adaptable in incorporating computers and other information technology into their curriculum.

Television and video evolved at virtually the same time as the computer, to complement the information revolution. The first television sets were sold in 1945 with high price tags and small screens. The first consumer-priced video recorder, the Sony Betamax, was introduced in 1975, and soon after, the videocassette recorder (VCR) was introduced in the Video Home System (VHS) format. Together, television, video recorders, and computers interact in ways that have revolutionized information gathering and dissemination and their impact is being felt dramatically in classrooms.

Other technologies such as laser and CD-ROM disks that store amazing amounts of text and graphics, satellite and telecommunications, computer information networking, and the interactive and multimedia capabilities of these various technologies enhance the increasingly versatile uses of computers, television, and video recorders in education, science and medicine, business and industry, and entertainment. At the heart of the technology is the computer (Oleksy 1995).

## **2.2 History of International Virtual University**

The Internet began with America's response to the 1957 Launch of Sputnik. In order to further the nation's technological development, President Dwight D. Eisenhower created the Advance Research Projects Agency (ARPA) to surpass existing technology and conduct advanced and often high-risk research into futuristic technologies. Under the leadership of Dr. J. C. R. Licklider (Schrum and Berenfeld 1997).

This ARPA established the ARPAnet that connected various military and research sites in the early 1970s. One of its projects was to develop reliable networking capabilities. Some of the networking methods they developed had reliable networking capabilities. Some of the networking methods they developed include a protocol enabling dissimilar computer systems to communicate, and the development of methods for routing data through multiple communications paths using groups of data with their own destination addresses built in (packets). These new techniques became a standard (in computer terms, a protocol) known as TCP/IP (Transmission Control Protocol/Internet Protocol) which became the standard for the Internet.

Beginning in the late 1980s, the National Science Foundation (NSF) started expanding incrementally its own NSFNET, using the technology developed by ARPAnet. This was done primarily to allow campuses and research centers to use NSF's

supercomputers; but increasingly, the connections were used for e-mail and transferring data and information accurately and quickly between sites. NSF set up a high-capacity data transfer backbone network based on TCP/IP, which became the core of the Internet (NSFnet). With this common protocol, networking grew rapidly within research companies, universities, and government-funded agencies. The TCP/IP standard also encouraged the growth of other networks and internetworking, outside of the Internet. These networks often were set up to transfer data for commercial and other purposes that were not allowed by the NSFnet. (Ellsworth 1994).

In 1985, Dr. Robert D. Ballard (now Director of the Woods Hole Oceanographic Institution's Center for Marine Exploration) and a research team discovered the wreck of the HMS Titanic on the floor of the North Atlantic Ocean. In order to photograph the vessel's interior, the team designed a submersible robot named JASON. In 1989, due to the success of JASON and the curiosity of school children who wanted to know how his team discovered the Titanic, Dr. Ballard founded the JASON project (Randall, December, & Tatters 1995).

While the World Wide Web dates back to March 1989. In that month, Tim Berners-Lee of Geneva's European Particle Physics Laboratory (which is abbreviated as CERN, based on the laboratory's French name) circulated a proposal to develop a hypertext system for the purpose of enabling efficient and easy information-sharing among geographically separated teams of researchers in the High Energy physics community (Randall, December & Tatters 1995).

The three important components of the proposed system were the following:

- (a) A consistent user interface.
- (b) The ability to incorporate a wide range of technologies and document types.

- (c) Its universal readership; that is, anyone sitting anywhere on the network, on a wide variety of different computers, could read the same document as anyone else, and could do so easily.

In 1990, the JASON Foundation for Education was formed "to excite and engage students in science and technology and to motivate and train their teachers." In the JASON Web (<http://seawifs.gsfc.nasa.gov/scripts/JASON.html>), DR. Robert Ballard talks about the project's purpose to excite young people in the fields of science and engineering by involving them in the excitement that we as scientists and engineers enjoy, to involve them in moments of discovery, to take young people to interesting research sites and let them participate in live exploration ([http://seawifs.gsfc.nasa.gov/JASON/JASON6/ballard\\_purpose.au](http://seawifs.gsfc.nasa.gov/JASON/JASON6/ballard_purpose.au)). One feature of the JASON project is telepresence, in which scientists, using remote sensing devices, involve others in the process of discovery. The JASON Project home page serves as a clearinghouse for information about the project, as well as tutorials and information for participants (Randall, December & Tatters 1995).

While specific projects such as JASON demonstrate how the Web can be used to support educational projects, other applications of the Web show how schools can build webs to provide information on their own students and teachers, as well as to connect their site to the larger world of the Web.

Although electronic mail (E-Mail), real-time text conferencing, and online tutorials have been used in the education community for several years, the Web brings a unique aspect to those online efforts by helping educators create information spaces that present the face of a school to anyone on the Web who ventures in for a visit (Randall, December, and Tatters 1995).



And early in 1993, American education has already become actively engaged in a new information revolution proposed and encouraged by President Bill Clinton and Vice President Al Gore shortly after their inauguration. They call the new technological concept an electronic data superhighway, a vast communications system designed to revolutionize information gathering and distribution. Similar in concept to telephone lines that link phone users along a telephone superhighway, fiber optics or satellite transmission would link computers in homes, schools, businesses, banks, research centers, universities, libraries, hospitals, and other outlets by two-way interactive multimedia data, sound, and video (Oleksy 1995).

In July 1993, The National Center for Supercomputing Applications (NCSA) Education Group produced new editions of the Incomplete Guide that is designed for beginner and intermediate Internet users. The full title tells its exact purpose: The Incomplete Guide to the Internet and Other Telecommunications Opportunities Especially for Teachers and Students, K-12 (Ellsworth 1994).

After that time, several elementary schools (such as Hillside Elementary School (<http://hillside.coled.umn.edu/>) and The Virginia L. Murray Elementary School (<http://pen1.pen.k12.va.us:80/Anthology/Div/Albemarle/Schools/MurrayElem/>)) and High schools (such as Thomas Jefferson High School for Science and Technology (<http://boom.tjhsst.edu>) and Claremont High School (<http://www.cusd.claremont.edu/>)) have created the web of their own to provide information for students and educators located at a single campus, other academic institutions operates a web to serve a more dispersed and diverse student population (such as Maricopa Center for Learning and Instruction (MCLI) of Maricopa Community College District in Arizona (<http://www.mcli.dist.maricopa.edu/>)), and that can support flexibly help educators succeed academically while maintaining busy lifestyles. The number of colleges and

universities with home pages is large and growing quickly. As of August 1994, Mike Conlon's page of American Universities at <http://www.clas.ufl.edu/CLAS/american-universities.html> has more than 480 entries, and Christina DeMello's page of American and International colleges at <http://www.mit.edu:8001/people/cdemello/univ.html> lists more than 1,000 college-level webs worldwide. This section focuses on selected college course material created for the Web (Randall, December, and Tatters 1995).

As Internet guidelines evolved, these outside networks were allowed to connect to the Internet, provided that the Internet's acceptable use policy. These commercial networks then became easy access points for individuals via modems and personal computers (PC), without institutional affiliations, to connect to the Internet (Ellsworth 1994).

### **2.3 History of Higher Education in Thailand**

Government education in Thailand dates only from the latter half of the nineteenth century. Until then, the only education of a semi-public nature, was that offered by the Buddhist monasteries, catered for only a small percentage of the male population.

In an effort to consolidate Thailand's independence and to modernize the country, King Chulalongkorn (Rama V) introduced far-sighted reforms in the government bureaucracy after he assumed the throne in 1868. Centers of higher education incorporating elements of western influence were established and subsequently flourished.

The history of higher education in Thailand can thus be divided into three periods: the Early Modernization Period (1889-1931), the Post-Revolution Period (1932-1949), and the Development Planning Period (1950-present).

### 2.3.1 The Early Modernization Period (1889-1931)

The founding of the country's first medical school, Siriraj Hospital, in 1889 marked the beginning of higher education in Thailand. Other establishments which were subsequently opened included the law school in the Ministry of Justice in 1897, the Royal Pages School (later known as the Civil Service College) in 1902, and the Engineering School at Hor Wang in 1913. These institutions aimed primarily to train Thai youth for employment in the newly expanded government civil service.

In 1917, the first university in Thailand was instituted by Royal Decree, elevating the Civil Service College to university status and renaming it Chulalongkorn University. It incorporated the existing schools of medicine and engineering with the newly created faculties of Arts and Sciences, Law and Political Science.

### 2.3.2 The Post Revolution Period (1932-1949)

Immediately following the Revolution of 1932, the nation adopted parliamentary democracy that necessitated a change to constitutional monarchy. There was a growing need for political leaders and civil servants to be educated about the principles of democracy and for the general public to have increased opportunities to higher education. Accordingly, the University of Moral and Political Science, now known as Thammasat University was founded in 1933.

In 1943, three more universities were created: the University of Medical Sciences (Mahidol University), the Agricultural University (Kasetsart university) and the Fine Arts University (Silpakorn University). Again, the focus of these institutions was to produce competent personnel in specialized disciplines for government service and administration.

### 2.3.3 The Development Planning Period (1950 onwards)

In 1950, with the establishment of the forerunner to what is now the National Economic and Social Development Board (NESDB), Thailand was set to embark on its modern course of planned development through a series of six and five-year economic plans. The very first was a six-year plan, launched in 1961 whereas successive plans covered the period of five years. This era saw tremendous expansion and change in Thailand's higher education system.

### 2.3.4 Expansion

Within a decade of the first national economic plan, three regional universities, Chiang Mai in the north, Khon Kaen in the northeast and Prince of Songkla in the south were established successively from 1964 to 1967 as part of the education decentralization program. Special attention was paid to promote engineering, agriculture, medicine and natural sciences as priority areas of study in line with the nation's accelerated efforts for economic and social development.

Apart from the establishment of regional universities, other important developments arose in the late 60s and early 70s. National Institute of Development Administration (NIDA) was established as a graduate institution specializing in administrative and national development. Asian Institute of Technology opened in 1967 as an autonomous international graduate school, offering sciences and engineering to students from all over Asia and beyond.

Other institutes and universities were formed through the amalgamation of existing schools and colleges. In 1971, King Mongkut's Institute of Technology was created through the merging of several technical schools (it has since developed into three independent institutes) while Srinakharinwirot University, created in 1974, followed similar pattern. Maejo Institute of Agricultural Technology, (subsequently



become Maejo University), was upgraded from a college under the Ministry of Education to a university status in 1975.

Around this time, private universities and institutions began to play a role in higher education provision, thus allowing more of the kingdom's young to gain tertiary qualifications. The Sixth National Higher Education Development Plan (1989-1991) saw greater government's encouragement, particularly in terms of financial support for private tertiary institutions to further improve standards of education and to provide increased education programs.

This period also witnessed expansion of private higher education with more establishments both in Bangkok and in the provinces to accommodate the social demand for higher education and the need to strengthen educational development of the country. Private universities and colleges also started to offer international programs to enhance internationalization of Thai higher education.

In 1990s, six more regional universities were established: Burapha University, Naresuan University, Mahasarakham University, Thaksin University, Ubon Ratchathani University and Suranaree University of Technology. Once campuses of Srinakharinwirot University; i.e. Burapha in the east, Naresuan in the north, Mahasarakham in the northeast and Thaksin in the south; the four were elevated to universities in their own right. Ubon Ratchathani University, formally part of Khon Kaen University was also upgraded to university status.

### 2.3.5 Innovations

A significant innovation during the Development Planning Period was the initiation of two open universities. Ramkhamhaeng and Sukhothai Thammathirat which opened in 1971 and 1979 respectively. These two universities provide an effective and

economical way to respond to the growing public demand for access to higher education.

Both make use of modern technologies such as radio and television to broadcast tutorials to a wider audience and the two universities presently share around sixty percent of all tertiary enrolments.

Suranaree University of Technology, founded in 1990, is the first public university in the country to operate independently from the government bureaucracy with its own autonomous administration system and with government financial support in the form of block grants. It is hoped that it will become a model for other public universities seeking to become autonomous in the future. Walailak University the second of its kind is set up in Nakhon Si Thammarat and will open its doors to students in 1998.

Maefaluang University, another autonomous university is being established in Chiang Rai with the plan to have the first student enrolments in 1999 (<http://www.inter.mua.go.th>).

#### **2.4 History of Virtual University in Thailand**

In 1988, Thailand first started to use Internet by connecting E-mail from Prince of Songkla University to ARRNET at University of Melbourne, Australia. After that, Chulalongkorn University and Asian Institute of Technology (AIT) were linked together.

In 1991, The first Internet in Thailand was the Thai Social/Scientific, Academic and Research Network (ThaiSarn). Starting from only 9600 bps international link in 1992, ThaiSarn was matured within about three years of its introduction with the first 2Mbps international link in September 1995. As of 1999, ThaiSarn has about 100 connections to all state-own university sites. (<http://www.nectec.or.th/it-projects/>)

In 1992, Chulalongkorn University and National Electronics and Computer Technology Center (NECTEC) started to establish the connection via leased line cable through Internet of USA for education networking.

In 1 March 1995, Internet Thailand was the first ISP in Thailand that went into commercial operation. Four other ISPs started business as their customers. It started with developed information technology for research on-line of universities.

In 20 June 1995, The Ministry of University Affairs presented the plan for an Information technology network for educational development to the cabinet. This plan has made the project called "UniNet" that was the solution concerning the distribution of educational opportunity to provincial areas by establishing a distance learning system using information technology to maintain standards in quality and knowledge. (Ministry of University Affairs, UniNet)

In 1996, NECTEC initiated the project "IT 2000", Thailand's national IT plan for sustainable economy, to be the boundary to develop information technology (IT) of Thailand in the year 2000. For turning the many opportunities into reality through wise application of IT, three fundamental prerequisites must necessarily be in place and function together:

- (a) A National Information Infrastructure (NII)
- (b) A Well-educated Populace and Adequate IT Manpower
- (c) Good Governance with A Dare to Dream and A Resolve to Act.

In 1996 and 1997, an information superhighway tested project was carried out at NECTEC to develop local researchers on the use of ATM network as well as many wide-band applications. ThaiSarn became the main academic and research network of Thailand with a number of information servers providing document archives, freeware/shareware mirrored archives and major local information such as the Golden

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Jubilee Network which hosts a wealth of information about Thailand in Thai language. The collection of servers is called "PubNet".

Starting November 1997, ThaiSarn launched the Public Internet Exchange (PIE) to supplement the PubNet project. PIE allows local commercial Internet Service Providers (through their own investment and connection license) to exchange domestic traffic without leaving Thailand. The project was so successful that after one year of experiment, the participants of PIE decided to provide some funding to NECTEC's operation and let the operation continue. In addition, as of February 1999, PIE circulating traffic was at 6.2 Mbps average. This means that in each month, 1.93 Terabytes (1,930,000 megabytes) of data was circulating inside PIE instead of traversing abroad and coming back. In real money, this is a saving of no less than 60 million baht per year.

In 1998, the SchoolNet project was set up for schools all over Thailand can be granted access to the Internet with an equal opportunity of nothing more than the cost of the local call with their location.

In 1996/1997, NECTEC started the project "Golden Jubilee Network" as a tribute to His Majesty the King on the 50<sup>th</sup> anniversary of the accession to the throne. The project aimed at providing massive educational contents in Thai language on the web, together with a unique public access network for the public throughout Thailand. Golden Jubilee Network was an initiative of Her Royal Highness Princess Maha Chakri Sirindhorn.

In 1998, the public-access network for the Golden Jubilee was extended to allow schools to access the Internet without requiring a long distance (ie. expensive) phone call to Bangkok. This became a great opportunity for schools to begin utilizing the Internet in the library, classroom and laboratories. As of April 1999, there are more than



850 schools using SchoolNet services, with more than 200 schools running their web site. To complement SchoolNet the successful connectivity, NECTEC ITS provided a contract to Kasetsart University to develop educational contents to be used in SchoolNet project. At present, Kasetsart University is running some test run of the developed contents in schools (<http://www.nectec.or.th/it-projects/>).

In 1998, the Eighth National Education Development Plan (1997-2001) aiming at preparing the Thai people to cope with a rapidly changing world in the 21<sup>st</sup> century. This plan strongly emphasizes that the education system should facilitate the country's development process towards self-reliance, sustainability and enhance global competitiveness. There have been continuous movements to push educational reforms by both public and private sectors. The first successful attempt was the inclusion of various provisions relating to education in the 1997 Constitution. Its provisions and set up was to extend compulsory education from 6 to 9 years up to 12 years basic education of quality.

In 14 August 1999, Majesty the King RAMA IX had an enactment to create common the National Education Act of B.E. 2542 for Thai people. And that was the starting of education reformation in Thailand to allow educational improvements on all aspects including basis of academic information, scrutiny by scholars, participation of all stakeholders, public relations, and public polls.

## **2.5 Technology-based Distance Education**

The technologies that support distance education continually increase in number, complexity, and power. As the options increase, so does the difficulty in choosing appropriate distance education solutions for particular educational and training needs. This section provides an overview of some of the more traditional or familiar options

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for distance education delivery, including those based on audio, video, and data technologies (Chute, Thompson, and Hancock 1999).

Table 2.1 provides a summary of all the technologies and technology combinations. These distance education solutions span a wide range, from one-way audio broadcasts where students can only listen to the instructor to two-way interactive multimedia telecollaboration in which all the sites can see and hear each other and simultaneously collaborate in a shared data communications medium.

There is no one best technology. Each technology has different characteristics, strengths and limitations, that make it more or less appropriate for a given education need. There are many ways to categorize technologies. One way is to sort them into groups based on the kind of message that is sent: audio, data (i.e., from a computer), video, or multimedia. Another way is to focus on the type of interaction made possible by the technology: one-way synchronous (real time), two-way synchronous, or two-way asynchronous (delayed time).

Table 2.1. Technology-based Distance Education.

Technologies						
Type of Interaction	Audio	Data	Video	Audio/DATA Examples	Video/DATA Examples	Audio/Video Examples
One-way	Audiotape, Radio Broadcast, dial access audio resources	Computer-based training (CBT), videotext, bulletin board, Internet	Videotape, Video broadcast, One-way video, Video on Demand (VOD)	Audio programs supplemented by on-line access to World Wide Web (WWW) resources	Video programs supplemented by CBT, Videotext, WWW resources	Audio/Video programs supplemented by audiotapes or videotapes, dial access, audio, VOD
Two-way asynchronous ("time-delayed")	Voice Mail	E-mail, Internet	Video messaging	Audio programs supplemented by E-mail, voice mail	Video programs supplemented by E-mail, videomessaging	Audio/Video programs supplemented by voice mail or video messaging
Two-way synchronous ("real time")	Phone, audioconferencing	Telecollaboration, Internet	Interactive visual distance learning (IVDL), two-way video	Audiographics, personal computer application sharing, telecollaboration	Video programs supplemented by telecollaboration	Audio/Video programs supplemented by audioconferencing or IVDL
						Interactive multimedia telecollaboration

## 2.5.1 Audio Technologies: Inexpensive Alternatives

Perhaps the simplest interactive distance education technology option is the audio-only system based on the telephone. Telephone technologies have a number of advantages for distance education and training: they are readily available, they are familiar to users, they are reliable, and they are cost-effective.

The telephone is one of the most common pieces of office equipment. Although education over the telephone, or educational audioconferencing, initially may seem to be a strange concept, consider the ways in which you and your coworkers are already using this technology for informal education. By expanding on the idea of the conference call by more formally integrating elements of course design, content, and delivery, instructors can use audioconferencing for the interactive delivery of training, to provide access to distant experts, and for ongoing professional collaboration and development.

One of the most appealing benefits of audioconferencing is its cost-effectiveness. The type of equipment used also depends on the available resources and budget considerations. However, it is important to realize that the success of audioconference instruction is largely dependent on sound quality. However, that the costs of even high-quality audioconferencing equipment and the associated telephone line charges are low compared with those of face-to-face communication that requires students or instructors to travel.

The devices used for audioconferencing range from individual telephones and inexpensive speakerphones to specially designed systems that include speakers, microphones, and equipment to mix the sound. Qualities of equipment depend on amount of students and instructional period. For larger groups and/or longer instructional periods there may be a need for higher-quality equipment that typically

employs digital signal processors (DSPs) that have echo cancellation circuits and noise control circuits that automatically adjust the unit to screen out ambient room noise. The cost of an audioconferencing system, depending on the type and quality of equipment, can range in price from \$150 to \$2,000 per unit.

### 2.5.2 Audio plus Data Technologies: Audiographics

Combining the audio capabilities of the telephone and the data capabilities of the computer creates a distance education application called "audiographics". In this education environment, the telephone is used for two-way voice interaction and the computer is used to share graphic materials and allow collaborative work.

With an audiographic system, students can audioconference and see visual presentations at the same time. Students at different sites not only can view the same image simultaneously, they also can write or type messages that can be seen by all the members of the group. Some audiographic systems allow students to simultaneously share computer programs. Students at different sites can enter data into the same spreadsheet, producing a collaborative workspace that is available to the students at every site. In some systems a digitizing camera can be used to produce images of drawings, people, and displays.

The audiographic equipment at each site generally includes audioconferencing apparatus, a computer and software, a modem, and peripheral devices such as a mouse, a graphics tablet, a scanner, and a camera. Voice and data are transmitted over standard telephone lines. Although some audiographic systems combine the voice and computer signals on a single telephone line, others use one line for voice and another one for data. Applications using audiographics range from one-time product update sessions to semester long courses for ongoing collaborative professional development. The cost of



an audiographic system, depending on the type and quality of equipment, can range from \$500 to \$50,000.

### 2.5.3 Audio Support Technologies

Several audio communications support technologies, although neither powerful nor flexible enough to serve as primary delivery media, are widely used to support other forms of distance education. These technologies include callback devices, voice mail, and fax.

- (a) Callback devices. Telephone technologies often are combined with one-way video systems to provide necessary or desired interactivity. Callback devices allow students receiving teaching via one-way video technologies such as satellite transmission to call the originating location to answer questions posed by the instructor, request feedback or clarification, and interact with other students.
- (b) Voice mail. Voice mail allows telephone callers to leave a message that can be retrieved by the recipient at a later time. Voice mail also can be used as an effective teaching and education tool, particularly when it is combined with other delivery technologies. Examples of the innovative use of voice mail include asynchronous student-instructor communications, feedback on or questions about assignments, and interim updates on course materials or procedures.
- (c) Fax. Fax machine allows the exchange of written or graphic information between geographically separated sites. Especially in cases where the main delivery system is audio-only, fax transmissions make the teaching and learning interaction more robust by supplementing audio interactions with

visual information transmitted over telephone lines. Students can use fax machines to submit homework or project assignments.

### 2.5.4 Video Technologies

Today distance education uses a continuum of video communications technologies to integrate a vast array of instructional resources into an education solution. Different types of video communications are being combined to mediate the flow of information among the organization, the instructors, and the students.

#### (a) Videotapes

For over 20 years videotapes have been useful tools for management communications and training dissemination. An inexpensive videotape can capture an organizational leader's directives or a subject matter expert's message and make it available to others at a time and place convenient for them. Videotape of a respected organization leader also ensures that critical management communication is delivered in an effective and consistent manner throughout the enterprise.

Videotapes also can be used to provide cost-effective self-paced instruction for a variety of skills.

#### (b) One-way Video Broadcasts

While the industrial use of videotapes began years ago in the training departments of large companies, today critical management communication more typically is delivered via live business video broadcasts to provide a quick, effective, and credible method of communicating management directives throughout the company. The term "business video" refers to the use of one-way satellite broadcasts of management communications and training programs throughout an enterprise. Industry estimates suggest that

more than 70 percent of business video programs are distance education programs.

One-way video distance education applications are characterized by the transmission of video signals in only one direction: from the instructor to the students. A common method of delivering the video broadcast is by satellite. The components of a satellite broadcast system include the origination site, the satellite uplink for transmission of the program to a satellite, the satellite transponder that receives the signal and retransmits it back to satellite downlink equipment and a site for people to view the program on standard television monitors at a distance of 22,500 miles.

The satellite receiving antenna can be fixed or stationary. Inexpensive fixed antennas costing less than \$500 is frequently used to receive satellite programs such as direct broadcast satellite (DBS) entertainment programming. Steerable satellite antennas can cost several thousand dollars; however, they permit the user to access even more programs by pointing the antenna at other satellites in the sky. Both fixed and steerable antennas must be connected to a device called a satellite receiver, which converts the satellite transmission to a video and audio signal that can be sent to a television monitor.

The origination site can cost over \$100,000, and skilled engineers are needed to monitor and maintain the transmission facility. Transponder use time can average \$700 per hour for domestic satellites and \$3,000 per hour for an international program.

This communication can combine one-way video transmission of teaching materials with the interactive capabilities of two-way data or audio

communication such as PowerPoint demonstrations, an overhead projector, a laser disc player, and a VCR to conduct their classes. Students at the receiving sites see and hear the instructor on television monitors and can respond to questions posed by the instructor by using electronic keypads.

(c) Video on demand

Video on Demand (VOD) had its origins in test-marketing trials of a cable television service that enabled residential customers to access hundreds of movies from a terminal attached to their home television sets. The viewers selected a movie and used a telephone line to send the request to their cable operators, which in turn made the movie available on a particular channel. They selected from a menu of options and agreed to pay a fee for viewing a particular movie.

From a learning point of view, VOD services allow the content of a video program to be hosted in video servers on an organization's data network. In the future, with increases in the bandwidth available for public networks, video programs could be hosted on Internet servers and made available to anyone with high-speed data access and a multimedia personal computer (PC)

(d) Video Plus CBT

Video program content can be supplemented with other education technology to create a powerful communications pattern. Video, computer-based training (CBT), and data resources can enable learners to experience a variety of training delivery media as they complete units of instruction. In CBT, the computer is the instrument of education. Many forms of CBT exist, including computer-assisted instruction (CAI), computer-assisted

learning (CAL), and computer-managed instruction (CMI). CAI and CAL is well suited for learning experiences that provide drill and practice, tutorials, simulations, and games. The student reads information presented on the screen and interacts with the content by using a mouse or keyboard. The student controls the pace of the instruction, and the computer controls the sequence of steps through the learning experience. CMI can perform routine data-processing tasks that are useful to instructors, such as assessing students, registering, mentoring, revising materials, keeping student records, and testing. CMI also may be used to diagnose the learning needs of individual students and prescribe optimal sequences of instruction. CMI enables the instructor to manage the provision of individualized instruction to many students. Multimedia CBT programming incorporates text, graphics, audio, video, and data in the delivery of the training content.

(e) Two-way Video

A two-way video distance education system provides video and audio communications in both directions between learners and instructors. All the locations in a two-way video system are equipped with cameras, monitors, and microphones. Point-to-point and multipoint connections enable instructors and learners to see and hear each other.

The ability of students to see and hear an instructor brings new levels of interaction to the distance education experience. Problem solving, demonstration, behavior modeling, and skills practice are all enhanced by the addition of two-way video. Distance education applications using two-way video technology fall into two general categories, that is compressed video and full-motion video.



(f) Compressed Video

Compressed video systems offer the flexibility of a variety of bandwidth services to the user. The audio and video signals go through digital signal processing that eliminates redundant information, thereby reducing the bandwidth necessary to transmit information between locations. The compressed signals can be sent to virtually any location over the switched telephone network. When switched digital services are used, the quality of the picture is a function of how much bandwidth is used. The cost of the connection is based on the bandwidth used.

(g) Full-Motion Video

A full-motion video distance education system provides picture quality that is comparable to that of commercial television. These systems typically require an investment in fiber-optic cables, high-capacity circuits, and Asynchronous Transfer Mode (ATM) or satellite transponder access to link education sites together. Full-motion network systems often are built with private full-time or part-time transmission paths to support them.

## 2.6 Internet Conferencing

Internet conferencing is a general term that includes several distinct but related activities in which computers support and facilitate communication between people. The most common forms of Internet conferencing are electronic mail (E-mail), FTP (File Transfer Protocol), Telnet, Gopher, group conferencing systems, and interactive messaging systems. All these systems can be used effectively in educational and training applications.

### 2.6.1 E-mail

The simplest form of E-mail involves one-to-one communication between two computer users. The originator of the message types it on his or her computer and special software directs the computer to send it electronically via telephone line to another user, who can choose to read, download, discard, store, or forward it. One way to extend the distribution of the message is by typing in the names and computer addresses of multiple recipients. However, many enhanced E-mail systems automate this function by creating and managing a distribution list for messages.

Enhanced E-mail systems such as Listserv have both a management function and a distribution function. First, they manage the list of subscribers or group members, which can number in the thousands, by keeping track of those who sign on and those who sign off from the conferencing group. Second, they copy any message contributed by an individual and distribute it to all the group members. The system also stores a copy of each message. In this way new subscribers can recall and read previous interactions to understand the background and prior discussion of a topic.

In education applications, E-mail, like voice mail, allows students to leave questions for instructors that can be answered at a later time. However, E-mail is more powerful than voice mail because the question and answer exchanges can be stored for other students to see. Any distance education system can be made more student-centered by improving the quality and in some cases the quantity of the interactions between the instructor and the students and those among the students. Many students have reported being pleasantly satisfied to find that they have more interactions and opportunities for interaction in a distance education environment than they would in many face-to-face classes. Busy working professionals who have little time for formal

education during the business day find that E-mail allows them to have ongoing interaction with fellow professionals throughout the course of study.

Using E-mail for instructional interactions has many other benefits. A major benefit for the student is that he or she determines the time and place of an interaction. The student has an opportunity to reflect on a question and provide a well-thought-out response.

Many training organizations with global responsibilities are finding not only that E-mail interaction makes distance education across multiple time zones and cultures easier but also that it is the preferred medium of expression for students who speak English as a second language. Those students are often overwhelmed in rapid question and answer sessions in a traditional classroom setting. Also, it may be culturally difficult or even inappropriate for them to question or challenge an instructor in a face-to-face setting. The time delay of the interactions in E-mail communication makes it possible for international students to be more reflective and word their comments carefully in responding to discussion topics or posing questions. The time delay also gives an analytic student the opportunity to research information before being required to respond.

Most E-mail systems automatically keep a record of these interactions, which can be sorted by respondent, date, and sometimes topic. The storing of previous messages adds to the power and flexibility of this medium. A student can join a discussion late and still have the feeling of being a participant in the thought process that led to the development of the ideas. Similarly, E-mail discussions can easily be embellished by bringing in outside subject matter experts who can add their knowledge to the educational discourse that has developed through the extended exchange the messages.

### 2.6.2 FTP (Ellsworth 1994)

FTP (File Transfer Protocol) is a way of requesting a file data or some software from a remote computer to send you a file, FTP transfers are usually made very quickly.

When you FTP, you first ask permission to visit the distant computer. If it's okay (not too busy, and so on), the remote computer lets you in and allows you to look around it's innards, asking what files are in each directory, copying files, and changing directories up and down at will.

If you know where to find the files you want, you can go right to them and transfer copies of them back to your computer. Otherwise, you can just snoop around and window-shop, looking for things that sound interesting.

### 2.6.3 Telnet (Ellsworth 1994)

Using telnet, you can access a remote computer, read files and data, and use the remote computer's other services.

A few telnet serves also enable you to e-mail files or session output to your e-mail address. So you see, telnet can expand beyond just reading information onscreen, or capturing the screen image in a file for later editing or printing.

Telnet is a lot like your local dial-up computer Bulletin Board Service (BBS). You use your computer to talk to another computer, about information and services the remote computer can provide for you.

Telnet also is a way you can use powerful Net access programs, such as Gopher, WWW, Veronica, Archie, WAIS, and others. If your local site can't, or won't, provide you with these services, you can telnet to a site that does have them, and use them there. It's a little slower, but you usually can accomplish the same goal.

### 2.6.4 Gopher (Schrum and Berenfeld 1997)

Many times you do not know the specific location of a file. In order to make the Internet more useful, program developers have created various search engines that search the Internet for particular kinds of files. In 1990, for example, Archie (a play on the word "archive") was introduced. It could search public FTP sites and create a database of available information on a particular topic. A year later, the University of Minnesota released Gopher, which is a menu driven information organizer that can "go for" information without a specified location. Gopher provided much needed organizational structure for Internet, and many researchers, scientists, and educators found it extremely useful. However, Gopher is menu-driven rather than graphical and it did not simplify access to the Internet enough to make it easily navigable for the general public.

### 2.6.5 Group Conferencing Systems

In general, group conferencing systems extend the features and function of E-mail. These systems are designed to handle the needs that arise when interaction extends beyond two participants. In other words, whereas E-mail is often a one-to-one activity. Group conferencing is a one-to-many or many-to-many activity. Group conferencing systems are used to manage the functions involved in group-oriented computer-based interactions. These functions include the management of group membership lists, the efficient distribution of messages to group members, and the storage and retrieval of prior interactions. Two types of group conferencing systems are the bulletin board system and the conference management system.

A bulletin board system (BBS) provides the function that it is a place to post messages of interest to the community that sponsors and maintains the system. Just as is the case with a real-world bulletin board, a virtual bulletin board often is divided into sections based on the content of the message. Users can send, or post, messages to the



appropriate area of the bulletin board and other users can reply directly to the sender of a message or distribute their responses to all the members of the conferencing group.

Conference management systems provide a structured approach to group conferences. They use database management features that allow the establishment of an asynchronous discussion forum through discussions in which responses to questions and comments are visually organized in a hierarchy, making it easy to follow a line of reasoning. As the asynchronous discussions grow, the responses typically are placed in chronological order under topic headings. Sophisticated group conferencing systems permit students to search messages for key words and sort responses by specified characteristics. These functions are particularly useful when the topics of messages are diverse and wide-ranging and/or when the number of group members is very large.

The structured approach of conference management systems makes them easy to learn and use and particularly valuable in supporting instructional communication. In instructional settings students can interact with their instructors, with outside content experts, and among themselves in both task-oriented and more informal exchanges. In this way, group Internet conferencing fosters many-to-many communication.

Increasingly, universities are using conference management systems to support distance education programs. Examples of conference management systems used for this purpose include VAXNotes, CoSy, Confer, and FirstClass.

#### 2.6.6 Interactive Messaging Systems (Chat)

While most Internet conferencing is asynchronous, or time-delayed, some conferencing systems support synchronous, or real-time, communication. In interactive messaging, a person typed a message on his or her computer screen and the message appears simultaneously on the screens of all the other members of the group. The messaging system automatically appends the name of the sender of each message and

manages the flow of messages. This type of conferencing interaction is useful when feedback is needed quickly or when a discussion will benefit from a more natural flow, as in brainstorming sessions. Examples of messaging systems are the UNIX "Talk" program and the Internet Relay Chat (IRC) system.

#### 2.6.7 Groupware

A specialized conferencing application, groupware, combines delayed and real-time communication features in a way that makes it particularly useful in business environments. Groupware creates an electronic workspace that supports a variety of functions. For example, groupware can sort, organize, and store the inputs of group participants as well as support group processes such as idea generation, evaluation, and consensus building. It also allows for data sharing and collaboration among a group of network users. Group members can simultaneously work on the same document or spreadsheet, and any changes made appear immediately on each individual's computer screen. Some groupware programs have other specialized features, including automatic organization of a group's telephone messages, appointments, facility schedules, memos, and work assignments. Examples of groupware programs include IBM's Person-to-Person and Novell's Groupwise.

### 2.7 Research Methodology

I have included description of the historical method used for data gathering for 3 months and analysis.

#### 2.7.1 Historical Research

Historical research is the systematic collection and objective evaluation of data related to past occurrences in order to test hypotheses concerning causes, effects, or trends of those events that may help to explain present events and anticipate future events. In nature of historical research precludes exercise of many of the control

procedures characteristic of other methods, but it also involves systematic, objective data collection and analysis and the confirmation or disconfirmation of hypotheses. Many current business-and-management practices, theories, and issues can be better understood in light of past experiences (Gay and Diehl 1996).

The steps involved in conducting a historical research study are essentially the same as for other types of research, that is:

(1) Definition of a problem

- (a) The purpose of a historical research study should be to explain or predict, not to rehash.
- (b) The historical researcher is basically limited to whatever data are already available.
- (c) It is much better to study in depth a well-defined problem with one or more specific, well-stated hypothesis, than to investigate either a too-broadly stated problem with a fuzzy hypothesis or a problem for which insufficient data are available.

(2) Data Collection

- (a) In a historical research study, the review of related literature and study procedures are part of the same process.
- (b) The term literatures takes on a much broader meaning in a historical study and refers to all sorts of written communication. In addition, identification, acquisition, and review of the literature is considerably more complex.

- (c) Written communication may be in the form of legal documents, records, minutes of meetings, letters, and other documents that will not normally be indexed alphabetically by subject, author, and title in a library.
  - (d) A historical research study in business may also involve with persons who participated in the event or process under investigation, if it occurred in the recent past.
  - (e) Primary sources constitute firsthand information, such as original documents and reports by actual participants or direct observers. Secondary sources constitute secondhand information, such as reference books or reports by relatives or friends of actual participants or observers.
  - (f) A common criticism of historical research is excessive reliance on secondary sources.
- (3) Data Analysis: External and Internal Criticism
- (a) All sources of historical data must be subjected to rigorous scientific analysis to determine both their authenticity (external criticism) and their accuracy (internal criticism).
  - (b) In determining the accuracy of documents, at least four factors must be considered, that are knowledge and competence of the author, time delay between the occurrence and recording of events, biased motives of the author, and consistency of the data.

(4) Data Synthesis

- (a) As with a review of related literature, historical data should be organized and synthesized, and conclusions and generalizations should be formulated.
- (b) Since summarization of historical research data involves logical analysis rather than statistical analysis, the researcher must take care to be as objective as possible.





### III. CURRENT SITUATION OF HIGHER EDUCATION IN THAILAND

#### 3.1 Why Will Internet Technology Have an Impact to Education?

Due to the growth of Thailand's population, there has been a large demand for qualified graduates. However, the numbers are still minimal compared to the demand on work. This has become an important issue for the nation as its economic development and largely needed to have better educated.

Technology evolution in its use has occurred. When a new technology is introduced, its early uses are likely to be found in developed countries and will change the general situation to modern situation, like the Internet that was used for many purposes such as electronic commerce (E-Commerce), electronic business (E-Business), advertising, electronic communication (E-mail and Chat), information search, entertainment, and multimedia. That's why Internet will be the most powerful tool of today.

Table 3.1. Perceived Benefits of Internet Users in Thailand.

Perceived Benefits	Increase Knowledge	Increase Speed of Information Acquisition	Increase Speed of Communications
Frequency	<u>2243</u>	<u>2088</u>	<u>1900</u>
Percent	<u>93.30</u>	<u>86.86</u>	<u>79.03</u>

Perceived Benefits	Be Entertained	Increase Socialization	Enhance Business	Others
Frequency	<u>1864</u>	1369	919	81
Percent	<u>77.54</u>	56.95	38.23	3.37

( N = 2404 and each may select more than choice )

The Statistic information shown in above table was collected from using research methodology of questionnaire, found in the book "Internet User Profile of Thailand" (NSTDA and NITC 1999), and present that Internet users believe that Internet is the way to mainly gain more knowledge (93.3%), increase speed of information acquisition (86.86%), increase speed of communications (79.03%), and plus the entertainment for them (77.54%). And from these benefits of Internet are pointed the possible directions to increase power of new education in Thailand.

Then, during the next few years, Internet will grow and take every step in the daily life of every human. And education will also impact with this trend because education will point on the educators to be the central purpose and adapt their supply, or education, to the demand of educators.

### **3.2 Common Character of Virtual Universities**

World Wide Web (WWW) provides an exciting new opportunity for distance education via Internet. The Virtual University builds a classroom homepage that can use both Two-way asynchronous and synchronous interaction by using WWW. The homepage can cover information about the class including the courses, exercises, resource references, communications, and instructor's biography. The instructor can also provide links to information on the web that would be useful to students in the class. Other links can access library catalogs or each student's individual home page. In addition, the home page can link students to a discussion list or Listserv that is set up for student communication. It is also a relatively simple matter to use the homepage to create forms that students can fill out and that will end up being sent to you as an e-mail message.

Virtual University uses the Internet and WWW to help students gain a basic understanding of how to navigate and take advantage of the web into which they will be

graduating. Some instructional possibilities of the virtual university include using e-mail for informal one-to-one correspondence, establishing a classroom bulletin board or Internet conference, creating chat room for on-line discussion from teacher and a group of learners, and making the clips of video on demand (VOD) for students who cannot access in the meeting time. Distant students often work in isolation without the assistance and support of fellow students, engaging students in dialogue with other students, faculty, and experts by encouraging them to join a bulletin board on topic related to the class and developing a classroom home page.

### 3.3 Situation of Internet in Thailand

Internet is the biggest network at present. Millions of people around the world are using it more and more. And Thailand also has increasing a growth of Internet users.

From an evidence that was found about growth of Internet users, refer to Assembly of ISP in Thailand, is shown as follows:

Table 3.2. Growth of Internet Users in Thailand.

	1997	1998	1999	2000
Internet Users	317,248	509,184	781,504	1,221,120

From this above table shows the estimated population of Internet User in Thailand was growing nearly double in every year. And in this year, we have Internet User more than 1 million people, or around 1.6% of total population, in Thailand.

In addition, some report forecasted that Internet Users of Asia-Pacific region will increase triple to 233 million over the next three year (2003), as follows:

Lehman Brothers: Asian Internet Users to Triple by 2003 (<http://www.nua.ie/surveys/>)

"Jul. 26, 2000: Increasing PC penetration and improved, cheaper telecommunications services should see Internet penetration in the Asia-Pacific region tripling to 233 million over the next three years.

This prediction is made in a new report from Lehman Brothers, 'Asian Internet Forecasts -- Wiring Up For Growth'. The report also forecasts that online advertising spending and e-commerce revenues will also increase rapidly between now and 2003.

Internet advertising revenues will be worth USD5.4 billion in 2005, compared with USD344 million now, while Asian consumer spending online will be worth USD57 billion in 2003.

The report emphasizes the difference between the developed markets of North Asia and the rest of the region in terms of projected Internet penetration rates and the value of e-commerce and advertising spending.

Lehman Brothers also advises investors to focus on companies with broad regional exposure or on markets with attractive short-term growth prospects, such as Japan, Korea and Taiwan."

From these reasons, if the growth of Internet users in Thailand will increase nearly double like this, amount of Internet users will help to forecast and realize that Internet users in Thailand will grow faster over than in the past. And whenever that Internet is still around people, education must change to this point to give the best solution with improved network and low cost. Especially in Bangkok areas have the growth of the diffusion of Internet User up to 54.37% of the country. That is shown in figure 3.1.

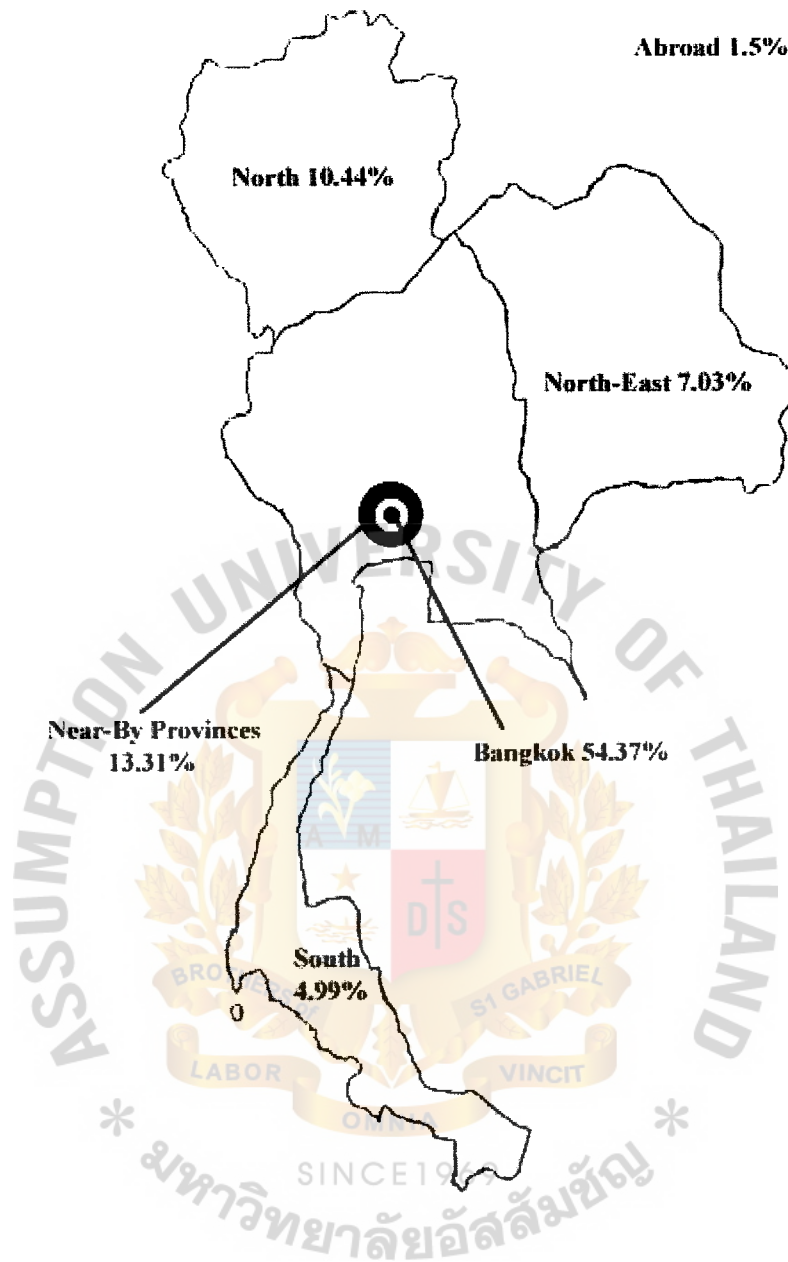


Figure 3.1. Internet Diffusion in Thailand.

And from the GiNet project said that Thailand has 75 provinces and the Bangkok Metropolitan Area. Each province is divided into some 7-14 districts. There are about 800 districts and about 8,000 sub-districts. The telecommunications infrastructure of Thailand, especially in Bangkok, is now mostly optical fiber cable based, with a density of 46 phone lines per 100 people in Bangkok and 5.3 lines per 100 people in the rest of



the country. Overall density is 11 lines per 100 people. The network that is set up with a optical fiber cable, to be backbone, can connect at speeds between 155 and 620 Mbps (million bits per second). So this is the opportunity of Bangkok that has ready in aspect of cable connection more than other provinces to reform education.

### 3.3.1 Why Will Internet Have an Impact to Higher Education in Thailand?

Higher education is involved with people who studied in Bachelor, Master, and Doctorate degree with the age estimates between 18-35. Therefore, we have to look at the behavior, of using the Internet, of this target group to know about demand to use Internet for their education. The Statistic information that will show in tables below are collected from using research methodology of questionnaire, found in the book "Internet User Profile of Thailand" (NSTDA and NITC 1999), and some information are important and related with confirmation of demand of Internet users in Thailand.

Table 3.3. Age of Internet Users in Thailand.

Age	Less Than 10	10-14	15-19	20-29	30-39
Frequency	2	22	<u>248</u>	<u>1383</u>	<u>542</u>
Percent	0.08	0.92	<u>10.32</u>	<u>57.53</u>	<u>22.55</u>

Age	40-49	50-59	60-69	70 and up	Total
Frequency	178	25	4	0	2404
Percent	7.40	1.04	0.17	0	100

From the above table, you will see that people who are between 20-29 are the highest of Internet users with 57.53%. Other sequences are arranged at age between 30-39 is 22.55% and age between 15-19 is 10.32%.

Table 3.4. Currently Enrolled Education of Internet Users in Thailand.

Currently Enrolled Education	Less than High school	High school	Lower Vocational	Upper Vocational
Frequency	29	49	19	35
Percent	2.64	4.46	1.73	3.18

Currently Enrolled Education	Bachelor	Post Bachelor	Master	Doctorate	Total
Frequency	<u>692</u>	6	<u>240</u>	29	1099
Percent	<u>62.97</u>	0.55	<u>21.84</u>	2.64	100

From the above table, you will see that people who used Internet are highest in currently enrolled in bachelor degree with 62.97%, and master degree with 21.84%.

Therefore, from above 2 tables, age and currently enrolled education, that can help us to trusts that most of the Internet users in Thailand are the students or educators in university or higher education. And we can use this benefit to create higher education via Internet for the successful need of students.

### 3.4 Situation of Higher Education in Thailand

From the National Economic and Social development plan no.8, government policy was set to extend compulsory education from 6 to 9 years up to 12 years. The number of students to enter higher education was increased by double. Thus government urgently needed to improve in the aspect of quality and quantity of higher education. But now, institutions under the Ministry of University Affairs can support fewer than 60,000 students and will lack universities for them. Most higher education institutes that have bachelor courses under government ministries are in the Bangkok area. And others are distributed in the provinces. As a result of the 195 institutes, 68 are

located in Bangkok and the other 127 distributed throughout the provinces. Therefore, the government and Ministry of University Affairs must create plans to distribute educational opportunities to all provinces as possible.

### **3.5 Current Master Plans Involving Virtual Universities**

Now, the circumstantial planning in Thailand has only 2 master plans that are the Ministry of University Affairs plan and IT-2000 master plan.

#### **3.5.1 The Ministry of University Affairs Plan**

The Ministry of University Affairs (MUA) has aimed to ensure that the educational provision among public universities and private universities will not only be of higher quality that meets the international standards, but also produce qualified graduates to meet the market's demand. The MUA accordingly, enacted six policies to cope with the current education condition, that are:

##### **(1) Quality and Excellence**

The MUA encourage universities to offer an international standard level of education, bearing in mind that quality is the key to produce qualified students who are capable of competing in the job market and to function fruitfully in the globalization era. The MUA has launched both short and long-term strategies to upgrade the quality of instruction an academic pursuit of all the public and private higher education institutions to meet the minimum standard set. Along with these efforts is the role of the MUA to strengthen academic excellence of universities in teaching, researching and community services.

(2) Access and Equity

The MUA has implemented the access and equity policy to provide mass higher education for Thai people of diverse social, economic and geographical characteristics. This policy, moreover, is aimed particularly toward providing high school to have greater access in attending universities. Subsequently, information technologies have also been employed. Through various measures, it is targeted that the percentage of the age-group population gaining access to higher education will be increased from the current 6% to 40% in the year 2020.

(3) Efficiency and Accountability

In promoting efficiency and accountability, the MUA enhances higher education cost effectiveness and management flexibility by undertaking management reforms emphasizing institutional autonomy and self governance with appropriate accountability measures. The MUA will then be able to take up its role as supervisory and supporting body for educational development in line with the National Plan.

(4) Relevance and Delivery

Under this policy, the MUA aims to produce graduates in fields with high demands, along with some specialized areas of study that are important to industrial growth. The MUA also conducted research studies to determine manpower needs of the country utilizing either manpower requirement approach or quality approach to suit each particular area of study.

(5) Internationalization and nationalization

With the rapid movement of globalization, international collaborative relationships among nations are highly valued. The underlying strategies are

to promote international education programs and enact staff and student exchange programs with foreign institutions. Additionally, the MUA, under this plan, hopes to connect closer to regional and international universities.

### (6) Privatization and Corporation

Under the privatization and corporation plan, the Ministry plans to promote the establishment of private universities and integrate corporate management strategies into the university administration. This policy is aimed to encourage increased role of the private sector in collaborating with higher education institutions for improved quality of higher education provision.

#### 3.5.2 The Real Position of MUA Plan

MUA plan is a good plan that tended to intensely improve manpower, quality, equipment, budget, experts, access toward IT, and supported direct to create the UniNet project. But at present, this plan was created and left on the shelf. Many aspects that they wanted to build seemed to be the dream in the real world. Like the fiscal budget, the vital factors of almost all aspects, is increasing in each year. But government did not make effective distribution to the system structure's needs. One example of this weakness is the UniNet that was the one of this supporting project. It needed the budget of 3,000 Million Baht to operate their system, but until now it gets only the 300 Million Baht or equal 10% of whole project and it makes effect to freeze the improvement of whole structure toward universities. Then this problem crashed the aspect of access toward IT because UniNet is the only one system of MUA that provided access for universities via leased line cable. Qualities of all processes collapsed, manpower was decreased, and experts were not hired to make its international standard and development because of the lack of managing fiscal budget of MUA.



Table 3.5. Budget of Education Sector (Bureau of the Budget).

Budget	Fiscal Years ( Unit : Million Baht)			
	1998	1999	2000	2001
Education Sector Budget	208,274	208,616	222,111	224,046
Current Expenditures	174,877	181,529	198,026	203,536
Capital Expenditures	33,397	27,086	24,085	20,510

### 3.5.3 IT-2000 Master Plan

IT-2000 Master Plan was looking at the use of information technology (IT), as in computer, telephone, television, electronic mail, multimedia, on-line database, and a wide range of other related technologies, to alter significantly the way to live, work, learn, and entertain. Not only will IT be instrumental in enhancing our competitiveness in business, but also look as cost-effective means for social development. In other words, IT holds very promising potential to spread economic activity, democratic principle, wealth distribution, and social benefit provision such as education across every region of the country. It consists of three pillars that are the foundations for the development. The plan has been implemented in several related activities and project by many organizations.

The first pillar of IT-2000: Better telecommunication infrastructure. Deregulation of telecommunication of Telephone Organization of Thailand (TOT) and Communications Authority of Thailand (CAT) are the most important issues. And it also requires that a universal access to information infrastructure must be provided by the state to all areas of the country.

In the second pillar, human resource development and education are to be improved. Even under the economic crisis, Thailand's letter of intent to the IMF (August 1997) stated that "Education expenditure, together with health and essential infrastructure projects, is to be intact". There are several IT projects which address

human resource development like as SchoolNet project, IT-for-Education field trials in Mae Hongson and Phuket provinces, Secondary School Resource Center Project and the Lighthouse project. The software industry of Thailand is also being developed through a series of measures that enhanced the capability levels software human resources.

The third pillar is on good governance, the most crucial factor necessary for the sustainable development of Thailand through less corruption and better services to the citizen. There are several on going IT and non-IT activities relevant to this issue: the Government Information Technology Service (GITS) and government Chief Information Officer (CIO) programs. The CIOs were appointed with two initial main tasks: completion of IT Master Plan of their agencies and fixing the agency's Y2K problems. Measures to make government more transparent and less corrupted are also strengthened through the Official Information Act (to enhance government transparency) and the establishment of the National Counter Corruption Commission (NCCC).

#### 3.5.4 The Real Position of IT-2000 Master Plan

IT-2000 master plan is the one best plans of Thailand that realized the use of information technology (IT) as the trend to development in the Thailand. And after this master plan was launched, Thailand has many improvements that based of this plan such as an information superhighway tested project to develop local researchers on the use of ATM network as well as many wide-band applications. ThaiSarn became the main academic and research network of Thailand with a number of information servers providing document archives, freeware/shareware mirrored archives and major local information such as the Golden Jubilee Network which hosts a wealth of information about Thailand in Thai language. Building the Software Park project to support software

development in Thailand. And from this improvement of Thailand, we can say that IT-2000 master plan is the first plan of Thailand that looked for the using of IT in Thailand. But from Thai Baht crisis (August 1997), it directly impacted toward this plan in the main aspect of budget like the Software Park project that needed a budget of 1,810 Million Baht, but got budget around 100 Million Baht after crisis. That's why this plan is not completely successful in Thailand as planned.

### **3.6 Current System Structures Involving Virtual Universities**

From the 2 master plans, IT-2000 master plan and MUA plan, makes good direction for distributed education to any sector in Thailand. After that, it also assigned the main 3 system structures to be center of each involvement. This 3 main systems are UniNet, SchoolNet, and GiNet.

#### **3.6.1 UniNet (Inter-University Network)**

The policy of increasing the number of universities in the provinces is to distribute educational opportunities in those areas to support an increase in high school student numbers and also increase efficiency in educational development in the local populations. This reflects the educational and social development of the country. The Ministry of University Affairs has established the distance learning system to be a solution concerning the distribution of educational opportunity to provincial areas. And using information technology to maintain standards in quality and knowledge.

MUA presented the plan for an Information technology network for educational development to the cabinet that made the following conclusions:

- (1) To approve a project to increase campus distribution to provincial areas by proceeding in three ways: establish Information Technology Campuses in 31 provinces; establish Higher Technology Institutes 3 provinces; and expand academic areas in three provinces.

- (2) To approve a project for an Information Technology Network for education development and approve a budget for the years 1997-2001 for 3,000 million baht for proceeding with this project; and approve establishment of an organization to manage and service the Information Technology Network for Education development via the Ministry of University Affairs by providing independence through government support.

MUA has targeted four phases for the information Technology Network for Education development network project:

(a) 1<sup>st</sup> Phase

To set up an Information Technology Infrastructure for Higher Education to connect all universities/institutes and campuses throughout the country called "UniNet". Universities in Bangkok to be connected by an ATM Network via optical fiber with a bandwidth of 155 Mbps. Universities in provinces will be connected with Bangkok universities/institutes via digital leased lines with a bandwidth at least 2 Mbps (E1).

(b) 2<sup>nd</sup> Phase

To develop self-study centers by developing the campus network to connect to an electronic library, Internet, Multimedia, Video on Demand (VOD), other Self-Study Centers and Computer Assisted Instruction.

(c) 3<sup>rd</sup> Phase

To develop social learning and life-long learning by developing courseware, a knowledge database and to develop distance learning via video conferencing system.

(d) 4<sup>th</sup> Phase

To develop persons capable of applying information technology for educational development; to develop teachers and teacher assistants; to develop, design and produce courseware techniques and also research and develop a modern academic system.



Figure 3.2. Present Network System of UniNet (UniNet 1997).

At present as shown in figure 3.2, we proceed to cover all regions of the country with the Information Technology Network. The Center University of a region is a center of connections to a distance learning room. The room can assist lecturers with production and development in a university campus that lacks personnel in its startup period.



The Northern gateway at Kasetsart University connects to Chiang Mai University via 2xE1 leased line (bandwidth 4 Mbps). The Southern gateway at King Mongkut University of Technology (Thon Buri) connects to Prince of Songkla University via 2xE1 lease line (bandwidth 4 Mbps). The Eastern gateway at King Mongkut University of Technology (Ladkrabung) connects to Burapa University and King Mongkut University of Technology (North Bangkok) Prachin Buri Campus via E1 leased line to each institute (total bandwidth 4 Mbps). The Western gateway at King Mongkut University of Technology (Thon Buri) connects to two provincial areas at King Mongkut University of Technology (Thon Buri) Ratcha Buri campus and Mahidol University Salaya. Each institute is connected via E1 leased line (total bandwidth 4 Mbps). The Northeast gateway at Kasetsart University connects to Suranaree University of Technology via E1 leased line to each institute (bandwidth 4 Mbps).

### 3.6.2 The Real Position of UniNet

UniNet is only one structure system of MUA that provides opportunity for students in higher education toward distance provinces. Now in this project has around 2,000 students to study in the country. It has the good targets to development system structure, but only in the past. Because now, leased line cable, with a bandwidth at least 2 Mbps, that provided for any main provinces are not proper for the present situation with developed high technology system with minimum cost. And only universities in Bangkok have properly connected by an ATM Network via optical fiber cable with a bandwidth of at least 155 Mbps, as 1<sup>st</sup> phase, to support high capacity rate of connection. UniNet expended for leased line cable to link within the nation, provided by TOT, with 40 Million Baht per year and for leased line cable to link international, provided by CAT and Teleglobe, with more than 70 Million Baht per year. So we concluded that UniNet used budget more than 110 Million Baht for leased line cable per

year. That is quite more budget if we compared with the bandwidth of 2 Mbps that it's provided. Another problem is the lack of personnel because of now, UniNet has only 10 staffs to involved with this project and only 5 staffs monitored network that connected with other universities which needed to have their own technical support with this project. All of this problem may be effected from the reduction budget of this project that needed of 3,000 Million Baht, but only got 300 Million Baht as of now.

### 3.6.3 SchoolNet

In 1998, the public-access network for the Golden Jubilee was extended to allow schools to access the Internet without requiring a long distance phone call, only 3 Baht per a time, to Bangkok via number 1509. This project became a great opportunity for schools to begin utilizing the Internet in the library, classroom and laboratories. As of April 1999, there are more than 850 schools using SchoolNet services, with more than 200 schools running their web site. To complement SchoolNet the successful connectivity, NECTEC ITS provided a contract to Kasetsart University to develop educational contents to be used in SchoolNet project. At present, Kasetsart University is running some test run of the developed contents in schools.

### 3.6.4 The Real Position of SchoolNet

SchoolNet is using Internet to be the network, flexible and minimum cost of today, and try to give knowledge based IT with opportunity to learn about Internet to younger student and teacher. At present, 1868 schools are online with this project. But from the past (1996) until 1999, SchoolNet used a budget of 68,543,250 Baht without any support budget from NECTEC. Any assets at present are from Golden Jubilee and ThaiSarn, resources are from National Servers of NECTEC, national access provided from TOT, international access provided from CAT, and any support from private individual sections such as Cisco, Microsoft, Compaq, Intel, and Powell Computer.

From this reason, we can say that SchoolNet has only the project structure and cannot stand alone if absent of sponsors to support their network system. And because of this reason, any schools that wanted to access via this project must have their own personal computer and buy Linux-SIS software, used for connecting to SchoolNet, with price 200 Baht. So many high schools in distance province that lacked budget and are poor will not use this system, then knowledge will not be transmitted directly to the students.

### 3.6.5 Government Information Network (GiNet)

The GiNet Project is a nation-wide, high-capacity, information network for government services in Thailand. The network will provide channels for communications within geographically dispersed ministries as well as for inter-ministry communications. The GiNet Project proposed by National Information Technology Committee (NITC). The cabinet has approved the budget of 2,012 Million Baht (over the years 1998-2001) to the NECTEC to implement GiNet through Government Information Technology Services (GITS).

GITS has the following missions and objectives. GiNet basically provides the network connectivity, network access and security parts of GITS.

Table 3.6. Objectives and Missions of GITS.

Missions of GITS	Objectives
1. Establish a common high-speed, nation-wide data network for sharing between government agencies.	To reduce or eliminate redundant investment is networking equipment by government agencies and gain better network services at lower operating cost.

Table 3.6. Objectives and Missions of GITS. (Continued)

Missions of GITS	Objectives
2. Establish a secured messaging infrastructure.	To provide timely, reliable and secure information exchange between ministries and thereby improve government.
3. Implement crucial common applications to run on GiNet.	To enhance the efficiency of public services, including the benefits to be obtained from the interconnection of ministries.
4. Establish first-class helpdesk and consultation services for all customers.	To guarantee that government agencies can focus on their responsibilities while getting a good level of service and customer satisfaction.
5. Establish necessary policy issues and solutions related to government automation using IT.	To support government policies on using information technology.

GITS will offer several related services to government agencies in addition to the provision of large-bandwidth connections to all districts in Thailand. The services are classified into 5 levels. The first two levels are identified closely with GiNet and the rest are to support government computerization.

#### (1) Basic Transport Services

To help GiNet customers connect to and access networks. Service pricing is calculated from the number of physical ports and the number of virtual circuits. All circuits are likely to be charged at a fixed rate, irrespective of distance.

(2) Network Services

To provide additional services such as electronic mail, government directories and government electronic document exchange services. Additionally, the high-speed network will have the ability to support high quality video conferencing.

(3) Distributed Computing Services

To set up a suitable environment that enables many different kinds of computer systems to communicate easily with each other.

(4) Application and Information Services

To provide standard packages that can be shared among government agencies to reduce redundancy. To provide common information services to all agencies.

(5) Program Delivery Services (Extranet)

To provide public access to government services by user-friendly forms such as electronic newsletters and government service through the World Wide Web (WWW).



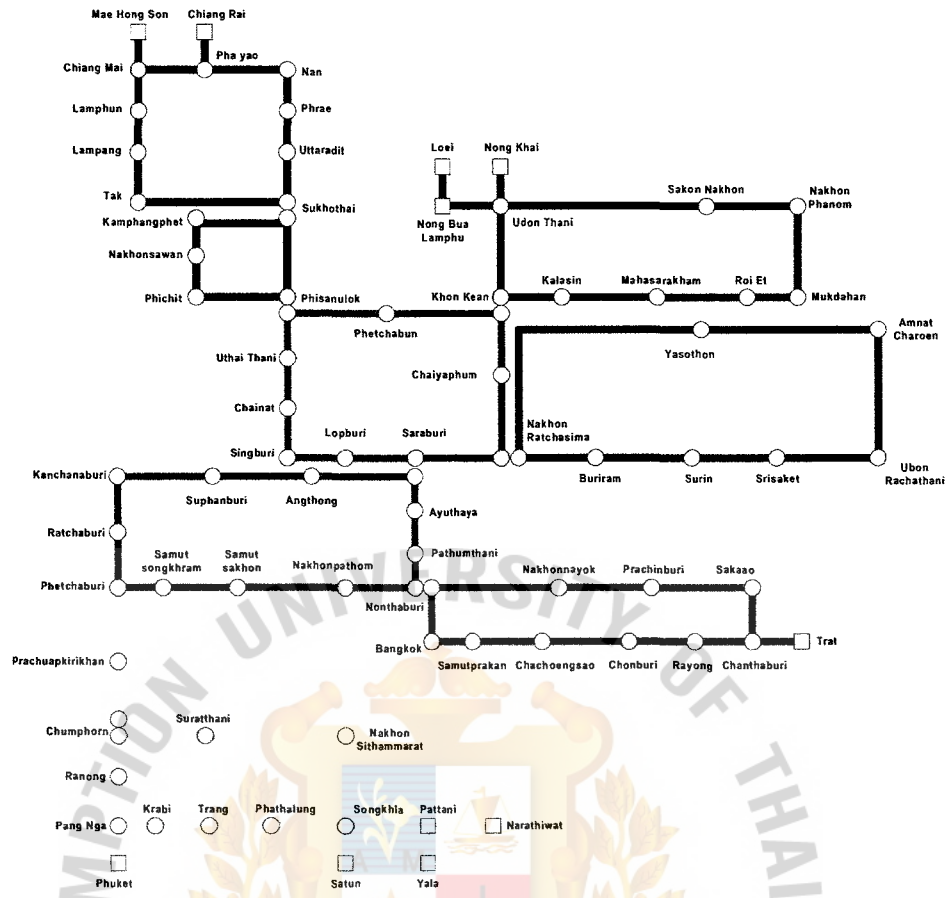


Figure 3.3. Network Topology and Capacity of GiNet (GiNet 1998).

The topology of the physical GINet backbone will be that of SDH rings implemented by telecommunication carriers such as the Telephone Organization of Thailand (TOT), the Communications Authority of Thailand (CAT), and their respective partners.

GINet operations will be based on leased fiber links. These links are driven by SDH devices. In each node, the tributary connections are expected to feed into ATM switches, which will in turn distribute the network connections into user access lines.

The stage of GINet connectivity will be completed after four implementation phases. In brief, all 75 provinces and Bangkok will be connected with rings running at

STM-1 speed or higher. In Bangkok, seven communication nodes will be operating with optical fiber rings running at STM-4 speed or higher.

GINet has designed to have services in 21 provinces in Thailand. GINet has served government agencies that wanted to use this system in 2 services that are, Dial-up and Permanent circuit. The network to be set up will have an optical fiber which can be the backbone to all provinces in Thailand running at speeds between 155 and 620 Mbps. It will have several 2 Mbps downstream links to every district. GINet services will expedite the computerization of government agencies with interactive IT applications.

### 3.6.6 The Real Position of GiNet

GiNet is the most powerful system network in present that is based on IT-2000 master plan. It used the benefit of optical fiber to connect and transmit the high capacity information toward their clients. This project has a good planning and investing of government sectors that makes it interesting for developing IT of Thailand. Unfortunately, this project is established only for the government agencies and their clients that wish to make the revenue return more than to improve the network for all people. And it tended to develop individual network more than using for non-profit sectors like education.

### 3.7 Current Strengths and Weaknesses Situation of Higher Education in Thailand

From all current information explained, we can conclude the condition of strength and weakness of current situation involved with aspects to create the Virtual University in Bangkok, as follows:

### 3.7.1 Strengths

- (a) Good master plans, the National Education Act of B.E. 2542 and National Economic and Social development plan no.8, to encourage universities makes better education. And having the MUA plan and IT-2000 master plan to developed and employed IT for education.
- (b) We have UniNet to be the center of universities with provided resources from international resources.
- (c) There are 195 institutes, 68 are located in Bangkok and the other 127 distributed throughout the provinces.
- (d) Most universities in Bangkok areas are linked optical fiber cables to connect with UniNet. Therefore, we do not invest on the cable connection for universities at Bangkok areas in the future.

### 3.7.2 Weaknesses

- (a) At the current situation, the Ministry of University Affairs can support fewer than 60,000 students.
- (b) Lack of qualified, experienced and knowledge for teachers. Most teachers still teach in the limited area of textbook and do not drive educators to think.
- (c) Lack of unity in international standard in terms of developing distance education system.
- (d) Educators who graduated lack innovation and human thinking to adapt and use in the real work and life.
- (e) Lack of both international and national information resources to supported education.
- (f) Lack of cooperation between both universities to universities and government to universities.

- (g) Government did not support enough in aspect of budget for higher education, even though education sector is using cost around 22% of fiscal budget in every year. Like as the UniNet project that have 3,000 Million Baht of the budget plan at beginning, but only get 300 Million Baht now.

In conclusion, Thailand has a good planing in master plan but lacked operation and reduction of budget, but we also have UniNet with optical fiber to completely link all universities in Bangkok areas. So we urgently need to reform the new education to meet the minimum cost and high capacity for students as Virtual University system. The next Chapter will discuss about how to make the possibility of Virtual University in Thailand with a new model of reforming higher education into Virtual University.



## IV. A MODEL OF VIRTUAL UNIVERSITIES FOR HIGHER EDUCATION IN THAILAND

In Chapter 3, I have already explained about the current situation of higher education in Thailand in aspects of Internet, currently higher education with master plans and system structures in Thailand. This chapter will suggest about the reformation toward Virtual University.

### 4.1 4P's Comparison between Traditional Universities and Virtual Universities

At the beginning, I needed to compare the traditional university with Virtual University in the form of "4P" (product, price, place, and promotion) that is famously used in marketing. It can also adapt to show briefly the obvious difference in 4 main aspects between the tradition and new system, even though we have some systems that used liken to this system.

Table 4.1. Comparison between Traditional Universities and Virtual Universities.

	Traditional University	Virtual University
<b>Product</b>	In form of paper, hard to maintain and Waste the natural resources, plus Reprinted every time.	In form of digital, and will prompt to repeatedly use every time, plus easy to update and keep it in form of Video on Demand (VOD).
<b>Price</b>	Mainly invest on University's Buildings And annually maintenance cost of each Building.	Mainly invest on one-time fixed cost on network cable.
<b>Place</b>	Independent faculty building. And Instruction will start whenever instructor And students are in the right room at The right time.	Integrated faculties in the one room. Students and instructor can live in any places. Even students can not access in the meeting time, they also access via Video on Demand.
<b>Promotion</b>	Make the handbill and document to promote their university.	Make a linkable banner via Internet and exchange it with other universities



This table will show you about benefit of reformation toward Virtual University that will reduce the amount of hard copy, in paper, to digital form to save the natural environment resources of the world with easy to repeat update as many time. Reduction cost of establishment of the building into main fix-cost of network cable. Integration faculties in the one room with any time and any place to access. And also publishing each university in unbound world to million of linking via the net.

As for the situation of Thailand, all the things that we already created are not lost for reformation, but only thing that we make is the plan. In the current situation of Thailand that collapsed after Thai Baht crisis until now, we must "Do to Plan" because we already passed the phase of planning. So this reformation of higher education will help us to make the possibility of concept "Plan to Do and Do to Plan".

## **4.2 SWOT Analysis for Virtual Universities**

If we tried to reform the education in Thailand to be the Virtual University, I trust that Thailand would gain more progress and improvement in many aspects. One analysis that will help us to make it clearly understand about character of Virtual University is "SWOT" analysis (Strength, Weakness, Opportunity, and Threat) that will show as follows:

### **4.2.1 Strengths**

- (a) More space for students in distance province, handicap people, and international students who are interested in Thailand's higher education because Virtual University can be studied anywhere and anytime.
- (b) For students who live in distant areas, do not need to spend variable costs such as textbooks, transportation, dresses, and hostel. But need to spend for a one time's fix cost that is the computer and modem, at least, to connect Virtual University via Internet.

- (c) High capacity of bandwidth with integrity networking of the world development.
- (d) Needs of few operators, who are responsible with creating content, developing, controlling, monitoring, and maintenance.
- (e) Resources can be found around the world, no need to lease the resources from international resources.

#### 4.2.2 Weaknesses

- (a) Needs to invest on the high-quality cable connection to support high capacity rate of connection.
- (b) Minimum requirement of each user needed personal computer (PC) and modem to access via the net.
- (c) Users must have extra knowledge and ability to connected and used Internet.

#### 4.2.3 Opportunities

- (a) In the National Economic and Social development plan no.8, government policy is to extend compulsory education from 6 to 9 years up to 12 years. The number of students to enter higher education is to increase by double.
- (b) National Education Act of B.E. gives high priority to education.
- (c) We have IT-2000 plan to be the master plan of developing IT system. And have MUA plan that responsibility for higher education development.
- (d) We have UniNet project to be the central of universities system that tried to improve the communication, resources, and coordination between universities.

- (e) The telecommunications infrastructure of Thailand, especially in Bangkok, is now mostly optical fiber cable based that can connect at high-speeds between 155 and 620 Mbps.
- (f) The society is well aware that bachelor's degree has become the basic degree of education to work at present.

#### 4.2.4 Threats

- (a) The economic crisis in Thailand has made it very difficult to improve Virtual University, particularly on distance provinces.
- (b) Government was not really supportive for the educational budgets as much, but also reduced the budgets down to almost 10%.

This SWOT analysis conclude that Thailand has possibility to make the Virtual University with strongly benefit to support any plans, but the pressures are from the government and economic crisis that reduction of budget that even this reformation will help our country to expand education through economic crisis.

### 4.3 A Model for Successful Virtual Universities

After all the results, I want to show diagrams of the successful model for Virtual University that will go through all the plans that we already made and will make benefit direct for students as well.



Figure 4.1 A New Model of Virtual Universities for Higher Education in Bangkok, Thailand.

## St. Gabriel's Library

From this above 2 pyramid's diagrams showed about how to reform the current situation of university in Thailand to be new form of Virtual University. Each of the pyramid can be divided into 4 principle phases that are master plan, system structure, operators, and students.

In the current situation of university in Thailand, in the left-hand side, showed the top-down level of the infrastructure in Thailand. The first phase, we have stressed on the master plan that can be divided into 4 main plans that are National Education Act of B.E. 2542, National Economic and Social development plan no.8, and IT-2000 & MUA plan.

The IT-2000 and MUA plan are the main master plan of our current situation. And both plans were tended to create and made up, to support education, depending on the National Education Act of B.E. 2542 and National Economic and Social development plan no.8. This first phase, we stressed on designing and planning that presents in green, it means quite good to be a guideline to make the flexible infrastructure in the future of Thailand.

Then, the second phase, IT-2000 and MUA plan used to set up the 3 main system structures for infrastructure's networked in Thailand that are UniNet, SchoolNet, and GiNet. It assigned the UniNet supported to be the center of universities in Thailand, SchoolNet supported to be the resources center of compulsory education or schools, and GiNet supported to be the center of government agencies. In this phase presents in red because we found the main problem that is the independence of each infra-network. We will explain each problem briefly.

UniNet, the vital network structure of universities, used the network of leased line cable with a bandwidth 2 Mbps. SchoolNet used the network of Internet with a bandwidth of 56 Kbps. And GiNet used the network of optical fiber cable with a



bandwidth of 155 Mbps. Different network structures of each will effect to many problems such as coordinating (both activities and information) of each, budget redundancy, different skills of personnel, and individual planning and developing system.

From this reason, it sounds like the trial and errors of each system. If one system did not properly work, then develop the new system to replace an existing system. But in the real situation, it did not do in this way because their investment on equipment that must be used at least many years, even if it is not proper for the present world.

After that, the third phase, UniNet used to be a center of connecting all universities and assigned the role of operators that are universities and teachers. The operator phase is the most important level to impact with the education. Basically, universities will have duties to create content of the courses, communication of a teacher and students, managing the education system, monitoring and evaluating teachers, and preparing resources for both teachers and students. While teachers will directly influence students, with monitoring and evaluating, and have duties to pass on their knowledge to students.

In this phase that presents in red because it also has 2 main problems that are, universities lacked adequate resources to support education and teachers lacked knowledge to teaching. In this time, most of the universities, especially in Bangkok, linked with the UniNet system for connecting with other and searching the resources. Ministry of University Affairs prepared the databases for UniNet in the budget of 42 Million Baht with potential to access 5 licenses in the same time. But it is still insufficient because of all 5 license's databases came from international resources, that are ABI/INFORM Full-text, DA (Dissertation Abstracts Online), ERIC (Educational Resources Information Center), MEDLINE with TOXLINE and AIDSLINE, and

IEEE/IEL. And all of these resources included the full-text project, thesis, general information, and journal which are not directly in the demand of students and teachers in Thailand because situation and environment of each author is not same as our country. It may not be suitably developed in other different surrounding, so that why we lack resources, even if we have invested on it.

Another problem is the teachers who lacked knowledge to teach. Most teachers, in Thailand, taught everything to students in boundary of each textbook style that they have. And from the government rules and compensate that decreased motivation of the teachers to make better teaching. Then memorized every word in the textbook, summarized to students in their class. A lot of teachers, especially for senior teachers, still lacked the needs of innovative knowledge to educate some experience and proper teaching in the real world to the students.

Finally, the fourth phase is employed to students. From 3 phases above that launched to operate from the top-down level, especially for the 3<sup>rd</sup> phase, will take a bad impact to the students. Students have not enough resources to study, and studied with the teacher who lacked knowledge and teach as speech of textbooks. Then it effected students to suffer enough knowledge to fight with the real world's situation and suffer to have creative idea which is knowledge. As a result, many of IT innovation software of Thailand must be bought from the international countries, although we have the Software Park project that makes the national software's progressive as the IT-2000 master plan. But now, we can mostly transfer international software to Thai language and that's it. Therefore, we will see that most graduate students in Thailand are unemployed and worked with international IT in the pattern of international control. Even this is not suitable for our country and we lost the vast budget for this sector because of unqualified graduate students.

New pyramid's model suitable for current situation of Thailand is to reform traditional university to the Virtual University in Bangkok, in the right-hand side, showed the down-top level of the infrastructure in Thailand. It is divided into same 4 principle phases that are master plan, system structure, operators, and students. But we will emphasis on the 4<sup>th</sup> phase or students as a main factors in the education. This pyramid will use of the blue color to present the new model with coordinating and unique support to the students. And will use the green color to present the main factors that must be interested and concerned with the new reformation.

From the 1<sup>st</sup> phase, both 2 nation acts and 2 master plans, are enacted as the good quality and adaptable situation in the present and future. Like the National Education Act of B.E. 2542, many international educators and journals said that it is the best nation act of Thailand that mostly included all aspects that will make possible and adaptable situation. So the problems in the past have created from the down levels more than the master plans as top level.

The 2<sup>nd</sup> phase is the system structures that constructed depending on the 2 master plans as independent of networking system in the current situation. If we reformed it to the Virtual University that will have the only one networking system as Internet, problems will be solved in many aspects.

As a result, SchoolNet was using the Internet as the network system but lacked faster cable connection, GiNet was using the optical fiber cable to operate via Internet but supported only government agencies, and UniNet was invested on optical fiber cable to link almost all universities in Bangkok areas but lacked faster cable connection. If we use of unique network system, it will help to reduce redundancy cost that makes each system have benefit of linking and sharing all information of each network system even inside of each system.

The 3<sup>rd</sup> phase that is the universities and teachers in the operator level. As current situation, the university must create content of education and prepare the resources to support teachers and students. Then teachers will take resources from the university to teach for students. But it was not satisfactory for both operator level and brought the problem such as boring teacher with decreased motivation to teach or teaching in the old fashion of problem solving that cannot adapt and use in the real world.

If we use the Virtual University, both universities and teachers must have both knowledge and resources for supported education because Internet has infinitely free resources across the world that will improve knowledge for all. So it can solve the problem such as the MUA that prepared databases for UniNet in the budget of 42 Million Baht with 5 licenses to be none. And teacher will search and study the information via Internet that will be useful for education to student and may present to university to make the research of specific content for the satisfaction of students.

In the last phase is the student. After all phases are involved, coordinated, and emphasized on this phase, the student will gain optimal benefits toward Virtual University. Both resources that operator level provided and unbound resources on Internet will make students have initiative thinking to fight with the real world with English literacy that is the international language on the net.

#### **4.4 Additional Factors for Successful Virtual Universities**

After the model, I want to suggest the extra factor that we can reach to build the successful Virtual University in Bangkok, Thailand, as follows:

##### **4.4.1 Build a Unified National Information Infrastructure (NII)**

Like as the IT-2000 master plan that has been recommended before. NII was significant for every step of development. It's a benefit to open up new opportunity and

equality for education and personal development, and to create a more open and equal access to basic public services.

In the present of system of TOT, they used the network system called "Public Switched Telephone Network" (or PSTN) that was the central of a telephone exchange and distributed to each customer via telephone line and the cost will depend on the distance between the customer location and a telephone exchange. So that will make the higher cost for distance using because TOT must have a lot of technical support, equipment, and a telephone exchange plus redundancy of maintenance cost.

This sector is the important problem effected with the NII in Thailand. If the basic of communication is cheaper, people will increase the rate of transfer voice and data information. Then TOT will reduce their cost.

The newest IT system is the most important for the NII of developing countries. It will help the distant province to communicate globally with low cost even if they have no books or instructors. They can talk with people globally and request for recommendation of expert in the way that they want. That's why every country tried to bring the new way of IT to adjust their infrastructure network and find out the network that will invest at once.

Now, TOT tries to reformed the new technology called "Voice Over IP" (VoIP) that will increase the capability of information transfer of sound and data (fax) in each region of Thailand. This service is called "economY Telephone" or Y-Tel 1234 that will transfer voice/fax data via IP network system that uses Internet technology. It will help communication to reduce the cost and benefit in future.

#### 4.4.2 Build a Unified the Information Technology Infrastructure for Higher Education

The problem is Ministry of Education (MOE) build the school infrastructure network, called "SchoolNet", that provides the resources and link for all in Thailand.



But this project is not the unique with another education system, that is UniNet. Both of them tried to develop their own system instead of coordinating to help each other or combine network system to a unique one. The cause of this problem is that they have invested for their network, hardware, software, and other equipment already. If they want to coordinate together, the budget that is in use will lose and must start with it again.

Actually, this cause will effect to make a repetition of redundant cost for IT infrastructure network. MOE and MUA must find out the way to join network system together because all of them have objectives to give knowledge to students.

#### 4.4.3 Build a Unified University

Universities in Thailand independently developed their contents and courseware of teaching. It is the right thing to make varied for students who are interested in difference. But it is not a proper way of beginning the newest education like Virtual University that must coordinately create content of education that they are skillfully expert in and exchange independent information with others via UniNet system. At starting, the famous university must lead to establish the content and courseware of Virtual University because students who want to study via Internet will be looking for the confident university and will benefit for their work-life after they have graduated. And if only universities, which are expert in the specific content, can create courseware and content that is famous. It also attract students to study via this reformation.

#### 4.4.4 Invest in Instructors & National Resources

In the situation of education that educated via Internet, instructors must have knowledge about Internet with applications in use. And instructor must build the necessary area of Internet using for students like the Personal Computers (PC) are used for many purposes to make complete homework such as word processing. But right

now, a lot of teachers have no knowledge about IT as much as they need. So Instructor is the one factor that we must invest on to improve the ability of creativity and teaching.

Resources is the important factor that will gain more ability of creativity of both teachers and students, if it is properly prepared. We have leased and looked for the international resources that are completely made. But national resources of Thailand still lacked creativity though it is vital to immediate use in our country. So government must invest and prepare the budget for this sector to develop more national resources for students to make creative idea and support education.

#### 4.4.5 Invest in Students

IT-2000 project has targeted to eliminate the current critical shortage of IT manpower at all levels as well as to meet the expected huge demand growth in future, and to fulfill the aspirations of all citizens to continue education and skills upgrading without regards to age, profession, distance, geography, or physical disability. Even in the National Economic and Social development plan No.8, the government policy is to extend compulsory education from 6 to 9 years up to 12 years, and most schools and universities in Thailand realized about the significance of IT by making up a course about IT.

However, the students still lack the right moral in IT aspect. The statistic number is shown that 87.9% of Internet users are higher student (see Table 3.4), and use Internet to gain more knowledge as 93.3% (see Table 3.1). But 77.54% of Internet users, as seen in Table 3.1 is the big problem that we must look at. Routine use of them, who used Internet for entertainment, almost used in E-mail, Chat, and some wrong using like pornographic web site. So education via Internet will not impact to the improvement of the country, if teachers and government do not bring up the right moral of using Internet for students.

## 4.4.6 Internet Nationwide

Internet is the most powerful communication of today. The organization that served is commonly called "Internet Service Provider" or ISP. All of them have a primary objective to get benefit and compete with others by reducing cost of Internet using or added value for each ISP like e-mail (user@company.com) or on-line check the using hours that will directly benefit to customer. It did not directly support for education, but it gives more chance for Thai people and students to use the net.

Now CAT has a new project called "IP Access" that is the opened ISP that gives opportunity for education and ISP's customer in many provinces via their network called "CATNet". This project may give the opportunity for Thai People to freely access toward Internet as American people did. This is quite a good opportunity for education, but unfortunately now it is still in the process of development and policy ([http://www.cat.net.th/new/Services/IP Access /ip access .html](http://www.cat.net.th/new/Services/IP%20Access/ip_access.html)).

## V. CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Conclusions

Virtual University is the new reformation of higher education by using "World Wide Web" (WWW) to provide a new opportunity for distant students to study via Internet technology including the courses, exercises, resource references, and communications. Ministry of University Affairs (MUA) established the center of distance university system called "UniNet" by using leased line cable.

The purpose of this project is to assess the possibility of higher education to create Virtual University via Internet in Bangkok, Thailand. The main subjects were UniNet and Ministry of University Affairs (MUA). The data were collected with the use of both primary (UniNet) and secondary sources (journals, textbooks, and web sites), including the questionnaire about Internet user profile of Thailand from NSTDA and NITC's book. It took 3 months to complete all data collection procedures. And used all related data to analyze the new model of university system for Thailand and explained the real situation, both past and present, in Thailand.

Chapter 2 showed the data collected the history of technology in education, history of higher education in Thailand, and on the road of Virtual University of both international and national to show about innovation and development of IT that is always used in education for a long time. It summed up with the technology based distance education that used in Virtual University such as audio technology, video technology, and Internet conferencing technology.

Chapter 3 showed the present that Internet users believe that Internet is the way to mainly gain more knowledge, increase speed of information acquisition, increase speed of communications, and plus with be entertainment for them. Benefits of Internet pointed the possibility directions to increase power of new education in Thailand. In

aspect of Internet, it showed estimate population of Internet User in Thailand was growing nearly double in every year. And in this year, we have Internet User more than 1 million people, or around 1.6% of total population, in Thailand. Additionally, most of the Internet users are people aged between 20-29 with studies in Bachelor and Master degree as highest.

From this reason, if the growth of Internet users in Thailand will increase nearly double like this, the amount of Internet users will help to forecast and realize that Internet users in Thailand will grow faster than in the past. And whenever Internet is still around people, education must change to this point to give the best solution with improved network and low cost, especially in Bangkok areas that have the growth of the diffusion of Internet User up to 54.37% of the country.

About current situation of higher education in Thailand, I concluded as the strength and weakness of the current situation that Thailand has a good planning in master plan but lacked operation and reduction of budget, but we also have UniNet with optical fiber to completely link all universities in Bangkok area. So we urgently needed to reform the new education to meet the minimum cost and high capacity for students as Virtual University system.

Chapter 4, I discussed about how to make the possibility of Virtual University in Thailand with a new model of reforming higher education into Virtual University.

First, I come out with the benefit of reformation toward Virtual University in "4P" (product, price, place, and promotion) that is famously used in marketing. It can also adapt to obviously show briefly the difference in the 4 main aspects between the tradition and new system, even if we have some systems that is already used like this system. I pointed that Virtual University will reduce the amount of hard copy in paper, to digital form for safe the natural environment resources of the world with easy to



repeat update as many times. Reduction cost of establishment of the building into main fix-cost of network cable. Integration faculties in the one room with any time and any place to access. And also publishing each university in unbound world to millions of linking via the net.

After that, "SWOT" analysis (Strength, Weakness, Opportunity, and Threat) was used to explained more clearly to understand about character of Virtual University. There I concluded that Thailand has possibility to make the Virtual University which strongly benefit to support any plans, but the pressures are from the government and economic crisis that caused the reduction of budget; even though this reformation will help our country to expand education through the economic crisis.

After all the results, I showed diagrams of the successful model for Virtual University that will go through all the plans that we already made and will make benefit direct for students. The 2 pyramid's diagrams showed about how to reform the current situation of university in Thailand to be new form of Virtual University. Each of the pyramids can divide into 4 principle phases that are master plan, system structure, operators, and students.

In the current situation of university in Thailand, in the left-hand side, showed the top-down level of the infrastructure in Thailand. The first phase, we have stressed on the master plan that can divide into 4 main plans that are National Education Act of B.E. 2542, National Economic and Social development plan no.8, and IT-2000 & MUA plan. We stressed on designing and planning that is presented in green, it means quite good to be a guideline to make the flexible infrastructure in the future of Thailand.

Then, the second phase, IT-2000 and MUA plan used to set up the 3 main system structures for infrastructure network in Thailand which are UniNet, SchoolNet, and GiNet. It assigned the UniNet support to be the center of universities in Thailand,

SchoolNet support to be the resources center of compulsory education or schools, and GiNet support to be the center of government agencies. In this phase it is presented in red because we found the main problem that is the independence of each infra-network.

After that, the third phase, UniNet used to be a center of connecting all universities and assigned the role of operators that are universities and teachers. The operator phase is the most important level to impact with the education. In this phase it is presented in red because it also has 2 main problems that are, universities lacked adequate resources to support education and teachers lacked knowledge to teach.

Finally, the fourth phase is employed to students. From 3 phases above that launched to operate from the top-down level, especially for the 3<sup>rd</sup> phase, will take a bad impact to the students. Students have not enough resources to study, and studied with the teacher who lack knowledge and teach as speech of textbooks. Then it effected students to suffer enough to fight with the real world's situation and suffer to have creative idea that needs knowledge.

New pyramid model that is suitable for current situation of Thailand is to reform traditional university to the Virtual University in Bangkok, in the right-hand side, showed the down-top level of the infrastructure in Thailand. It divided into the same 4 principle phases that are master plan, system structure, operators, and students. But we will emphasize on the 4<sup>th</sup> phase or students as a main factor in the education. This pyramid will use of the blue color to present the new model with coordinating and unique support to the students. And will use the green color to present the main factors that must interest and concern with the new reformation.

From the 1<sup>st</sup> phase, both 2 nation acts and 2 master plans, are enacted as the good quality and adaptable situation in the present and future. So the problems in past have created from the down levels more than the master plans as top level.

The 2<sup>nd</sup> phase is the system structures constructed depending on the 2 master plans as independent of networking system in current situation. If we reformed it to the Virtual University that will have the only one networking system as Internet, problems will be solved in many aspects.

The 3<sup>rd</sup> phase that is both universities and teachers must have both knowledge and resources to support education because Internet has infinitely free resources across the world that will improve knowledge for all.

In the last phase that is the student. After all phases are involved, coordinated, and emphasized on this phase, the students will gain optimal benefits toward Virtual University. Both resources that operator level provided and unbound resources on Internet will make students have initiative thinking to fight with the real world with English literacy that is the international language on the net.

Then finally, I suggested the extra factor that we can reach to build the successful Virtual University in Bangkok, Thailand, that is to build a united National Information Infrastructure (NII), build a united Information Technology Infrastructure for higher education, create expert of unification University, invest in instructor & national resources, invest in students, and invest in Internet Nationwide.

### 5.2 Recommendations

This project indicated that both 2 master plans and 2 nation acts in Thailand were ready and interested to reform the education system, but still have problems in aspects of system structures and operational levels toward students. So that, government must support more budgets in any aspects of education sector, especially for higher education that will directly effect though development of the country. Another thing is MUA must look at the possibility for one-time cost of high-speed networking that will help our

country even in economic crisis, plus with coordinating of all main projects as unity system.

Finally, I concluded that all the things that we already created are not lost for reformation, but only thing that we make is the plan. Current situation of Thailand has collapsed after Thai Baht crisis until now, we must "Do as Planned" because we already passed the phase of planning. So this reformation of higher education will help us to make the possibility of concept "Plan to Do and Do as Planned".

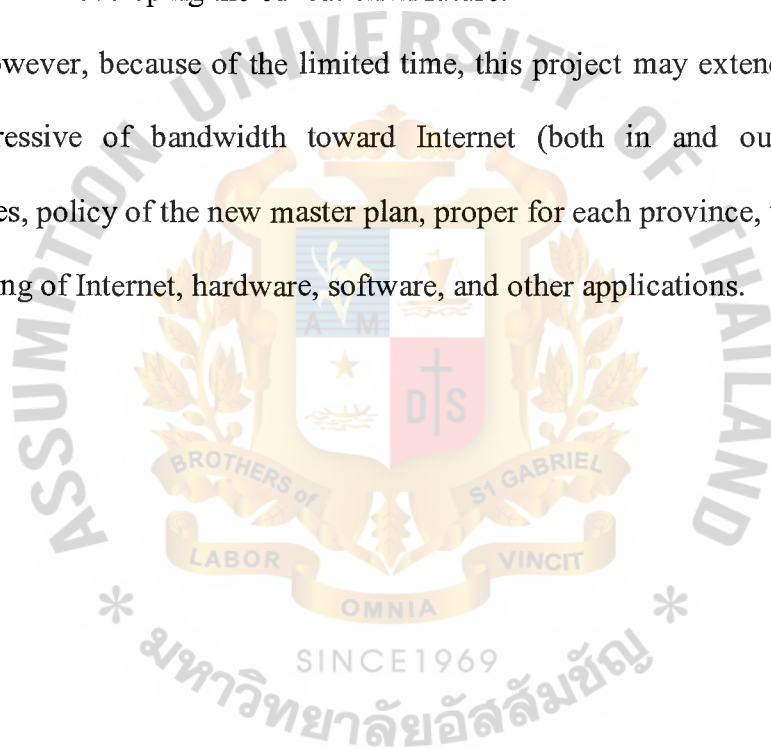
The reformation of education by using Virtual University via Internet will emphatically benefit students and their motivation about studying with computers via Internet. And in E-Society, like this time, that computer has become the one of vital thing such as E-mail, E-Businesses, E-Company, and E-Commerce, this reformation would be useful for them in later life and also fully prepare knowledge based IT for students to solve all crisis of our country in the future. Because we could not predicted when crisis will take, then the only thing that we do is protect and prevent the chance of having a crisis.

The international governments have taken interest in this reformation and supported famously the international universities to readily establish on this reformation such as Stanford University (<http://standford-online.stanford.edu>), and Penn State University (<http://www.worldcampus.psu.edu>) of United States. And also in Thailand's universities, we have many universities that planned and developed Virtual University via Internet as well. The universities that are obviously in processes of development such as Suranaree University of Technology, Kasetsart University, and Naresuan University. So, I trust that in the near future, Virtual University would be established in Thailand by both progressives of all universities and government's cooperation. That is the main purpose of this project.

### 5.3 Further Study

This project has focused on the higher education as target and tried to explain the possibility to creating Virtual University in Bangkok, Thailand with information related to master plans, system structure, operators, students, and Internet users. So I could say that most of this information were related to higher education, that are MUA and UniNet system. Therefore, I want to suggest that it may need to find the best solution in that time that may not be the Internet. But we can also use the model of V.U. to be the guideline for developing the education in future.

However, because of the limited time, this project may extend to study in aspect of progressive of bandwidth toward Internet (both in and out bound), network topologies, policy of the new master plan, proper for each province, using of equipment, and pricing of Internet, hardware, software, and other applications.





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