CHAPTER 3

EDUCATION IN THAILAND
3.1. HISTORY OF EDUCATION IN THAILAND

1) Education in Sukhothai Period (About 1219 – 1530)

This was the first period that Thai people had their own national alphabet to replace Khamier alphabet. It was King Ramkhamhang the Great who invented the Thai alphabet in 1282. At that time temples were important learning places. Only boys had opportunity to be educated. Monks acted as teachers. The main purpose of teaching was Buddhism. Other lessons were taught at home, for example, vocational lessons, custom and tradition.

It might be said that education in that period was Learning by Doing.

Picture 3-1 : The Thai Alphabet of King Ramkhamhang
2) Education in Ayuttaya Period (1350 – 1767)

In this period, temples were still important learning places. Foreigners began to travel to Thailand. The first nation that came to do business with Thais was Portuguese and some time later they began to make known their own religion. After that more and more nations began to come in. It was likely that in the reign of King Narai there was a religious school belonging to French reverend brothers. Thai students, especially those who were form high class, were sent to France to study. As for people from common class especially boys were educated in the temples and them had careers by keeping doing what their parents had done before.

When foreigners built schools in Thailand and began teaching, King Narai thought that it was a disadvantage if Thais didn’t have their own textbooks written in Thai. The king then assigned a government official to write the first textbook entitled “Chindamanee” for Thai children and the book had been used till the beginning of Rattanakosin Period.

Moreover, in the reign of King Narai, there were several good books such as Surkokamchan, Samutkotekamchan, Lilitpralaw.

3) Education in Thonburi Period and in the Beginning of Ratanakosin Period (1767 – 1868)

After the fall of Ayutthaya in 1767, and following a brief Thonburi Period, the capital city of Bangkok was founded in 1728 by King Rama I (1782-1809), the first King of the present Chakri
Dynasty. He made an impact on the development of public education by reforming the Buddhist Church.

Education in Thonburi Period was not much different from education in the previous periods. Temples were important learning places. Teachers were not professional teachers. They taught because they were interested in teaching so the number of students were restrictive. The teaching aids used at that time were just blackboards and white chalk. The subjects that were taught were Thai and arithmetic.

Education at home dealt with manner, custom and tradition. It also included vocational lessons which were taught from one generation to another generation such as handicrafts, dances and flowers arranging. The boys who were nobles, after they were literate, would learn how to govern the country and then became a clerk in the department in which their fathers worked.

Thai education became modernized in the reign of King Rama III. More missionaries entered the country and introduced new things such as medical science and typing which were fundamental in Thai education.

Modern technology in the form of the printing press entered Thailand with the coming of Western missionaried and merchants in the mid 1800's. In 1858, King Rama IV (1851-1865) commanded the government to establish a printing press for its own use and began to print the Royal Gazette or Rajkitchanubksa which has continued till the present day. For the first time, printed books were available in the Thai language showed in picture 3-2 as below.
During the early Bangkok period, a number of treaties were concluded with foreign powers, mostly in the form of a Treaty of Friendship and Commerce. Since English became the lingua franca of the Far East, King Rama IV realized that the kind of education provided by the monastery and the court was not adequate for future government officials. For this reason, he commanded that measures be taken to modernize the education of the country and a good knowledge of English would form a part of the new educational requirements, as it had become a necessary key to further knowledge as well as a medium of communication with foreigners.

4) Education in the Reign of King Chulalongkorn (1868 – 1910)

King Chulalongkorn is Thailand's most beloved monarch and was Siam's great modernizer and visionary. He was deeply committed
to improving education in Siam, and also introduced fellowships to allow Siamese to study in Europe.

The policy of educational modernization was further pursued by King Rama V. Recognizing the need for better-trained personnel in royal and governmental services, he opened a school in the palace to educate young princes and the sons of nobles in 1871. This was the first Thai school in the modern sense as it had its own school building, lay teachers and a time-table.

A learning place called “the school” was founded for the first time in 1871 in the reign of King Chulalongkorn. The king realized that it was education rather than any other thing that made the country in progress. It might be stated that education reformation started in his reign. Immediately after the setting-up of the first school, the Command Declaration on Schooling was issued for this purpose. Although, it is interesting to note that the Command Declaration on Schooling signifies the advent of a formal education in the reign of King Rama V, the fact remains that the education system at that time was essentially for the elite. Soon afterwards, he set up an English school in the palace to prepare princes and court children for further studies abroad as well as a number of schools outside the palace for the education of commoners' children.

The king himself was well-educated when he was young. His education was both in Thai aspect and in western aspect. Unexpectedly, there were invasions of western empires in South East Asia. Siam, as Thailand was called at that time, lost outer Khamier as the result of 1867 Treaty. The Thai nation had to adapt in every aspect
for its survival. Reformation in all aspects were needed. To achieve this, modernized and competent human

Resources were required. Unfortunately, there was a shortage of such resources in government service. The king then had encouraged his people to be educated so he pushed forward on modern education.

Picture 3-3 : School for Boys

Picture 3-4 : School for Girls

Picture 3-3 & 3-4 : Education in the Reign of King Chulalongkorn
In 1887, King Rama V established the Department of Education to oversee the Kingdom's education and religious affairs. At the time of its inception, the Department had under its jurisdiction, 34 schools in the metropolitan and provincial areas, 81 teachers and 1,994 students, including 4 other advanced schools in the metropolis. It is worth noting that the implicit significance of the establishment of the Department of Education lies not in the scope of its responsibilities but in the fact that education in Thailand was on its way to being a planned enterprise, more systematic than ever before, and that education also had its own spokesman to speak for its worthy cause.

The Department of Education became a full-fledged Ministry of Education on April 1, 1892, as a result of King Rama V's experimental measures in administrative and political reform with a view to establishing 13 ministries.

By virtue of the 1892 Declaration, the control of private schools, in their rudimentary form, was introduced. A development in this respect reflected that the private sector had come in to share the educational responsibilities with the Government.

Queen Sribajarindra had the *Saowabha School* for girls established in 1897. From the beginning of the twentieth century onwards, women's educational development in Thailand went from strength to strength.
In 1871, the first government school was founded. The textbooks were merely those prepared by the government. The students were government officials’ children and those from royal families.

In 1878, Suan Anan School was founded and was located at Nanta-utayan Palace. The lessons were languages and arts of western countries.

In 1885, a private school was founded. Its name was Mahannaparam School. Twenty-nine more private schools were founded in the same year.

In 1892, H.E. Pasakornwong (Pon Boonnark) became the Minister of Education. He was the first Education Minister and he was ordered by King Chulalongkorn to do “Education Extension Project” covering three rules below:

Rule 1: Education curriculum for ordinary schools.

Rule 2: Scope of what to be taught in lower ordinary schools in rural areas.

Rule 3: Schools in Bangkok.

(54)
Under King Chulalongkorn’s successor, his son King Wachirawut (Rama VI), (1911–1925), a compulsory education act was passed in 1921. By the time of the fall of the absolute monarchy in 1932, approximately 80 percent of the country had access to primary school facilities.

From the reign of King Chulalongkorn until now, education plan has been called differently and the subject matter has been changed according to social condition, economic and politic in each period. The main purpose of studying in every education project or in every education plan was to provide an opportunity for every citizen to be literate. They were expected to be able to apply their knowledge in their careers. Every government aimed at following education plan strictly because it was like law, as stated below :-

1) **The Education Project in 1898** was the first Thai education project. There were two parts of education; one dealing with education in Bangkok and the other dealing with education in upcountry. This project was not administered; however, it was the model project of the later ones.

2) **The Education Plan in 1902** was the cause of education system.

3) **The Education Plan in 1907** was the cause of secondary education which had 3 curricula namely general knowledge, special knowledge and languages. Each curriculum put more emphasis on English language learning and other subjects. This was because they needed teachers training to solve the problem of not having enough teachers. Besides, they wanted more students to study abroad.
4) **The Education Plan in 1909** had its purpose changed from training people to be government officials to educating people. Moreover, there was an improvement in vocational education in lower levels.

5) **The Education Project in 1913 and The Education Project in 1915** were the cause of education extension for ordinary people whether they were boys or girls. As a result of this, the number of graduates were more than the positions which were available for them. This was the cause of unemployment later.

6) **The Education Project in 1921** existed as the result of elementary education act in 1921. There was an extension of compulsory education but the act could not be passed to all villages. Although there were more schools and more teachers, they were not enough. Education was not good enough.

7) **The National Education Plan in 1932** made the elementary education act come into force in all villages in 1935. There were four levels for elementary education. The students who finished the fourth level was in a low rate, about 17-20 percent.

8) **The National Education Plan in 1936** paved the way for municipality schools in all villages. The students who finished the fourth level was still in a low rate, about 17-20 percent. After World War II, the number of the students increased but did not reach the rate of 50 percent. There was an extension in other levels such as in vocational education. The government tried to build vocational schools in all provinces according to the appropriate location and the people’s interest. The subjects like woodcraft and weaving were taught in these schools, which located in every province but this idea
was found unsuccessful because people were not interested. This was because vocational schools in each level were self-completed.

9) The National Education Plan in 1951 paved the way for a trial on quality improvement project which was important for the progress in Thai education both in quantity and in quality and it is good for education management in Thailand at the present time. Vocational education needed advanced levels in studying and specific fields of knowledge so the government tried to persuade more people to study in vocational schools because they had a chance to continue their studies in universities.

10) The National Education Plan in 1960 extended compulsory education to 7 years. This was 51.43 percent of all villages in the country. Teacher training was urgently needed and finally there were more teachers than they were expected. The rate of the students who failed in the exam was about 15 percent in 1968-1976. This was because the curriculum purpose was so extensive. Teachers could not apply the curriculum appropriately.

11) The National Education Plan in 1977 decreased the time requirement for compulsory education from 7 years to 6 years. There was great improvement in education quality in every level of both formal school education and informal school education. Informal school education was extensive in two aspects both general education and vocational education.
3.2. DEVELOPMENT OF EDUCATION IN THAILAND

In doing Education Extension Project, a method for compulsory education management was defined. Fundamental schools were built in temple areas. Education Act was issued. Students aging between 7 and 15 were to attend their classes. If any boy or girl did not go to class, he or she would be sent to a Reform School, where he or she would be forced to study different subjects and to do handicrafts as well. It was the first time that a person in charge of education applied law in education management. As a result of this, more people were educated. Education became more systematic in 1898.

In 1898, the first *Education Plan* was launched. It was divided into 2 parts: the first concerned with education in the Bangkok area while the second with education in the provinces. The most significant feature of this Education Plan was that the educational organization had covered all levels namely; pre-primary, primary, secondary and technical education up to higher education.

In 1901, the first government school for girls, *the Bamrung Wijasatri*, was set up in Bangkok.

The 1902 *the National System of Education in Siam* retained all the education levels of the 1898 Plan and reshaped them into 2 categories; namely, general education and professional or technical education. Another feature of this plan was that a variety of age limits for admission was imposed to motivate graduation within a scheduled duration.

In 1907, education for girls was restricted because schools were in the temple areas and it was not proper for girls to enter the temples.
In 1913, the first women teacher training school was set up at the Benchama Rajalai School for girls. And the School of Arts and Crafts (Poh Chang) was set up in Bangkok.

In 1916, higher education emerged in Thailand as Chulalongkorn University was founded with 4 faculties: Medicine, Law and Political Science, Engineering, and Literature and Science.

![Picture 3-6: Chulalongkorn University](image)

![Picture 3-7: Students of Chulalongkorn University](image)
In 1921, the *Compulsory Primary Education Act* was proclaimed.

The Year 1932 heralded a period of historical change in Thailand as a constitutional monarchy system replaced the traditional system of absolute monarchy. *The first National Education Scheme* was thus devised whereby individual educational ability regardless of sex, social background or physical conditions would be formally recognized.

The current ruler, H. Bhumipol Adulyadej (King Rama IX) (b. 1927), who has shown a great commitment to education, is the longest-reigning monarch in the world. The fact that Thailand was never colonized has had important implications for the evolution of its educational system, which for the most part uses the Thai language and script.

In 1960, compulsory education was extended to 7 years. In addition, special provisions were, for the first time, made for disabled children, who were originally exempted from compulsory education, so that they might be given some form of basic education, regardless of their handicaps.

In 1977, Thailand's educational system was changed from a 4-3-3-2 structure to a 6-3-3 system wherein six years of compulsory primary education is followed by three years of lower secondary school and by another three years of upper secondary schooling, which is still in use nowadays.

From the year 1977 right through to the present day, it can accurately be said that all of the efforts made by the Ministry of Education have been geared towards one direction, which is to
provide educational services as a means for a better quality of life and society.

Gerald Fry reported that during the four decades that followed the establishment of a constitutional monarchy, Thai politics were dominated by the military, primarily under the leadership of the field marshals Pibul Songgram, Sarit Thanarat, and Thanom Kittikachorn. During this period there was a great quantitative expansion in Thai education, with the goal of providing every village with a school. Also, there was a significant expansion in secondary and higher education. Despite such expansion, the most common level of education for most Thais remained only the completion of four years of primary schooling, hardly adequate for sustaining literacy in a complex written language such as Thai. During the first part of this period, Thailand had a 4-3-3-2 structure of education, with four years of lower primary schooling, three years of upper primary, three years of lower secondary, and two years of upper secondary. The 1960 National Scheme of Education brought in a 7-3-2 system, with seven years of primary schooling, three years of lower secondary education, and two years of upper secondary.

Also during this period, there was a serious lack of unity in education. The powerful Ministry of the Interior, responsible for local government, was in control of most primary schools, while the Ministry of Education was responsible for most secondary schools, and the University Bureau (later to become the Ministry of University Affairs) was responsible for higher education. Largely as the result of a close Cold War alliance with the United States, Thailand received substantial foreign aid, which enabled many Thais, particularly in the
civil service, to receive fellowships for graduate study in the United States.

Two major changes emerging from this period were a new National Scheme of Education (approved in 1977), which established a 6-3-3 education structure. With six instead of seven years of primary education, universal primary education was more attainable. Under the previous seven-year primary system, many rural youth were completing only four years of education. The second change, approved in 1980, was the return of the control of primary education to the Ministry of Education from the Ministry of Interior. This period saw the continued expansion of education at all levels. By 1980, Thailand had more than three hundred colleges.

The 1980s and early 1990s saw Thailand achieve rapid macroeconomic growth led by rapid export expansion and industrialization. With an abundant supply of cheap labor, Thailand became an attractive site for offshore manufacturing, particularly from Japan. However, as wages rose in the mid-1990s, Thailand's international competitiveness declined. With its workforce's relatively low average level of education, Thailand's ability to raise its productivity was limited.
Thailand's economic crisis became globally known on 2 July 1997, when the government allowed the Thai baht to devalue. Thailand subsequently went into its worst economic recession since the end of World War II. However, as an important part of the response to the crisis, major political and economic reforms have been introduced. In the education area, a new National Education Law, mandated by the new 1997 constitution and promulgated in August 1999, makes nine years of education compulsory and requires that all Thai citizens be guaranteed twelve years of free education. The law also mandates the implementation of key education reforms. Two key elements of the reform are decentralization of education to Local Education Areas and school-based management and the reform of learning to a participative learner-center approach. To the extent that these reforms can become reality, Thailand's opportunities to be internationally competitive and improve its standard of living will be dramatically enhanced.
Boon, Jo and groups (2005) reported that predictions on e-Learning are characterized by methodological and technical constraints of disruptive technologies. For sound trend watching research, different forecasting methods can be used, such as monitoring, opinion of experts, statistical trend analysis, modeling, and scenario construction.

The authors defined the concept of quality of trendwatching reports by using four dimensions:-

1. Author and authority,
2. Accuracy of research and data collection,
3. Accuracy of the document, and
4. Objectivity of the presented content.

Wikipedia (2007) reported that Education in Thailand is provided mainly by the government through the Thai Ministry of Education. Education is divided into two major levels with 6 years of elementary / primary school (Prathomsuksa) and 6 years of high / secondary school (Mattayomsuksa). After 2001, the Ministry changed the system of education into 'Children Centre,' and divided into four levels: the first three years in elementary school is the first level, the second level is the other half, the third level is the first three years in high school, and the last is the other half of high school. After each level, students need to pass the National Educational Test (NET) to graduate. Children are required only to attend six years of elementary school and at least the first three years of high school. But, if they have graduated the sixth year of high school, there are two important tests following: Ordinary National Educational Test (O-NET) and
Advanced National Educational Test (A-NET). After graduating from high school, lots of students in the major cities like to continue their education in bachelor level, so they need to pass Central University Admission System (CUAS) which contains 50% of O-NET and A-NET results and the other half of the forth level Grade Point Average (GPA). Since 2001, Thai Education has changed its face. Lots of students in the major cities don't like the CUAS system and protest it, because there is no standard of GPA result from each school, but there is opposite situation in country area. So, some university boards decided to avoid the problems by receiving students before the CUAS.

There are public and private schools. Some local schools have only elementary school and 3 years of high school.

Teachers have been criticized for looking the other way when students and colleagues plagiarize. Some believe that the allowance of plagiarism stifles learning and creativity in many Asian countries.

3.3. CRITERIA

The Thai education curriculum is:-

1) e-Learning Function Model

To understand how different systems might work together, it is useful to have a simple functional model of an e-Learning application environment. Figure 5 below provides a visual representation of the components that make up an e-Learning environment and the objects that must be moved among these components. This is not an architecture reference model for use by
engineers but rather a conceptual model that can be used to position e-Learning products and their functionality in an e-Learning environment.

Source: Eduworks Corporation, 2002 - www.eduworks.com

Figure 3-1 : e-Learning Functional Model

2) Model of School e-Learning System

Each school consist of :-

2.1) Hardware

- School Control Room uses LAN System link to data at classrooms and school control room
- Intelligent Classroom

2.2) Software

- Learning Management System (LMS)
- Courseware
2.3) Training

- Continue teacher and students training: 12 times per year

2.4) Evaluation

- Evaluate and solve problems with schools

2.5) Operation

- Classroom Model in school e-Learning system

The model of school e-Learning system is shown in figure 7 as below:

![Diagram of e-Learning system]

Figure 3-2: Model of e-Learning for School
SSL ONLINE SYSTEM

SSL ONLINE is e-Learning system to study in this thesis because there is lessons straight mostly Thai education curriculum.

1) Introduction

1.1) Project Objectives

SSL ONLINE System has been developed to support teaching and learning in order to achieve key objectives —— the learner's fundamental knowledge after each lesson and the problem solving of those who fail. With this SSL ONLINE System, a summary of important subject matter is assigned including remedial exercises and tests so that the students can practice and evaluate themselves.

1.2) Expectations of SSL ONLINE System

SSL ONLINE has two main points:-

1.2.1) The student is able to learn and develops his or her own potential.

1.2.2) The teacher is able to suggest a suitable activity and a way to acquire knowledge so that the student can seek for it.

1.3) Principles

There are four principles as listed below :

1.3.1) Content

SSL ONLINE consists of the following essential contents:-

a) The contents are considered in accordance with informative learning such as mathematics, science, English, social studies and Thai.
b) The learning process must be complete in itself and go on step by step as stated below:

- Forming concept
- Order of presentation and method
- Giving examples
- Doing exercises (keys are given)
- Talking an examination and evaluating

1.3.2) Classroom-like situation

For each lesson, the teacher can choose the appropriate activity for his or her student so that he or she will learn efficiently for instance, through assignments, chat, web board and video visual. These will help the student to learn as if he were in his own classroom and were studying a certain subject.

1.3.3) Lively content

The student can search for new knowledge which varies all the time from other sources besides the textbook so that he can compare it with the knowledge he learns from the classroom.

1.3.4) No limited extent of learning

It is the source of learning where the student can come for more knowledge at any time.

2) Learning Management System - LMS

2.1) System Overview

Learning Management System (LMS) helps the teacher to be able to write a curriculum on line easily and quickly. The curriculum may concise of teaching aids such as Word documents, tables, figures, plans, charts, video, sound, webpage, PDF documents
and other kinds. By this approach, it will take the teacher less time in preparation of subject matter for presentation. It is easier to keep the subject matter for putting in the database through web. The teacher is able to keep the teaching data as required by the curriculum, announcements, assignments, exercises and tests and is able to recall these for correction if needed later. Furthermore, the teacher can follow up his or her student’s learning.

2.2) **System Requirement**

2.2.1) *Software Requirement - Server*

a) *Operating System*: Learning Management System works on the following operating systems:

- Windows 2000 Server
- Windows 2003 Server
- Windows XP Professional
- Linux

b) *Web Server*: Learning Management System works on the following web servers:

- Apache
- Internet Information Services (IIS)

c) *Programming Language*: To set the learning management system, all of the operating systems above and the web servers must support the operation of PHP language from performance 4.1.0 up. For the complete operation of learning management system, PHP language program to be used should support the following modules:

- Set Module of GD library to support picture illustration in the families of JPG and PNG.
• While operating Windows, set zlib library module to support the use of function for data and restore.
• Support the use of Sessions.
• Support the use of File Uploading.
• Switch off Safe Mode in PHP program.
  d) Database Server: Learning Management System can work on database server “My SQL” from performance 4 up.

2.2.2) Software Requirement – Client
  a) Operating System: The client can work on the computer that supports the following operating systems:-
  • Windows
  • Linux
  b) Web Browser: The client can work on the computer that supports the following web browsers:-
  • Internet Explorer
  • Netscape
  • Firefox
  c) Every web browser above must support the operation of Flash Player from performance 7 up.
3) System Feature

![Diagram of Learning Management System](image)

**Figure 3-3: Overview of Learning System (LMS)**

The Learning Management System (LMS) as presented above consists of main properties which help the learner and the teacher to deal with the lessons efficiently. These properties are as follows:-

**3.1) Course Management:** This includes curriculum design and the addition of curriculum matter for which the activities below are arranged:-

- **Assignment:** There should be deadline, total score, online submission, teacher’s advice, and suggestions for each assignment.
- **Chat room**: Continuous communication in real situation, photograph attached in personal history, URLs Link, and pictures.

- **Choice**: Poll for surveying students' opinions.

- **Forum**: Different kinds of forum to be chosen. Students can be members and can get E-mails when they post. Scores are given for the post.

- **Journal**: This will help the teacher and the student to be able to communicate with each other and the student can reveal his or her opinion towards the subjects and can raise the problems. From this technique, the teacher may observe the student's progress in learning.

- **Quiz**: This will cover automatic grading, objective tests, fill-in, true-false matching, sampling, several alternatives. Different methods of lesson presentation are used such as Word File, Flash File, Power Point, video, sound or HTML File.

- **Survey**: The survey will reflect the student's points of view on the lesson or on the test in each subject.

- **Workshop**: From this online workshop, the student can rate himself or herself.

- **Lesson**: The lesson can be divided into units as required. The student learns and does the test until he or she understands. If there are any questions, they can be put in.

- **Glossary**: More technical terms in each subject are given. The student can add other words. There is marking system
for new words and the student can express his or her idea on the meaning of those words.

- **SCORM**: SCORM, which is formed by means of other programs is put in. This can record the scores into the system.

3.2) **Learner Management**: The examples are given below:-

- Participants
- Groups
- Grades
- Logs

3.3) **Learner Experience**

- Login
- Enrollment Keys
- Anytime Anywhere

Besides those mentioned above, there should be System Management as listed below:-

- Personal data of teacher and student
- Safety
- Adaptation of result announcement
- Assistance
- Data back up and restore

4) **Authoring Tool System**

This program works as Web Application. It is set up in the computer server and the user can use it through Web Browser. This
program consists of two parts as follows:-

4.1) **Author Plus Professional**

This program is Web Application which is designed for the teachers who are supposed to understand the students’ requirement and their learning. It is the teachers who set up the learning objectives for the subject matter and also who understand the curriculum best so they can write the lessons and manage the curriculum themselves.

4.1.1) **Program Benefits**

a) Author Plus Professional is assigned for the users who are teaching so as to enable them to prepare the lessons that suit the learner’s requirement and the learning objectives the best.

b) It is easier to learn and to use. The user need not be an expert of the computer program or have knowledge in programming or Flash earlier.

c) Author Plus Professional will keep the teacher to prepare his or her lessons in the form of text which includes multimedia such as pictures, sound, and moving pictures.

d) The teacher can produce exercises or tests of various kinds to clarify the subject matter that he or she has written. Author Plus Professional will help the teacher to do such activities more easily and more quickly.

e) The template is easy to use.

f) Twelve alternative forms of exercises can be made. This allows various usages.

4.1.2) **General Properties**
a) The user can choose the program that works through Web Browser either on Intranet or on Internet.

b) The program can be used with multimedia such as slide, sound, and animation which are used to clarify the subject matter.

c) The program can work with data in Thai, Chinese, Japanese, Spanish, French and German.

4.1.3) Program Properties for Teachers

a) It can check the teacher’s password before using the program.

b) The teacher can add the subject matter, lessons and exercises by himself.

c) The teacher can manage the curriculum structure, lessons and exercises by himself.

d) The teacher can manage the subject matter, lessons and exercises by himself.

e) The teacher can add the exercises of various types as shown below:

- Multiple Choice
- Quiz
- Dropdown
- Drag and Drop
- Drag on
- Stop Gap
- Cloze
- Countdown
• Analyze
• Presentation
• Target – Sporting
• Proofreading

f) Multimedia such as slide, sound and moving pictures can be included in the exercises.

g) The key for each question in every exercise can be given.

h) Time allowed for each exercise is stated so that the student will try to finish his or her exercise in time.

4.1.4) Program Properties for students

a) After the student has finished his or her exercise, he or she can correct and mark the exercise.

b) The total score is given and the result is shown after the student has done his or her exercise.

c) The student can make a personal note while he or she is doing his or her exercise.

d) The student can choose multimedia such as slide, sound or animation to illustrate when he or she does the exercise.

e) The student can look at any key for any question in each exercise whenever he or she wants to do.

f) The student can find out his or her report of progress. From this report, the student will know the result of what he or she has done since it records which exercise he or she has done, how many marks he or she has got, the date and time when the exercise is done and how long the exercise takes.
Report of progress can be printed as soon as the student has passed or has finished the exercise. As a conclusion, Author Plus Professional helps the teacher to produce the lessons, exercises and tests wherever and whenever he wants to. The student can learn anywhere and anytime through network. It is the program that is developed by means of Flash and can be used with all media whether it is context, picture, animation, sound or video. The file to be used must be suitable for operation on the network. The basic idea for program development is to make it easy for usage. The teacher need not have knowledge about program because such program is set in the form of template, which is easy to use. Besides, twelve forms of exercises can be selected to suit the requirement.

4.2) Results Manager

This is Web Application, which helps the teacher to recall the student's achievement report of each lesson. The teacher can follow up what he or she wants to know as mentioned below :-

4.2.1) Program Property

a) Be able to check which lesson has been attended, which exercise has been alone and in the other way round which student has attended that lesson or has done that exercise.

b) Be able to check the data and time when the student attends the lesson or does the exercise.

c) Be able to check the total time that the student spends for each exercise.

d) Be able to recall the student's score for each exercise.

e) Be able to recall the student's average score for each lesson.
As a conclusion, Results Manager has important features namely checking its operation or checking the student’s attendance, student’s data management both individual and group, showing various reports as required by the teacher whether in terms of the student or the lesson.

5) Readiness of teacher and learner

5.1) Readiness of teachers

5.1.1) The role of the teacher

Teaching and learning through ICT system is a tool to help ordinary teaching and learning. The teacher who operates the system must have a plan and a design for the subject to be taught. He must produce a lesson, a test and an exercise by himself. He must be ready to interact with the learner through different activities such as forum and chat.

5.1.2) System operation for the teacher

The teacher can operate the system through website of the system that has been set, then log in the user’s name and his password. When the teacher has already entered the program, he will be able to find the subject that he is teaching and can manage the virtual classroom and the online lesson content, can add activities, can record the study result and can follow up the student’s report.

5.1.3) The teacher’s role and responsibility

They are concerning self-taught lesson through ICT system as below:-
a) The teacher has to design the subject that he wants to teach. He must know what units he will cover, how many topics there are and what activities he will choose to help the students understand the lessons well.

b) He has to prepare a list of his students’ names and give it to the system controller so that he can put the names into the system.

c) He has to add the content to each on-line lesson and add exercises through Author Plus Professional.

d) He has to add the tests and activities through Learning Management System (LMS).

e) He has to follow up the students’ study records and their reports through Results Manager and through Learning Management System (LMS).

f) He has to integrate with his student whether through activities which the system allows such as forum and chat or through e-Mail.

g) He has to encourage the student to operate the system and to participate in learning, questioning, answering, submitting his homework and doing on-line activities.

5.2) Readiness of learners

5.2.1) The role of the learner

Teaching and learning through ICT is a tool to provide more academic opportunity for the learner and to help teaching and learning design to be more interesting and more efficiently. The learners can operate the system for studying,
reviewing on-line lessons, doing exercises and doing the tests that the teacher has designed. The important role of the learner in terms of this learning feature is that he learns by himself, which is considered to be one of the student-centre methods. The student must have his own study plan, arrange his own schedule for system operation, do exercises and tests and participate in the on-line activities that the teacher has designed. Besides, the student has designed. Besides, the student should enquire or talk with the teacher through forum or chat.

5.2.2) Learner’s system operation

a) Operate the system through the website of the system that has been set up.

b) Log in the user’s name and his password.

c) Enter the subject which has already been registered.

5.2.3) The student’s role and responsibility

They are concerning self-taught lesson through ICT system as below :-

a) The student can study or review the lessons in the subject that he has already registered. He can also do the exercises and the tests that the teacher has designed.

b) The student can perform on-line activities that the teacher has prepared.

c) The student can make inquiries or talk with the teacher through forum, chat or e-Mail.

The students can study on-line lessons from any computers which have been connected to the system. They can arrange their own schedule also.
6) Basic Structure of Thai Science

From the result of evaluation of IMD in 2005, the competitiveness in basic structure of Thailand was ranked 56th among 60 countries. In 2004, it was ranked 55th. Thailand was above four countries such as Romania (57th), Philippines (58th), Argentina (59th), and Mexico (60th), but it was below 55 countries including Asian countries such as Japan (2nd), Taiwan (10th), Korea (15th), Singapore (18th), The Republic of China (20th), India (30th), Hong Kong (38th), and Malaysia (44th).

The reasons for this were as follows:-

6.1) Investment for research and development

Investment for research and development of Thailand in the last 5 years was 0.255%, 0.26%, 0.267%, 0.258%, and 0.26% of GDP which were small especially in 2005 when compared with the country which invested for research in the first rank like Israel which invested 4.35% of GDP.

In 2005, investment for research and development of Thailand was ranked 58th which was above only 2 countries such as Philippines (0.14% of GDP) and Indonesia (0.04% of GDP), but it was below the Mean (0.04% of GDP) and below other countries in Asia such as Taiwan (2.45% of GDP), Korea (2.64% of GDP), Japan (3.12% of GDP), Singapore (2.13% of GDP), China (1.31% of GDP), India (0.84% of GDP), Hong Kong (0.60% of GDP), and Malaysia (0.69% of GDP).
6.2) Personnel for research and development

Personnel for research and development of Thailand in the last 5 years were at 14, 14, 20, 32, and 24.5 per the population of 1,000.

In 2005, personnel for research and development of Thailand were ranked 33rd. The number of researchers was 24.5 per the population of 1,000 which was less than The Republic of China which was ranked 1st and had 1,094.8 researchers per the population of 1,000. When the number of personnel per the population of 1,000, was taken for consideration, it was found that The Republic of China had over 100%. It was possible that The Republic of China included foreign researchers who worked there.

Besides, in 2005 personnel for research and development in Thailand were below the Mean (121.1 researchers per the population of 1,000) and were below other countries in Asia such as Taiwan (119.6 researchers per the population of 1,000), Korea (186.2 researchers per the population of 1,000), Japan (857.3 researchers per the population of 1,000), Singapore (23.5 researchers per the population of 1,000), Hong Kong (12.9 researchers per the population of 1,000), and Malaysia (12.8 researchers per the population of 1,000).

6.3) Patent

The total number of patents given to Thai people in 2002 was 98 patents. It was smaller than the total number given to Japan (110,053 patents) which was in the first rank. This number was smaller than the Mean (5,893 patents) and those numbers given to Taiwan (26,964 patents), Korea (24,984 patents), The Republic of
China (5,913 patents), India (537 patents), and Singapore (174 patents), but it was bigger than those given to Hong Kong (27 patents) and Malaysia (25 patents).

For the patents which got protection overseas in 2002, Thailand had 43 patents which were a very small number since most countries had more than 100 patents. Japan had 106,184 patents, Thailand was below Korea (8,673 patents), The Republic of China (633 patents), India (512 patents), and Taiwan (188 patents).

6.4) Articles on science

In 2001, United States of America was in the first rank to reveal the articles on science. There were 200,870 articles altogether whereas in Thailand there were only 727 articles. The difference was 276.3 times and was 15.26 times below the Mean (11,095 articles). Besides, when compared with the countries in Asia Thailand was below Japan (57,420 articles), The Republic of China (20,978 articles), India (11,076 articles), Korea (11,037 articles), Taiwan (8,082 articles), Singapore (2,603 articles), and Hong Kong (1,817 articles), but it was above Malaysia (494 articles).

6.5) Teaching science in schools

After the survey of top executives and middle executives’ opinions in many countries, it was found that teaching science in schools in Thailand in the last 5 years (2001 - 2005) was not good enough because the scores obtained were 4.76, 4.05, 4.27, 4.43, and 4.21 respectively from the total score of ten.

In 2005, Thailand had 4.21 scores which slightly decreased from 2004 and was below the Mean (4.73 scores), Singapore (7.56
scores) was in the first rank, Thailand was below Taiwan (7.30 scores), India (7.06 scores), Hong Kong (6.09 scores), Malaysia (6.04 scores), The Republic of China (5.62 scores), Korea (5.10 scores), and Japan (4.73 scores).

Table 3-1: International Competitiveness on Basic Structure of Thai Science in 2005

<table>
<thead>
<tr>
<th>Rank</th>
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<tbody>
<tr>
<td>1</td>
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<td>21</td>
<td>Russia</td>
<td>41</td>
<td>Slovenia</td>
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<td>22</td>
<td>Belgium</td>
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<td>Roh-Alp</td>
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<tr>
<td>20</td>
<td>The Republic of China</td>
<td>40</td>
<td>The Republic of Czech</td>
<td>60</td>
<td>Mexico</td>
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</tbody>
</table>

As a conclusion, the above data indicated that investment for research and development of Thailand was very small, personnel for
research and development were limited, and teaching science at school was not good enough, all of which would affect other criteria such as the limited number of patents both in the country and overseas and articles on science as well. As a result of those mentioned above, the competitiveness of basic structure of Thai science and technology was low.