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Thailand–US Education Roundtables

2001–2005

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Message from the Chairman of the Thailand–US Education Roundtable Steering Committee

The Thailand-US Education Roundtable Project auspiciously originated from the royal private visit of Her Royal Highness Princess Maha Chakri Sirindhorn to the University of Pennsylvania, U.S.A., in 1998. Her acceptance to serve as Honorary Chairperson of the Thailand-US Education Roundtable Steering Committee has been a great support to the project.

For project implementation, Thailand and the US have taken turn in hosting the Thailand-US Education Roundtables on policy research on higher education reform and science education. In all three roundtables previously held, Her Royal Highness Princess Maha Chakri Sirindhorn most graciously presided at the inaugural sessions, during which the royal inaugural and keynote addresses were delivered.

To facilitate discussions and deliberations of participants at the roundtables, the Thailand-US Education Roundtable Steering Committee duly selected relevant research topics, based on the framework of the Thai higher education reform and science education policy. Up to the present, 17 research projects have been conducted and submitted to the roundtables. The discussions have resulted in formulation of policy recommendations, leading to useful strategic plans for implementation of these two fields of vital importance.

As a manifestation of its gratitude to the benevolence of Her Royal Highness Princess Maha Chakri Sirindhorn, the Thailand-US Education

Roundtable Steering Committee deems it opportune to publish in a single volume all the royal inaugural and keynote addresses, thus enabling scholars and the general public to benefit from the royal wisdom and ingenuity. The research papers presented by the Thai researchers in the previous roundtables, included in this volume, will undoubtedly be beneficial to academics, administrators as well as the general public.

Lastly, the Thailand-US Education Roundtable Steering Committee wishes to express its profound appreciation of the wise guidance and relentless efforts of the late Prefessor Dr.Sippanondha Ketudat, who served as its first chairman. We hereby pledge our commitment to ensure that the trail he has blazed will continue and reach greater heights of achievement in the years to come.

The Thailand-US Education Roundtable Steering Committee would like to take this opportunity to express its sincere thanks to the Office of the Education Council, which has most competently served as secretariat of the committee, for its valuable and much appreciated services. We also thank the Graduate School of Education, University of Pennsylvania, and researchers for their continuous support and cooperation in this project.

Krissanapong Kirtikara, Ph.D.
Chairman

September 2008

Preface

Under the aegis of the programme of cooperation between Thai higher education institutions and the University of Pennsylvania, the Thailand-US Education Roundtable Project was conceived in 2001. Since its inception, the Project has had the privilege of benefitting from the continuous commitment and strong support of Her Royal Highness Princess Maha Chakri Sirindhorn, a renowned scholar well recognized far and wide for many royal achievements. In Her capacity as Honorary Chairperson of the Thailand-US Education Roundtable Steering Committee, Her Royal Highness graciously accepted to preside at the inaugural sessions of all the three roundtables, with the first being organized at Srinakharinwirot University in 2001; the second at the University of Pennsylvania in 2004; and the third at Dhurakij Pundit University in 2005.

Other than delivering the Royal Inaugural Address, Her Royal Highness Princess Maha Chakri Sirindhorn graciously presented the roundtable with a most stimulating Royal Keynote Address. Evidence can be found in the Royal Keynote Address to the second roundtable, in which she addressed vital issues that challenged educators, as well as cautioned against economic globalization that might aggravate equal opportunities among the people. Following the royal presentation, the Graduate School of Education of the University of Pennsylvania presented Her Royal Highness with an International Education Leadership Award. At the third roundtable, Her Royal Highness presented a Royal Keynote Address on “My Career in Education”, reflecting Her commitment and care and concern for the cause of education, especially education for disadvantaged groups.

The Thailand-US Education Roundtable Steering Committee is indeed most grateful for Her benevolence toward the Project, which has resulted

in various gratifying activities. Among these are 17 policy researches on science education development and higher education reform in Thailand; exchanges of information and experiences among Thai and US academics of leading universities of the two countries; and opportunities for Thai academics to observe latest academic advancement in outstanding institutions in the US, enabling them to formulate relevant strategy for science education development and higher education reform in Thailand.

The Thailand-US Education Roundtable Steering Committee deems it opportune to publish in a single volume all the Royal Inaugural Addresses, the Royal Keynote Addresses and the valuable research papers. It has therefore sought cooperation of the Office of the Education Council in its capacity as Secretariat of the Steering Committee to produce this publication, which would undoubtedly be beneficial to scholars, academics, administrators and the general public.

Finally, the Office of the Education Council avails of this opportunity to express its warmest thanks and appreciation to the University of Pennsylvania, Srinakharinwirot University and Dhurakij Pundit University for having graciously accepted to host the Thailand-US Education Roundtables with such apparent resounding success.

Amrung Chantavanich

Amrung Chantavanich,Ph.D.
Secretary-General
The Education Council

Preamble

Background

Pursuant to the royal private visit of Her Royal Highness Princess Maha Chakri Sirindhorn to the University of Pennsylvania, U.S.A., on October 26, 1998, the Project on Thailand-US Education Roundtable on Research on Science Education Policy and Higher Education Reform was conceived. On the occasion of the royal visit, Her Royal Highness received briefings on programmes and activities of the Graduate School of Education of the University of Pennsylvania. Following the briefings, Her Royal Highness deemed it appropriate for the education reform efforts of Thailand to benefit from achievements of the University of Pennsylvania. In this connection, Her Royal Highness has initiated cooperation in academic affairs between the University of Pennsylvania and educational agencies concerned in Thailand, through strengthening of teaching-learning activities, curriculum and evaluation, especially the teaching of mathematics and science in our country.

In response to the royal initiative, the Office of the National Education Commission (ONEC), currently known as the Office of the Education Council (OEC), submitted a proposal to the National Education Commission, currently known as the Education Council, which authorized implementation of the Project on the Thailand-US Education Roundtable. Project implementation has been under guidance of the Thailand-US Education Roundtable Steering Committee, of which Her Royal Highness Princess Maha Chakri Sirindhorn has been graciously serving as Honorary Chairperson. Professor Dr.Sippanondha Ketudat served as Chairman of the Steering Committee during the period 2000-2006. Its present chairman is Dr.Krissanapong Kirtikara, while Dr.Siriporn Boonyananta, Deputy Secretary-General of the Education Council, has been serving

as member and secretary of the Steering Committee (2000-present), with the Educational Policy and Planning Bureau of the OEC acting as secretariat of the Project.

The main responsibilities of the Thailand-US Education Roundtable Steering Committee include: planning and initiating research on science education policy and higher education reform in Thailand; supervision and monitoring of research activities leading to formulation of policy recommendations; planning and organizing Thailand-US Education Roundtables and related activities; and representing Thailand at each roundtable. Meanwhile, the Graduate School of Education of the University of Pennsylvania has also established a counterpart secretariat for the US Steering Committee.

Measures Taken

Thailand and the US have agreed to alternate hosting the Thailand-US Education Roundtables, three of which have been organized as follows:

The First Roundtable, organized at the Imperial Queens Park Hotel and Srinakharinwirot University, Thailand, on January 7-9, 2001;

The Second Roundtable, organized at the University of Pennsylvania, U.S.A., on April 8-9, 2004; and

The Third Roundtable, organized at Dhurakij Pundit University, Thailand, on November 7-8, 2005.

In this connection, Her Royal Highness Princess Maha Chakri Sirindhorn most graciously presided at the inauguration of all three roundtables, reflecting her keen interest in the field of educational development. On the occasion of the Second Roundtable, the Graduate School of Education, the University of Pennsylvania honoured Her Royal Highness Princess Maha Chakri Sirindhorn with the prestigious International Education Leadership Award. At the Third Roundtable, Her Royal Highness graciously provided a keynote presentation on her dedication to educational development at all levels, from early childhood to higher education, with special attention to the marginalized and disadvantaged groups. The text of the royal keynote address has been published by the OEC for distribution far and wide.

Other than engagement in organizing the Thailand-US Education Roundtables, Thailand has taken measures to strengthen the technical cooperation network of academics of the two countries. Prior to the Third Roundtable, the University of Pennsylvania invited the Presidents and Deans of education and science faculties of higher education institutions in Thailand concerned to participate in consultation on technical cooperation. The President Summit was held on April 10-21, 2005, while the Dean Summit was organized on May 1-14, 2005. The results of the deliberations at the President and Dean Summits were submitted for consideration of the Third Roundtable for subsequent concrete actions. Furthermore, an Eight-Nation Education Research Project has been implemented, with the First Conference for the Project hosted by the OEC in cooperation with Chiang Mai University in Chiang Mai, Thailand, on December 1-2, 2007. Prior to the Conference, researchers for the Project were granted a private royal audience by Her Royal Highness Princess Maha Chakri Sirindhorn at Chaipattana Building, Chitrlada Palace, on November 30, 2007.

Achievements of the Thailand–US Education Roundtable Project and Benefits to Thailand

Prior to each roundtable, Thailand has actively been engaged in identification of vital aspects of science education policy and higher education reform for in-depth researches. Outcomes of the researches were submitted for deliberation of the respective Roundtables. Apart from valuable exchanges of knowledge and experience among Steering Committee Members, academics and resource persons, Thailand has

extensively benefitted from research outcomes for formulation of recommendations for policy and strategy for her education reform. During the period of the three roundtables, a total of 17 research studies have been undertaken, with 5 topics devoted to science education policy, and the remaining 12 topics on higher education reform, details of which are as follows:

Science Education Policy

1. Profile of Science Education in Thailand;
2. Science Education Reform in Thailand;
3. Science and Technology Manpower Development Roadmap of Thailand (2006-2013);
4. Thai School Science Education 1999-2005; and,
5. Learning Revolution: Synergy of Tacit and Explicit Knowledge.

Higher Education Reform

1. Higher Education in Thailand and the National Reform Roadmap;
2. Development Thoughts of Thai Higher Education in the 1990s;
3. Models of Non-Baccalaureate Higher Education Institutes (NHEI);
4. Development of Virtual University in Thailand;
5. Management Innovation in Thai Higher Education;
6. Financing of Thai Higher Education: A Leverage for Quality Improvement Reform;
7. Faculty Development in Thailand;
8. Overview of Thailand's Higher Education Development;
9. TICAL in a Nutshell: or What Thailand's Income Contingent and Allowance Loan Scheme is all about;
10. A Participation Model of the Private Business Sector in Management of Higher Education;
11. Leadership Development in Higher Education; and
12. Royal Diamond Jubilee's Strategic Knowledge Consortia: A Program for Development of University Faculty for Enhancing Competitiveness of Thai Higher Education.

As already mentioned, outcomes of the above researches have been availed of for formulation of important policies and strategies, notable among these are:

Science Education Policy

Relevant researches carried out since the First Roundtable have progressively advanced, culminating in the presentation to the Third Roundtable of the Science and Technology Manpower Development Roadmap of Thailand 2006-2013 by Assoc. Prof. Dr.Khunying Sumonta Promboon, Chairperson of the National Sub-Committee on Manpower Policy in Science and Technology. The Roadmap covers the targets for manpower development, with proposals for concrete actions required for implementation. Other projects emanating from the Thailand-US Education Roundtables include: Project on Development and Promotion of Talents in Science and Mathematics under aegis of the Ministry of Science and Technology; Project for Promotion of Science and Technology in Schools of the Ministry of Education; and Project on Development of Teachers and Faculty Staff in Science and Technology. Besides, case studies have been conducted for identifying schools with outstanding achievements in science programmes. These schools have served as models for other schools for strengthening their capacity, with necessary adjustments being made to suit particular requirements of individual schools, multiplier effects have thus been achieved.

Furthermore, the Knowledge Network Institute of Thailand has regularly organized discussions on "Science Education Development", in order to provide incentive for policy formulation and to expand science education networks.

Higher Education Reform

Since the First Thailand-US Education Roundtable, attempts have been made to present thoughts and reflections on development of Thai higher education in the 2000s. Relevant information obtained has provided useful basis for mutual consultation among Thai and US specialists on higher education as well as for dissemination to the general public. At the Third Roundtable, Dr.Krissanapong Kirtikara, then serving as Steering Committee Member, presented an "Overview of Thailand's Higher Education Development" covering the following aspects: Reform of Structure and Administrative and Managerial System; Reform of Teaching, Learning and Research; Outcomes of the First Quality Assessment of Higher Education by the Office of National Education Standards and Quality Assessment (ONESQA); and Reform of Higher Education Financing. In this connection, the Office of Educational Reform Committee as well as the OEC have availed of outcomes of the researches presented at the Roundtable for formulation of strategies and guidelines for reform of Thai higher education. The six main strategies identified include:

1. Reform of Structure and Administrative and Managerial System of Higher Education

Outcome of the research on Management Innovation in Higher Education have led to preparation of strategic recommendations on innovative approaches to management of higher education institutions in various aspects, covering management of general and academic affairs, research activities, financing and human resources.

2. Reform of Higher Education Financing

Outcomes of the research on "Guidelines for Re-organizing Budgetary Allocation and Investment for Higher Education" have led to many significant policy recommendations, notable among these are: incentive for policy of budgetary allocation with linkage to missions of higher education institutions; annual budgetary allocation for state universities has become more performance-based. At the Third Roundtable, a presentation was made on The Promise of Thailand New Higher Education Financing System: The Thailand Income Contingent and Allowance Loan - TICAL Scheme. The TICAL Scheme represents a major shift from the supply-side financing to demand-side financing through the Income Contingent Loan (ICL) System. Students who decide to accept ICL debts are expected to pay off their debts when their future income has reached the threshold agreed upon. The presentation of the TICAL Scheme benefitted from exchange of views of participants at the Third Roundtable.

3. Manpower Production and Increasing Access to Higher Education

Outcomes of the research on "Community College: A Model of Higher Education Institution at Lower-than-degree Level" have been utilized for establishing and increasing the number of community colleges. As specified in the Framework of the Second 15-year Long Range Plan on Higher Education of Thailand, community colleges constitute one of the 4 groups of higher education institutions. The high profile of community colleges include: emphasis on manpower production for their respective communities; prescription of curricula which meet community needs; mobilization and utilization of resources available in the local areas; community participation in administration of the colleges etc.. Besides, outcomes of the research on "Development of Virtual University in Thailand" have been availed of for application of ICTs for providing equal access to quality education for all. The research has provided a significant incentive for adoption of e-learning in higher education institutions in Thailand.

4. Reform of Teaching, Learning and Research

During the period of the three roundtables, there has not been a research specially designed to support this strategy. Nonetheless, the Steering

Committee has recognized its importance and has consequently commissioned a study on "Development of Teaching and Learning in Higher Education Institutions through Research Process". The study has proposed recommendations on a variety of teaching-learning models. The Committee has commissioned two more studies, one on intellectual property and the other on good models of university of technology. It has also produced a synthetic report on "Work-integrated Learning Models to Prepare Students for the 21st Century, especially in the Learning of Mathematics, Science and Technology", which will be submitted for discussion in the Fourth US-Thailand Education Roundtable in October, 2008.

5. System Reform for Development of Faculty Staff and Higher Education Personnel

Outcomes of the research on "Faculty Development in Thailand" have been availed of for formulation of this strategy. A presentation has also been made on "Royal Diamond Jubilee's Strategic Knowledge Consortia: A Program of Development of University Faculty for Enhancing Competitiveness of Thai Higher Education". Emphases are placed on: integrated teaching and learning; collective research and sharing of research results; creating excellence of Thai higher education through personnel development and strengthening research activities; networking with other countries; and strengthening higher education institutions, so as to become centres of excellence in various fields, thus contributing to enhancing national competitiveness.

6. Participation of the Private Sector in Management of Higher Education

Relatively little research has been undertaken to support this strategy. However, the research on "A Participation Model of the Private Business Sector in Management of Higher Education" has proposed several notable recommendations e.g. creating cooperative efforts between higher education institutions and the private business sector in quality assessment and enhancing manpower capacity required by the latter.

For the Fourth Roundtable, the following issues have been proposed for exchanges of views: Development of Liberal Arts College/Education (already included in General Education of the Thai higher education syllabus); Work-Integrated Curriculum Development for the 21st Century Workforce; and Development of Teachers of Science and Mathematics for the 21st Century.

Other Benefits of the Thailand–US Education Roundtables

Under aegis of the Thailand-US Education Roundtables, Thailand has been participating in the Eight-Nation Educational Research Project, thus expanding the former policy research network with 5+1 countries i.e. Japan, Republic of Korea, Singapore, China, Switzerland and SAR Hong Kong. Topics of the Comparative researches include: Transition from High School to Higher Education; Teacher Recruitment and Retention; and Science Education Statuses. Participation in these researches provides Thailand with essential information on situations in various countries as well as guidelines for problem solution on relevant issues.

Royal Inaugural and Keynote Addresses

Royal Inaugural Address

By

Her Royal Highness Princess Maha Chakri Sirindhorn

At the First Thailand–US Education Roundtable

Imperial Queens Park Hotel, Bangkok, Thailand
January 7, 2001

It gives me great pleasure to be invited to preside over the opening of the First Thailand-US Education Roundtable on the topic of Research on Science Education Policy and Higher Education Reform, hosted by Thailand. I am pleased to learn about the concerted efforts of both public and private agencies of our two countries in supporting this valuable project. As many of us are well aware, Thailand and the US share a common keen interest in the reform of science education and that of higher education. Urgent measures have consequently been taken in both countries to ensure success of the reform.

An apparent benefit of science education is that it enables learners to enhance their learning skills through observation, experimentation and critical analysis of various phenomena around them. The knowledge and experience thus gained will accordingly be transferred from generation to generation, leading to improvement of the quality of their lives and that of the society. Science education reform in all countries, therefore, should necessarily emphasize increasing teacher's knowledge and skills required. At the same

time, efforts must be made to provide and improve quality of various learning sources. These include encouraging extensive use of libraries, information and communication technologies and community learning resources. These efforts will encourage learners of all ages to become inquisitive and eager to learn about various phenomena around them throughout their lives.

Regarding the movement for higher education reform, educational institutions in all countries fully appreciate the need to modernize the system of education at this level, which must serve the real needs of learners and their respective communities. Emphases have accordingly been given to diversity and flexibility in teaching and learning, curriculum and evaluation process. I therefore very much hope that your participation in this roundtable and the benefits gained will create close ties of relationship among higher education institutions of our two countries. Knowledge and mutual under standing will lead to establishing academic cooperation, resulting in future strengthening of our respective educational institutions.

At this auspicious moment, I have the pleasure of declaring open the First Thailand-US Education Roundtable on the topic of Research on Science Education Policy and Higher Education Reform. I am sure that this roundtable will proceed with every success and provide all participants with the highest benefits as aspired. May I also extend my very best wishes to all of you in this gathering.

Translated from the Thai original

Royal Inaugural and Keynote Address

By

Her Royal Highness Princess Maha Chakri Sirindhorn

At the Second Thailand–US Education Roundtable

The University of Pennsylvania, Philadelphia, Pennsylvania, USA
April 8, 2004

It is a great pleasure for me to be among so many distinguished scholars from the United States and Thailand. I would like to take this opportunity to thank Provost Robert Barchi of the University of Pennsylvania for his warm welcome on my second visit to the university. I also wish to thank Dean Susan Fuhrman and Vice Dean Cheng Davis of the Graduate School of Education for initiating this roundtable and many education development projects of benefit to Thailand; especially for including Thailand in the ongoing Eight Nations Education Research Project. I would also like to thank Mr. Edmund Tse, Senior Vice Chairman and co-Chief Operating Officer of the American International Group, Inc., and many other people for their support of these activities.

May I thank the Graduate School of Education, University of Pennsylvania, for presenting me the GSE International Award of Merit. I am most honoured and feel encouraged to work harder for education development for all.

As educators, I am sure all of you agree that we as human beings are unique in our amazing learning capacity and our compassion for the weak and the disadvantaged. We value education as the finest tool

for human development. Parents around the world try their best to educate their children, but unequal opportunities lead to a marked difference in educational and professional achievements.

May I review for you the traditional concept of Thai education that focused on the total development of the human person through the following four domains:

The first domain *(Buddhisuksa)* includes useful knowledge and information.

The second domain *(Hatthasuksa)* comprises hands-on activities, which coordinate the eyes, hands and the brain. This develops not only work skills, but also creativity and artistic ability.

The third *(Balasuksa)* is physical education, which includes physical work such as gardening, household work, etc., in addition to athletic activities and sports.

The fourth domain *(Chariyasuksa)* encompasses moral and values education.

We have to be careful to include all four domains in basic education. Modern education tends to over-emphasize the first domain, that is, knowledge and information. In many cases, this domain can falsely become the whole education and use up most educational resources and time.

Modern living is so full of ready-made products that money can buy, and so children nowadays tend to adopt consumerism habits with little motive and opportunity to invent, innovate, create and develop things by themselves. They tend to lack psychomotor development, defined in the second domain.

The most unintended neglected part of all is the last domain, moral and values education. As speed and competition seem to be the prime movers of modern living, the last domain becomes even more and

more difficult to achieve. This leaves the education process unbalanced and so seriously incomplete. If we are not careful, education may defeat its own purpose and end up producing selfish and aggressive competitors for a competitive society.

So may I emphasize that education must be for total development of the human as a person, not just as a resource or capital.

I myself was very lucky to have grown up in an environment that was conducive to my education. During my childhood, I followed my parents and my grandmother to visit remote areas of Thailand. I saw many people, especially children, suffering from poverty and deprivation of food and education. This experience had a profound effect on my education and my work. I have gradually absorbed the idea that nutrition and education must be viewed as the two equally important basic rights of all children, regardless of their ethnic background, religion and socioeconomic status. This belief has influenced my thinking and my work until now.

Upon completing my bachelor's degree, I decided to follow in my parents' and grandmother's footsteps. I began by fostering schools for children, setting up preschool day-care centers for young children, and establishing learning centers for villagers in deprived areas. This was especially important along the border of Thailand where most inhabitants are minority groups of diverse ethnic origins. In 1980, I started a self-sufficiency project where schools were able to produce their own food supplies. It was called the "Agriculture for School Lunch" project.

From there, the project expanded to include all aspects of human development. From the initial three schools, the project has grown to include 305 schools, 232 learning centers and 18 preschool day-care centers. Now there are several sub-projects like Education Quality Improvement, Iodine-Deficiency Prevention, Nutrition and Health Development for Mothers and Children, Cooperative Stores, Natural

Resource and Environmental Conservation, etc., to help solve different problem areas.

Each project encountered unique cultural conditions, while many projects shared similar problems. All were in remote areas and deprived of most modern educational resources. In many cases, border patrol police had to fulfill the roles of teachers. The situation has gradually improved since then. One remaining problem is that teachers often leave the remote areas in lieu of more comfortable teaching positions in towns.

My original intention was simply to get the children to attend school and to have enough to eat. In practice, I had to face many other problems, such as nutrition, health, environment, culture and agriculture just to keep them in school. I therefore realized that in reality problems are usually too complicated to be solved by any single party or academic discipline. I have addressed these conditions by gathering help from various public and private organizations, especially colleges and universities. So my approach has become more and more integrated and holistic.

Science, mathematics and languages (both Thai and English) seem to be the most difficult subjects to manage, due to the lack of qualified teachers. This is one main reason why students in the project could not successfully compete for entrance examination to further education. The few who have pursued higher education required extra tutorial support.

Thai researchers have analyzed my project and called it a **whole-school** model for education improvement. Some call it a **total development,** a **school-centered** or **school-based management** model. Many educators have recommended this approach as a major policy for education reform. There have been a few pilot projects adopting this whole-school reform model in Thailand, and nationwide

whole-school reform is being planned. The following are some successful pilot whole-school projects which have been carried out by the Thai participants in this roundtable.

- The Science-In-Schools (SIS) Project, initiated by the National Science and Technology Development Agency, now managed by the Institute for the Promotion of Teaching Science and Technology with the help from 24 faculties of science in 24 universities in Thailand.
- The Science School Project at Mahidol Wittayanusorn School for gifted and talented students in science and mathematics with help from Mahidol University and several other universities in Thailand.
- The National Pilot Learning Reform Project of the Office of the Education Council.

One obvious advantage of the whole-school approach is its sensitivity to diversity among different schools and communities, as one size cannot fit all. Another advantage is the participation and coordination of many organizations involved in school development. The model usually requires a long-term linkage between schools and colleges or universities. Higher education institutions serve as mentors for schools.

Ladies and gentlemen, I have presented some of my ideas about my interest and work in education. My parents, my grandmother and I have been trying to give all people nutritious food and opportunity for education, consistent with UNESCO's World Declaration of "Education for All" at Chomtien, Thailand in 1990.

My project has been established for twenty-three years now. However, I observe that as new scientific and technological developments occur, new disadvantaged groups arise. It seems there

are increasingly more disadvantaged people as globalization advances. "Education for All" at the present rate, might never keep pace with the rapidly expanding number of disadvantaged people.

For example, we live within the dynamics of modern global society and our capacity for communication appears borderless. Meanwhile, we must admit that globalization has created a large number of people who do not have access, or cannot keep up with, rapidly changing information, communication and knowledge-based society, and related educational opportunities. It is costly and time-consuming to procure skills in new and high technologies. We can therefore expect that many children and adults alike may become information and communication technology illiterate. This is the most recent kind of illiteracy that will further polarize people according to their access to information, knowledge and technology. Resources allocated towards promoting this new literacy might divert funding away from more fundamental human education requirements.

These are serious issues that challenge educators today. If we believe that education is the greatest tool for human development, and that human development brings wisdom and peace, then we must think deeply about these issues. Perhaps we need a methodological breakthrough in education to make UNESCO's "Education for All" a reality.

This roundtable comes at the right time to discuss issues that are heavily implicated with science education and higher education development. I am confident that the results of your discussion will provide strong recommendations for educators and policy makers of our two countries. I have hoped that together we can make our education a lot better.

I wish the roundtable every success, and thank you very much for inviting me to be part of this important event.

Royal Inaugural Address

By

Her Royal Highness Princess Maha Chakri Sirindhorn

At the Third Thailand–US Education Roundtable

Dhurakij Pundit University, Bangkok, Thailand
November 7, 2005

I am pleased to join you once again in the Thailand-US Education Roundtable. I would like to thank you for your warm wishes extended to me on the occasion of my 50th Birthday Anniversary.

Education is a very important factor for national as well as individual development. All countries have adopted a major policy of providing the best quality education for their children by giving budgetary support and other necessary resources. However, to improve the quality of children's education, it is more important that we manage education realizing the differences and diversity in individual learning potentiality and intellectual capacity.

Educational policy formulation and implementation should be sensitive to students' different learning potentials. They continuously require policy research, so that investment of capital and efforts will reach the desired targets and attain greater effectiveness.

I wish to congratulate you for your continued efforts devoted to policy research in science education and higher education, the two topics so important to educational development. I believe that the research outcomes will give us accurate guidance and enable us to steer our efforts towards the right path.

I now declare the Third Thailand-US Education Roundtable open. I wish the Roundtable every success.

Royal Keynote Lecture on
"My Career in Education"

By

Her Royal Highness Princess Maha Chakri Sirindhorn

At the Third Thailand–US Education Roundtable

Dhurakij Pundit University, Bangkok, Thailand
November 7, 2005

I will try to finish my talk on time, because at 9.45 I will have to give the floor to the Minister of Education. First of all, I would like to thank our American friends for coming. Welcome to Thailand once again. I hope that you will have a productive and enjoyable time in our country. If there is anything you would like to do, see or eat, do not hesitate to tell my Thai colleagues who accompany you. I am sure that they are all pleased to have you here and wish you a happy, enjoyable and interesting stay.

I consider myself a representative of Thai education, because I am entirely a product of the Thai education system. It took me 16 years in grade school and undergraduate school, and more time afterwards in the graduate schools of three Thai universities. So, as you hear my presentation, you can be sure that my style is totally a reflection of Thai mentality.

From US Visits to Thailand–US Education Roundtables

During my visits to the US, I have many opportunities to visit various places of interest, including the University of Pennsylvania, and gain

a lot of information, knowledge and experience. Of course I have learned a lot more from my American friends and those who were educated in American universities. I think what I got is useful for my life and also my work. For example, in 1997 I had an opportunity to visit the Graduate School of Education at the University of Pennsylvania and listened to the briefing of many projects and activities of the school.

One project involved cooperation of the Graduate School of Education with many countries, especially in science and technology education. It includes teacher exchange among universities and schools in the US and in other countries. At that time I thought it might be possible to have such a program with Thai school teachers as well. So I talked to the Dean, Vice Dean Cheng Davis and the people about selecting a few teachers and school administrators to go to the US to observe the way the American teachers conducted their science and technology courses in their schools, and also to have a chance to stay in those teachers' homes. This project seemed to be quite successful, and it has been expanded to cover many other schools.

After that, we had the first roundtable, and so the roundtable is the product of this project. I have to say that I am honored to be asked to be the Honorary Chairperson of the Steering Committee on the Thailand-US Education Roundtables, that have been focusing on policy research in the areas of Science and Technology Education and Higher Education ever since.

My Career in Higher Education

In higher education, I have been working for almost 25 years in the military academy. It will be my 25th year next year. I think the strength of this academy is its various disciplines of engineering. We offer courses in basic science, like physics, chemistry, and some biology. Now we have environmental science and biotechnology courses. I myself began to serve in the Department of Law and Social Sciences, and later in the Department of History. I also coordinate for the academy to establish scientific and technological cooperation with other universities and research institutes both in Thailand and abroad. We often have lecturers from various countries, including the US. The present ambassador, while serving his former post, also honored us by giving one lecture.

Education Development in the Remote Areas and Role of Higher Education

Apart from my job at the military academy, I would say that I am more familiar with education development at the level of Grade 1-12 and some vocational education. Most schools I have been working with are not in big cities. My observation is that if you want to be successful in a tough job like that, you need a lot of professional help from higher education institutions and a lot of research to support the development of teachers' knowledge and teaching techniques to transfer knowledge to their students, besides helping them with food and nutrition, which is also a fundamental role of education.

Here, I started by introducing agriculture to them to grow plants and vegetables and to raise edible animals and fish to secure students' food source. Agricultural practice in the schools has provided a more affordable food source, and we can also train skills in agriculture to the children. They have to make observations and keep records as part of their lessons, not just for their agriculture subject, but also for science and mathematics classes as well. We do that by making all of those activities their science projects. They have to work in teams and in a democratic way. We have tried to make sure that they have to have some sort of meeting, and everybody has a chance to express his/her view. The conclusion drawn from all views are implemented. Nobody can be a dictator in those schools. Later on other parties like

teachers, parents, students, members of the local administration and villagers also form committees when they work together.

We should know how to deal with and manage water supply in those schools as well as in the nearby communities, because in some schools there are boarding students from far away communities. We need water for agriculture. So if we get the water supply for the schools without sharing it with the communities, that can cause problems. So, we have to provide enough resources for everybody in the areas.

We have to depend on good research to know the right things to do and the right technologies to use, for example, knowledge about soil condition, decision about what crops to grow, etc. We should know good agricultural practice in the first place. We also need good workers in many fields, for example, public health, laboratory work, etc. In this case, universities can help a lot.

One good example is that in some areas there is a lot of malaria epidemic. It is a problem that we have to solve. There has been a big project that non-profit organizations from the US, the Ministry of Public Health and the universities work together in educating the villagers about how to do the blood testing and to give some treatment. In my project, I was aware of that problem, because when I visited some schools, people laid down greeting me, instead of sitting down or standing up. That was not good. If they were not healthy, the schools could not go on, because the teachers could not teach, and the students could not study.

When we tried to get some microscopes, we could get the ones that were discarded by universities or hospitals. When we fixed them a little, they were usually good enough for testing blood samples. It worked quite well this way. The universities helped in campaigning to raise the awareness of the problem. Not just the schools of health sciences and medicine, but the schools of social sciences could also

help in this program. This also became a topic for science projects of the primary school students, who interviewed people and came up with various ideas about the disease to present to their classes.

We have the immunization program, especially the polio vaccination project, which works quite well in schools. In dealing with the problem of malnutrition, even when you have a good nutrition project for the schools, the children may still be quite thin because of the problem of parasites. Once we discovered in one student 4-5 species of worm in his stomach. So, we had to invite them out in one or more ways. This is the work of universities.

There are more projects in schools, like dental hygiene, arts, crafts and some technologies. Again universities help in those projects. We have to do research and development to improve finished products. We also do quality control with some help from technical colleges and universities. Apart from that, we sell our school products. This needs a lot of marketing techniques, and we do it professionally with the help from some universities. These are just some examples.

Science Education in Rural Schools

In the rural schools, we have promoted a lot of science projects that I have already mentioned. We have a project to promote the study of biodiversity in schools, by helping them set up school botanical gardens and school herbaria. In this project, children are taught to collect plants, both living and dried ones, to know the correct ways of preserving herbal and plant specimens. The same project also promotes arts, like painting and sketching of plants and plants' parts. Students seem quite interested in this project.

We have tried to build some laboratories in the schools, but we try not to have too sophisticated laboratory equipments due to some

constraints of those schools. Sometimes they are just adequate to get work done. Sometimes some innovative teachers design their own equipments to substitute the expensive equipments. For example, one teacher uses the nearby small waterfalls to shake the flasks instead of buying an expensive flask shaker for tissue culture experiments. There are a lot of innovative ideas in the school projects. One example of the products is the banana plants, that have been distributed to the people in the community as a result of the tissue culture work in a remote school of a Northern province. In this case, the school is able to serve the whole community.

Not only Thai professors have helped me, I have also been advised by many American professors. Since I studied in the Thai schools, I was taught mostly by the Thai teachers, but at one time I was a trainee in a GIS course at the AIT (Asian Institute of Technology). At the AIT there were a lot of American instructors. That was the first time I attended courses taught in English.

Early Childhood Education

In the field of education and community development, I started my work mainly on primary and early childhood education. Later on I set up some day-care centers because it is too tough for me to run around catching those kids from the villages to be de-wormed and immunized. So, when they get together in the day-care centers or in the kindergartens, it makes the job easier for me.

Health Education and Cooperation with American Professors

An American professor whom I look forward to meeting this Friday suggested that I should focus also in promoting the health of pregnant women, nursing mothers, newborn babies (0-3 years). Apart from that I also had to do health education for the upper primary students.

We have been quite successful in the promotion of health at the primary level (nutrition and immunization). The extent of my work for other categories of the target population enables me to have a more effective result. There is much less problem about protein and energy malnutrition now, but we still have to focus on deficiency of vitamins and micronutrients, including some mineral elements, for example, iodine deficiency.

The American professor also advised me to meet the experts in the same field in the countries I have visited. For example, last year when I went to the US and attended some lectures on nutrition, I said, “In a couple of days after I return home, I will go to Iran”. The American professor could contact the Iranian experts to meet me in Tehran. So, I have an opportunity to exchange views about nutrition with them. Experts have their professional networks. There are global networks of all disciplines, facilitating me to learn more in each trip abroad.

Once I had an opportunity to accompany a delegation of the School of Public Health of an American university to a country in South Asia. We did house visit. If we heard the news about a newborn baby in a household, we would rush to that house to see how much the baby weighed and how it was in relation to the condition of the mother. I helped them do some interviews, of course with an interpreter, and we did the whole house survey. Later, this group of experts came to visit Thailand, and I acted as their tour guide sometimes. Some of the places they went you will also visit after this meeting. The delegation donated to my project to build the extension classrooms of the schools in the rural areas, in addition to their own province schools. They are like the campuses of the schools.

One school I have recently visited has 14 campuses. When the school principal has to visit a campus, he has to walk nearly 2 hours or more. He has to do a lot of walking. It is quite worthwhile

because those people have no opportunity at all to meet the teachers, to study, and to have opportunities like others. So the extension service of the school is worth it. After we sent the progress report to the donors, they were very pleased, and we got some more help in other projects.

Community Learning Centers

We have also helped build a lot of community learning centers. These are not exactly schools, because the number of pupils is too small, and the access is too difficult for regular teachers to stay. So, we used this fund to build a small simple school, and hired 1 or 2 teachers there. Those teachers must be able to speak their local languages and to teach from kindergarten to older children, including the grownups in the evening. They have to help the students in agriculture, cooking, and everything. It is very cost-effective.

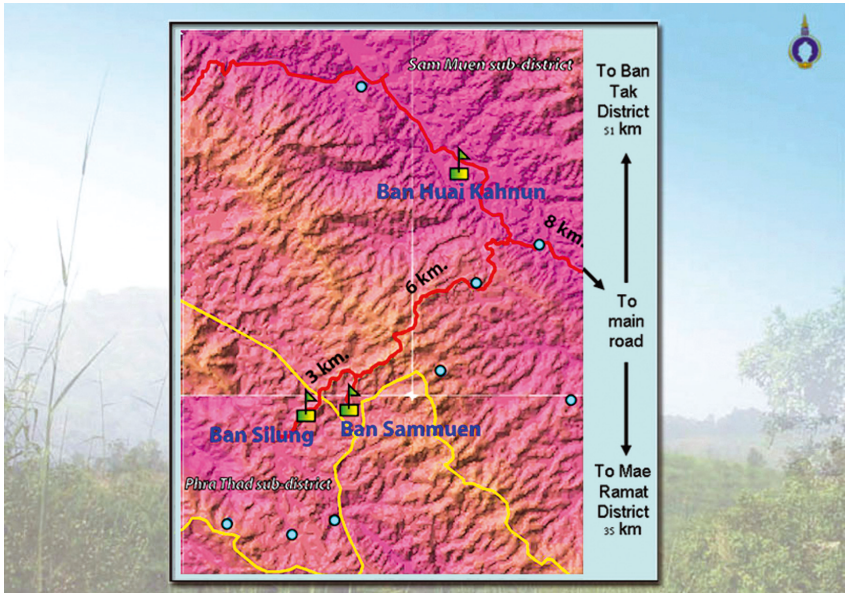
Thailand–US Education Cooperation

I am glad that starting with the Thai teacher training project at the University of Pennsylvania, we have extended our cooperation to the discussions of many interesting topics in the Thailand-US education roundtables. For example, the topic on financing and budgeting in higher education is very important. We are not so poor as if we had nothing at all. In fact we have some money, but we should use our money in the most effective way, and how to do this is very important.

My grandfather and my father had cooperated with the US foundations. It is not our duty to work on government to government cooperation but we can do a lot by working with non-profit organizations and the civil society of the US. This has proven that the people in the US are our very good friends. I am very happy to play a small part in this Thailand-US academic cooperation.

A Slide Show

To end my presentation, let me show you some photographs.



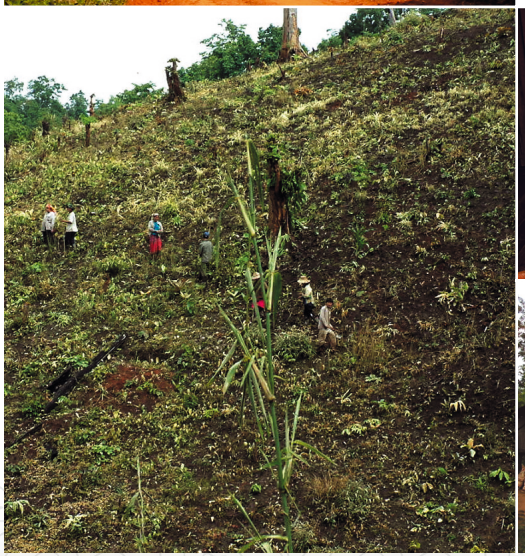
- This shows the three villages *(Ban Huai Kahnun, Ban Si Lung, Ban Sam Muen)* in a town *(Mae Ramat District)* in Tak Province. In one of the GIS school mappings, we found that there were no educational services available in this area. So we asked all people from various agencies to help out by dividing the work for each agency. One part was done by the Border Patrol Police Office, one by the Non Formal Education Office, and another by the General Education Agency (now part of the Office of the Basic Education Commission), under the Ministry of Education. We wrote the projects to get some funding from various sources in Thailand and abroad. Many overseas friends, including my American friends, helped us a lot in these projects. So, I would like to show you this map. On the map the two areas may seem

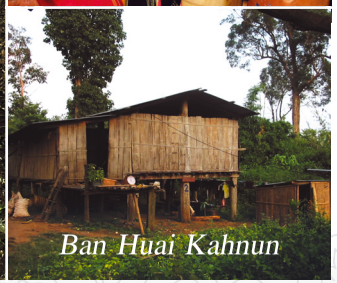
close to each other, for example, only 3 kilometers away. It does not seem like a big deal in the city, but if you have to walk across the mountains and sometimes along the muddy trails in the rainy season, just like skiing up the mountain, but instead of snow, it is mud, then it is not as near as it looks. I have tried walking in this area, and so got to know it well. This is the place where we have some information, for example, their per capita income is about US$100 per year.

Ban Si Lung

Ban Sam Muen

- These are the pictures in a similar area, not very far away from the one before.





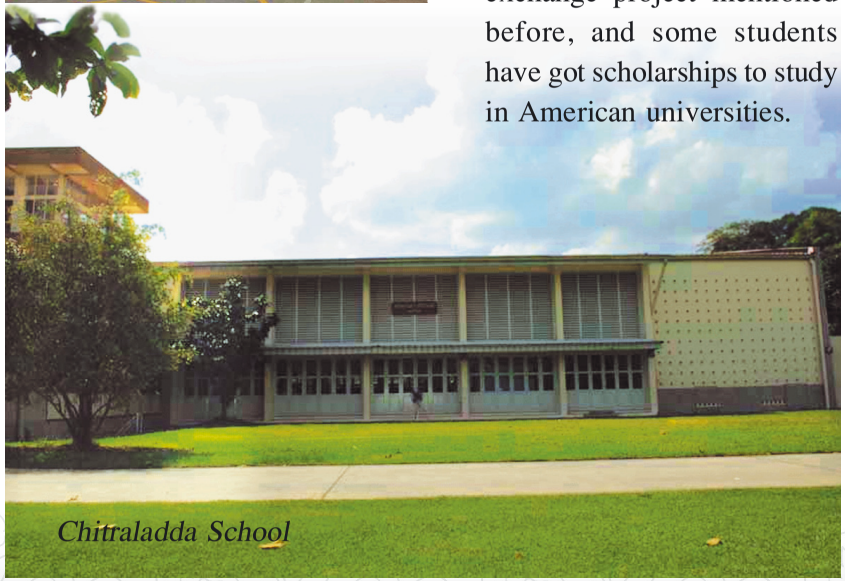
Ban Huai Kahnun

Doi Tung Project

- This is the Doi Tung Project which you will visit. The people who came to live here, are some sort of illegal migrants. The project is in the place where my grandmother used to live. There are many projects going on, like handicrafts, macadamia nut factory, coffee plantation, and food processing. Of course, university people come to help in work like quality control and maintenance of old machines and equipments.We also have the Ministry of Education help in our school network. There are several schools in this area, and they are under different umbrellas of central administration. We also have to do some demographic study like population estimation and projection. We have discovered that some schools are attended by people from the nearby countries, not only from Thailand. One of these schools has only 20% Thai students, and 80% from abroad. Nevertheless, we make sure that they can have access up to higher education.

- This is the outcome ofthe tissue culture lab. People who come to work here are mostly girls who were unemployed in the past.

- This is the school where I studied from kindergarten up Grade 12. My father founded this school andnow I look after the school. This school also took part in the administrator/teacher exchange project mentioned before, and some students have got scholarships to study in American universities.



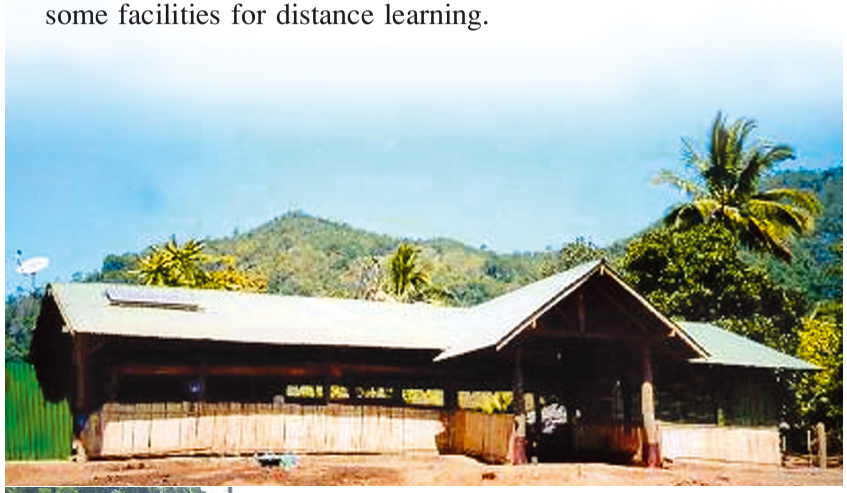
Chitraladda School

- This is a project in Nan. It is a Community Learning Center that I talked about previously.

- This is one of the districts in Chiang Mai, where there are a lot of community learning centers, funded mainly by many companies in France.

- This is how we develop a community learning center project. It is a package that we send to people who are interested in building them. We have the so-called “school house” which was built by the villagers. When we visit and see that this place needs a school, we send people who can speak the local language to announce that we are going to build a school. If the people agree

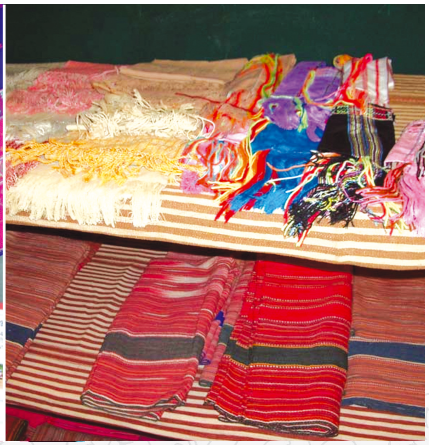
that this is a good idea, they should help building it. They all come because they would like their children to study. They them selves also come to study there. We even have the elderly come to study. Both men and women participate equally. We provide each place a set of educational equipments/tools, a solar cell and some facilities for distance learning.



- This is a school run by the border patrol policemen. They will celebrate their 50th anniversary next year. Before that, in the boarder areas there was no chance for the people to get any education. So, the border patrol policemen used whatever knowledge they had to teach the people under the severe condition, like no electricity.

Sometimes the teachers were only police privates. Their bosses realized that it was an important thing to do, and so they gave the support. They also told my parents and my grandmother to support the project and to get some money from donations. I myself have done mostly the work in nutrition and how to further their education. Some of the students in these schools got master's degrees, but no one gets a Ph.D. yet.

- These are the arts and crafts that we support the teachers from the communities to teach their students. They also learn the way to use certain plants as natural dyes for their cotton thread. It is the techniques they learned from their parents. This is one part of their science projects. Then, we help them sell all these things.

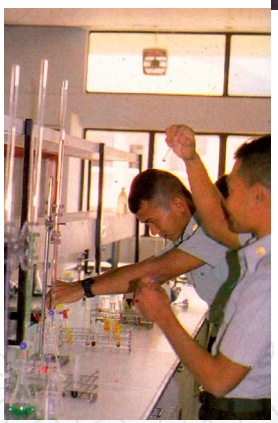


- This is a day-care center that I started some years ago in Narathiwas Province, in the southern most part of the country. Many years ago, I had a picture of the children and myself taken.

After that I tried to search for them to see how well they have been doing. Some months ago during my visit to the center again, the village community surprised me by having them there to greet me. Now the same children in the picture are all grown up. Some are nurses. Some are technical people. I took the first picture from the one they hang on the wall. These are all the people that the village community was able to keep track of.

Teaching in Chulachomklao Royal Military Academy

- This is my class in the military academy. From time to time I invite people from outside to give lecture.



We invite people from the US Embassy several times, especially during the election. We had an opportunity to learn from some American professors through the VDO conference. We have some labora tories that students can work in. Now we have some special projects supervised by many highly qualified faculty members who got their Ph.D.s mostly in engineering and weremostly trained overseas.

- This is the project that helps some children who because of poverty cannot attend regular schools, and their parents send them to be novices in the temples. This is one of the novice schools. We have many in the country that is under the Office of Buddhism. We can get some donation to help them. One novice spoke up and asked me "Yome Mae (Mother), can you get some computers for us?" So I managed to get them some computers. In fact, I should not be his mother, but I should be his grandmother.

- This is the language lab. It is used for Thai, English and Pali languages, the kind that has Buddhist teachings. They use this sound lab, and the lessons should be more interesting. They may use computer as well in their teaching and learning.

- This is the girl with no limbs at all. She has only shoulders and hips, but no legs and no hands. She would like to be a computer expert, and she is quite good in languages. She wants to be two things, a DJ and a computer expert. She sings very well. She manages with the help of an electric wheelchair. She can go anywhere.

We have tried to provide some appropriate equipments for her. This is why I have to shop around and see some research in the US universities to learn how to help people with disabilities. One good way is to use voice recognition or voice command, but it is very difficult in the Thai language. So, now I am training her to be more proficient in English. This is not easy because she stays in a very sensitive area. So, it is very difficult to find a teacher to go there. She can only use those computer facilities.

- This is the boy whom I have been helping. It is quite difficult because this boy wants to be a soldier. He is lucky because he has his parents supporting him. The previous girl has only her mother. This is the equipment that we somewhat copied from the expensive one we saw abroad. It is expensive to make a plastic mould. So we tried to use ceramics which can be made easily in Thailand. In this way he can be independent in eating. No one has to spoon feed him any more. He can use this spoon to transfer food to the right spot from where he can then take it in.

Now we have found another girl with no limbs. She is an orphan. Her parents came from the North, and they did not have enough money to take care of her. So, she was left in an orphanage. We have tried to help her.

That is about all I have time to say. Next is the Minister's time. I took this last picture yesterday. They were all sleeping, and we just had to wake them up.

Thank you very much.

The First Thailand–US Education Roundtable

Srinakharinwirot University, Bangkok, Thailand
January 7–9, 2001

Opening Remark

Sippanondha Ketudat
Chairman,
Thailand-US Education Roundtable Steering Committee

Good morning distinguished colleagues,

It is great privilege for me to be the first to greet you today at this Thailand-US Education Roundtable. On behalf of Srinakharinwirot University, I would like to thank our distinguished guests from the United States of America, University of Pennsylvania, and particularly Dr. Cheng Davis, who has put great effort in arranging the agenda for today and the upcoming meeting during the next two days. Without her tremendous contributions, we may not even have had the opportunity to be here and to learn from and exchange views with our American counterparts. I also would like to express our appreciation to the Embassy of the United States of America for their support of this event.

In January of 2001, the first Thailand-US Education Roundtable was conducted on this campus, with the graciousness of Her Royal Highness Princess Maha Chakri Sirindhorn to preside over the opening ceremony.

A number of priority issues in the field of higher education and science education have been identified during that Roundtable. The first is the cultivation of new leaders or the so-called managers of higher education institutions. As our Thai universities now are moving to become autonomous universities, we will need new leadership, specifically new management skills for potential higher

education leaders. Modern leadership will be instrumental in enabling our higher education system to face the new challenges of a rapidly changing high technology era, coupled with growing interaction and cooperation among peoples from different corners of the world.

Second, new ways of financing higher education must be explored. Innovative financing strategies and governance have been discussed and it has been agreed that the priority should be on the protection of institutional base funding in order to allow the institutions to concentrate on developing new programs, closing outdated programs and promoting innovations without fear of unjustified changes in their base budgets. Research trust funds and matching funds between state and private sectors should be set up to fulfill these goals.

The third issue concerns expanding access to higher education. We will need to explore concepts of the community college and virtual university in order to make higher education possible for people of all walks of life and even for those located in the remote locations.

We should consider issues of credit transfer between a community college and a university, and the need to maintain high standards of quality and adequate budgets for community colleges. Given the advancement of information and communication technologies as well as the foreseeable drastic increase in demand from the incoming high school graduates in Thailand, virtual university programs could be another alternative.

And the last-but not the least important issue is how to maintain our tradition of moral and ethical values in higher education. In the age of global consumerism, higher education institutions must not dissociate themselves from cultivating moral and ethics in students. Society makes progress through the enrichment of minds as well as the accumulation of material wealth.

Now, at the beginning of the new century, it is a good time to take stock of the achievements we have made, and also to explore ways to build on those achievements. We have developed very beneficial partnership relationships with western universities, and, in particular, many of our faculty members have benefited directly by studying abroad. These experiences and relationships can provide the foundation for exploring new ways for our universities to help each other.

In Thai universities, as I mentioned earlier, we are facing an urgent need for advanced up-to-date training for potential higher education administrators able to lead our universities in the contemporary era of high technology and increasing global interaction. We will also continue to explore the cutting-edge organizational and curricular models of western universities and to adapt them to our institutional settings when they are appropriate.

For example, our universities face an urgent need to find effective ways to develop and support our human resources for an expanding university system. And generating and managing financial resources will continue to be a challenge; we will be interested to learn of strategies for resource development and management from the experiences of U.S. universities. We will be interested to learn from the experiences of University of Pennsylvania and Harvard University in seeking support form corporate funding sources. We feel privileged to have relationships with two of the most prestigious universities in the world.

We have already benefited from a University of Pennsylvania case study showing how to improve curriculum management, using their computer system to ensure academic freedom of choice for their students. We recognize that academic freedom is a key to the success of American higher education. In this area, we will be interested to learn from the American experience.

We feel that our universities can offer our western partners many opportunities to benefit from relationships with our faculty members, our students, and the Thai people. We hope that this conference will be just one of many such opportunities for mutually beneficial exchanges, and that together we can meet the challenges that will face our universities in the global society of the twenty-first century. I would like to thank all the participants who have been here with us today and all those who have made this conference possible.

Thank you very much.

Higher Education

The First Thailand–US Education Roundtable

Higher Education in Thailand and the National Reform Roadmap

Krissanapong Kirtikara
President, King Mongkut's University of Technology Thonburi

Status of Higher Education in Thailand

The higher education system in Thailand is quite complex and has lacked policy cohesion. It is under responsibility of 10 ministries and 1 independent agency. Key Ministries are the Ministry of Education (MOE) and the Ministry of University Affairs (MUA). Others are Public Health, Agriculture and Cooperatives, Defenses, Transport and Communications, Justice, Science, Technology and the Environment, Office of the Prime Minister and the Thai Red Cross.

In 2000 there are a total of 645 institutions, not counting the different campuses. 74 are under MUA, 489 under MOE and there are 82 specialized institutions. Two levels of tertiary education are offered, namely, Diploma Level and Degree Level. Programs can be classified into academic, professional and technology programs.

Regarding access to higher education, nearly one quarter of the higher education age-group have enrolled in higher education institutes, excluding open universities, Table 1. Thailand should be proud of this quality access to higher education. However, we recognize that at regional level access to formal education at all levels, in particular higher education, varies markedly between regions, especially with that of Bangkok area. Factors detrimental to access to quality

education are socio-economic background and concentration of schools and higher education institutes in Bangkok and big cities. Moreover, quality education, not quantity education, is a determining factor of the present millennium in the age of the new economy.

With severe economic contraction since the 1997 economic collapse the numbers of secondary school students and higher education students have shrunk. But there are signs that the secondary school enrolment will pick up leading to more demand for access to higher education. On the basis of the free 12-year basic education resulting from the 1999 Education Act, it is projected that the number of secondary school graduates and first year university intake will increase by about 2.5 to 3 times that of present in 15 years time. This poses a formidable challenge for educational planners to come up with a higher education system that can cope with this figure in the time of limited resources, yet maintaining quality education. It is recognized that Thailand has 5 to 10 years to fix her education system, including higher education, if Thailand is to be relevant in the region.

Table 1: School-Age Population (millions) and Enrolment Ratio by Level

	1997	2000
Pre-Primary	3.202 (90.8%)	2.892 (95.0%)
Primary	6.539 (90.7%)	5.838 (101.2%)
Secondary		
- Lower	3.395 (72.5%)	2.827 (83.1%)
- Upper	3.464 (46.8%)	3.006 (54.1%)
Higher	4.662 (19.3%)	4.431 (23.6%)

Notes:

- Enrolment depends on socio-economic factors
- 1997 economic collapse has impacts on enrolment
- Secondary school graduates will increase by 2.5 times in 15 years

Thai higher education institutes are traditionally dominated by the public sectors since the end of the Second World War. However, the Thai private sector, as private colleges, has played a very important role in providing higher education during the last 2 decades since the government decoupled the question of national security from higher education and allowed private colleges to be established, Table 2. This means that financial resources for higher education can be mobilized from the public as well as the private sector.

Table 2: Number of Educational Institutions (1999)

	Total	Public	Private
Whole Kingdom	50,402	47,290	3,112
Pre-Primary	45,577	43,123	2,454
Primary	33,840	32,343	1,497
Lower Secondary	10,109	9,555	554
Upper Secondary (General)	2,563	2,416	147
Upper Secondary (Vocational)	854	542	312
Below Bachelor's Degree	573	304	269
Bachelor's Degree	178	145	33
Post-Graduate Degree	51	31	20

Regarding the public contribution to formal higher education, about 15 to 17% of the total education budget is spent on higher education, Table 3. However, there are no reliable estimates of private or personal contribution to higher education as a whole.

Table 3: Education Budget

	1997	1998	1999	2000
Billion Baht	202.9	201.7	207.3	220.6
% of GNP	3.9	3.9	3.7	4.3
% of National Budget	20.6	25.2	25.1	25.7
Higher Education Budget as % of Education Budget	-	-	17.1	15.6

Thailand is unique among the countries in South East Asia with higher education institutes located evenly throughout the country. Only 2 provinces have no higher education institutes. With these optimum locations of higher education institutes, increasing role of the private sector in higher education, and judicious applications of information technology it is hoped that the country can cope with the immense increase in demand for higher education as mentioned above. Moreover, under the 1999 National Education Act, participation of city-based, province-based organizations and even municipalities in higher education provision is possible. Financial resources for higher education can be secured form these city or province-based organizations and local government, in addition to direct funding from the central government.

Modern industrialization of the country began nearly 40 years ago but the country never coupled higher education and professional manpower development with industries, along the line that newly industrializing economies such as South Korea, Taiwan, Hong Kong and Singapore. Thailand has lost nearly 4 decades of this golden opportunity. It is hoped that the enlightened public will induce future government to come up with intelligent and far sighted policies with proper fiscal and financial incentives to enlist support and contribution from business and industrial sectors in higher education and professional manpower development, especially during the new economy millennium.

The Higher Education Reform

Thailand first looked at the reform or transformation of higher education in a systematic manner at the end of 1980s when MUA prepared the first 15 year Higher Education Plan covering 1990 to 2004. The atmosphere at that time was one of economic buoyancy and international competitiveness. Ten years have since passed, the economy has been in deep recession and it is still debated whether the recovery is V or U or L shape. New issues have emerged. The new Constitution was promulgated in 1997 and the first National Education Act was enacted in 1999. It is strongly felt that the higher education system need to be overhauled if Thailand is move forward with renewed confidence and to be a country of relevance and prominence in the new millennium.

Rationale for Higher Education Reform

We can summarize the rationale for the higher education reform from as follows:

Intrinsic Problems and Crises

We feel that the higher education system has suffered from an inefficient management structure. Examples of these are limited management flexibility of the civil services under which the public higher education system is. During the economic boom of the late 1980s until the economic collapse of 1997 the country had witnessed brain drain of quality manpower from public universities and the

public sectors. Due to bureaucratic difficulties, termination of public organizations, including university faculties and programs offered, are next to be impossible. Non optimum resource utilizations as a result of uncoordinated operation, duplication of works and outmoded programs are encountered.

The private sector, which has replaced the public sector as the major employers of university graduates since the 1980s, has complaint of the mismatch of graduate profiles and market requirements. Yet the private sector had to employ these mismatched graduates during the economic boom as there was no other alternative on supplying of higher education manpower.

It is observed that Thai universities have low level of research and development works. Moreover, most the research works are not meaningful for the economic development. The higher education institutes in Thailand were set up to produce professionals firstly for the bureaucratic reform during the reign of King Chulalongkorn nearly a century ago. Strictly speaking, the Thai first tertiary institute was not a university in the sense of western world where search for new knowledge through research has always been part of the university culture. After the 1932 coup d'tat leading to the constitutional monarchy and until the period up to the Second World War, university graduates were employed to man subsequent public agencies and took part in physical infrastructure developments, replacing European experts brought in earlier on. As the country embarked on the modern development four decades ago after the end of the Second World War, the bureaucracy kept expanding. So did the public universities and the demand of more professionals, never research work.

Due to rapid industrialization and overseas investment promotion three decades ago, the private sector became the major employer of university graduates. The Thai industries have been heavily protected

such that no meaningful technology transfer and adaptation has taken place. Research and development in the private sector has been insignificant. Hence, no expectations on universities doing research and development works. The corresponding research funding has been well below the state of economic development of Thailand. Newly industrializing economies at the time of comparable economic state to that of Thailand spent much more on public research and had incentive to strengthen industry investment in technology transfer and technical manpower development. Consequently, the Thai research manpower, measured either with respect to the population or the labor force, and research spending, as percentage of GNP, is 5 to 10 times below those of the industrializing economies due to low level of activities 3-4 decades ago at the take off stage.

Problems of equity and access to higher education have been recognized, and partially solved. Nearly half (44%) of higher education institutes are located in and around Bangkok. Close to a quarter (70%) of higher education students are from families with good economic background. Quota systems have been adopted for 2 decades for admission of provincial students to universities without going through the common university entrance examination, that of which upcountry students cannot equally compete due to lower quality of school education. At the end of the economic boom, decision was made to establish over 30 new campuses throughout the country, using videoconferencing facilities for teaching, creating the so-called IT campuses. It was hoped that IT would help solve the perennial problems of shortages of university lecturers, and enables access of provincial students to quality lecturers.

There exists a low degree of collaboration between higher education institutions and the modern economic sector, especially Thai industries. Since the investment privileges accorded to industrial development during the 4 decades of industrialization are not coupled

to higher manpower development, technology transfer and research, similar to the public policies and strategies of the newly industrializing economies. Industries view universities as solely responsible of producing professional workforce. Very few university-industry education co-operations exists.

Demand of Quality Workforce to Enhance National Competitiveness in World Community

Thailand had witnessed a continuous decline in national competitiveness for the past 5 years. Based of the IMD ranking, the overall competitiveness of the country drops from 29 in 1997 to 39 in 1998 and 34 in 1999, 33 in 2000, especially in the fields of science and technology. Higher education is recognized as being a major solution to this competitiveness ranking.

Limitation of National Resources for Education

Education budget has traditionally been a major part of the government budget, about 20%. The economic contraction after the economic collapse in 1997, reflected by negative growth in GDP (8.7% in 1995, 5.5% in 1996, -0.4% in 1997, -8% in 1998 and 0.9% in 1999), makes it difficult to maintain the education budget. Decreasing of public investment in higher education during the 1st to the 8th National Education Development Plans is noted, varying between 0.24-0.58% of GDP or 0.7-3.06% of GNP.

Development and Impacts of Information Technology

Thailand has been on the receiving end, as far as the hardware, contents and applications, of the information technology (IT) since its emergence in the second half of the 1990s. However, this may not be so in the future if we can integrate IT into strategies for education, and in particular higher education, workforce development and life long education. The explosion of knowledge and extensive global connectivity should be seen as a great opportunity, rather than threat, on the Thai society, culture and economic growth.

Growing Demand for Higher Education

The new policy on the 9-year compulsory education and 12-year free basic education as a consequence of the 1999 National Education Act will result in a large increase of high school graduates. The figures are 0.7 million in 2000 to 1.8 million in 2016, an increase of 150% in 15 years time. Demand for higher education places will increase correspondingly and put severe pressure on the education and higher education systems with intrinsic weaknesses described above.

There exist limitations on admission capacity of higher education institutes under MUA and MOE. Only 80% of school graduates can be admitted.

Implications and Impacts of the 1999 National Education Act

The National education Act heralds transformations unheard of in the Thai education world, if fully implemented. It may be the most major transformation since the first transformation that introduced public education and institutionalization of schools over a century ago. Thai brought basic education to the mass, education used to be in only for boys in the restricted domain of temples, palaces and nobility. Pertaining to the higher education system, the higher education reform calls, inter alias,

- restructuring of the higher education administrative system through merging of MOE, MUA and the Office of the National Education

Commission (ONEC), and creation of the Ministry of Education, Religion and Culture,

- changing of the public sector role in public higher education institutes from regulatory to supervisory, through incorporating public institutes, presently part of the Civil Services, into autonomous agencies or public corporates,
- creation of a national agency on education quality assurance that will set national education standards and undertake systematic implementation of quality assessment,
- extensive resources mobilization and investment in education, and
- redirection missions of higher education towards societal participation, student-centered learning and lifelong learning.

Charting the Road of Higher Education Reform (1999–2000)

The groundwork on the reform started with in-depth analysis of the 1997 Constitution and the 1999 National Education Act, and their implications on the Thai society and education. Evaluations on the past and current higher education systems and trends were taken. Research on overseas higher education reforms were conducted.

With all these information, critical issues of the reform were identified. The conceptual framework was then developed. It was recognized that transition management is crucial, and transition mechanisms are required. Participation of the public and various stakeholders was brought about through public seminars and workshops. The final outcome was submitted to ONEC for transmission to and consideration of the National Education Reform Office (NERO), a specialized public agency set up with the task of preparing the new administrative structure of the new ministry, the new personnel management system, requisite draft bills and the foundation of financing the overall education reform including the higher education. NERO will present its work, including draft bills, to the government for consideration. The work of NERO will lead to the establishment of the new Ministry by August 2002.

Goals of the Higher Education Reform

Under the higher education reform it is aimed to achieve the following goals:

1. The Thai higher education system with distinctive division regarding levels and types. There will be a central and unified mechanism of policy formulation and integration, planning budget allocation and evaluation, in the body of the new ministry.

2. The higher education system with improved access and participation.

3. Achieving academic excellence, requisite standards and quality assurance.

4. Management with autonomy and flexibility.

5. Mobilization of resources from various sectors.

6. Balanced development of the Thais and Thai graduates with desirable attributes of physical and mental strength, intellect and ethics.

Basic Tenet of Higher Education System

The restructured higher education system will have as its basic and important tenet a **unifying policy formulation,** and an equally crucial attribute of **diversity of practices and implementations.** Salient features are:

1. Division of the higher education system into two levels: sub-degree and degree levels.

2. National bodies to coordinate policy formulation, planning, education standards, resources mobilization, monitoring and evaluation.

3. The overall system will consist of public institutions, private institutions, specialized education institutions and area-based institutions. The last category is a new form whereby municipalities, local (tambon) administration councils, and provincial administration councils can set up higher education institutes level.

Higher Education and Administration Structure Reform

Issues that are addressed under the new higher education administration structure are

1. Maintaining of unified policy formulation and standards, while delegating authority and administrative and management responsibilities to educational service areas.

2. Administration and management of the education system are divided into 3 levels: **the national level, the educational service areas level, and individual institutions level.**

- **The National Level:** The Ministry of Education is mandated to supervise education at every level, under which 2 national bodies will manage higher education, namely, the National Council for Education, Religion and Culture, and the National Commission for Higher Education.
- **The Educational Service Areas Level:** The Educational Service Area Committees and the National Council for Education, Religion and Culture are mandated to supervise sub-degree level institutions.

- **Individual Institutions Level:** Degree level institutions are autonomous in management of their academic, financial and personnel affairs under supervision of their respective institution councils or governing boards.

3. There will be independent national organizations of common interest, in the form of autonomous agencies or public corporates, such as institute of standards and quality assurance, institute of education technology, organization of teachers and educational administrators, etc.

Administration and Management Reform

On the administration and management reform we envisage the following scenario with introduction of new and innovative mechanisms.

New Missions and Functions

Traditional missions and functions of higher education are **teaching, research, provision of academic services to society, and promotion of arts and cultures.** The first new expectation is placed upon higher education institutes to play roles of **watchdogs, social beacons and society conscience building.** This came out of realization that universities had played passive roles during the rapid socio-economic transformation of Thailand during the last 2 decades, this being distinct form the 2510s when leading social and political movements were university-driven. The second expectation is for higher education institutes on manpower development, not only producing graduates but being a pivotal and important instrument in professional upgrading and lifelong learning. This being so, the **target groups** for higher education institutes will not only be hundreds of thousands of **school graduates** a year as present, but millions of the **workforce** in the future.

Education Administration and Management

Coherence in Policy Setting

The Ministry of Education, Religion and Culture will be focal to unity and coherence in education policy formulation, planning and higher education standards. As manpower must be continuously developed, lifelong and continuous education are promoted. Improvement of access and equity are to be further pursued. Transfer of credits among institutions should be encouraged, the concept of which has been around for some time but hardly happens in practice. Recognition of work experience in formal education program will take place.

Incorporation of Public Universities

A systematic transition of public higher education institutions from being a part of the civil services to autonomous institutions will happen. Indicators on preparedness for the transformation will be developed. Capacity for autonomous management will be strengthened

Autonomous or incorporated higher education institutions will be accorded block grants budget. Unit cost of providing higher education in various disciplines and degree levels are to be formulated. Performance auditing mechanisms for academic, financial and management will be developed.

Internationalization of Higher Education with Thai Values

The higher education system will be more internationalized bringing the Thai education system to the international standard as well as making Thailand the country of higher education destination for South East Asia. Yet, during the age of internationalizing Thai higher education, retention, refinement and improvement of indigenous capability and knowledge must be concurrently pursued so that Thais will maintain optimum balance of indigenous and global knowledge.

Good Governance Culture

Good governance will be an important issue in management of autonomous universities, especially the public institutions. The institution boards or university councils need to be strengthened as they represent the government (MUA or MOE) and the public interest in overall internal management of a university, once a public university is incorporated. Most current university councils carry proforma duty. A university council, in a new management context, is supreme in setting the vision and direction of a university, formulating policy on education and research, overseeing the personnel system, budget and finance. Performance evaluation of faculties, functional units as well as senior administrators are to be carried out by a university council. An internal audit unit needs to be similarly strengthened to do internal auditing and performance evaluation, in addition to simply auditing of accounts normally carried out by public agencies. Reporting, auditing and assessment will become regular features and are a manifestation of transparency and accountability dimensions of good governance.

High Caliber Manpower and the Enterprising Spirit

Systematic recruitment of academic staff and personnel of higher education institutes must be established. Personnel development, key to organization efficiency and effectiveness, has not been priorities of the civil services in the past. However, if universities are to fulfill the new missions and functions outlined above and meet expectations of the society, high caliber academic staff and high quality personnel are requisite. Adequate resources must be allocated for the purpose.

Enterprising spirit is a new trait to be cultivated as a higher education culture. University staff need to be innovative in their thinking, and enterprising for the benefits of a university and the public. Entrepreneurs will bring innovations and dynamism to Thai business

and economic communities, and enhance competitiveness. Universities are seen as a potential source and incubator for young and technologically oriented entrepreneurs. This has been successfully demonstrated in advanced and newly industrializing economies.

Extensive Resource Mobilization

International competitiveness derives mainly from qualified professional manpower and accumulated intellectual properties form research and innovations. There is a strong correlation between the international competitiveness and the quality of higher education institutes. Higher education of quality is costly. Limitations exist, at least in the short and medium terms, on public financing of higher education due to economic constraints, increase in funding requirement for the education and constitution reforms resulting from the 1999 National Education Act and the 1997 Constitution, respectively, Extensive resources mobilization are necessary if the higher education reform will bear fruits. Cultivation of the new stakeholders for higher education is to be made through better public understanding and appreciation of the national benefits resulting from high quality education. Public and private commitments to higher education may need both simultaneous promotion of public spirit and tax incentives.

New public and private financing mechanisms for higher education are to be developed. The traditional one has always been direct funding to institutions (for public institutions). Fund for student loans, introduced during the 8th Plan (1997-2001), need to be increased to accommodate large increase in projected numbers of higher education students. Funding could be shifted overtime from **supply-side financing** (direct to institutions) to **demand-side financing** (student loans). Loans are available for students of public and private institutions. Loans conditions, based on family earning, and loans payment need to be revised. There have been calls to make **loans payment income-contingent** and, possibly, as **graduate taxes.**

Universities are the most important institution of a country to conduct research, apart from the fact that research is one of the important functions of Thai universities. Research in Thai universities is weak. To rectify this for the benefit of Thailand, massive research capacity building over few decades are required. Fundamentally speaking, more competent researchers of critical numbers in any field needs to be produced through doctoral studies. Intensity and continuity of research must be achieved. Direct and increase funding of basic research to universities and competitive bidding for research projects must be realized.

On the private funding at individual level, incentives should be developed for families to spend more on education and higher education, perhaps, through income tax allowance. Incentives for business corporates and industries to contribute to higher education, including research financing, should be in place. Apart from direct grants, they can become education partners through provision of facilities for training and make available professionals as lecturers, for example. Corporate tax allowances can be one instrument.

Other financing mechanisms to be considered may be specific funds targeting specific issues of higher education institutions. The government can consider establish funds for university staff development, research, innovations and entrepreneurship, effective management and good governance development. These are issues that required quantum amount of funding over sustained periods, not in the traditional domain of an annual budget process, to yield outputs and have reasonable impacts. They need goals and strategies at national and individual institution levels. **Financing** these can come from the annual **government budget,** education tax, taxes on cigarettes and alcoholic drinks, **government bonds** and **overseas loans.**

Networking Institutions and Society

There are over 600 higher education institutions and 130 degree granting institutions throughout the country. Networking these institutions will make available quality academic programs for production of professional manpower and extensive, diversified and nationwide education services for manpower upgrading and lifelong education. Transfer of credits among institutes and recognition ad accreditation of work experience are to be promoted. Collaborative research and service work of common interest among institutes are not common and need to be promoted by proper incentives. Internet connectivity of institutions will enhance cooperation modes.

For higher education institutions to better service the society, networking with other education bodies such as schools, public bodies at national and local levels, for example, local (tambon) administration councils, and the private sector is indispensable.

Academic Management and Teaching Organization

Novel Mechanisms for Teaching, Learning, Knowledge and Skills Development

The higher education reform will promote novel curricula and mechanisms for teaching and learning. This is to ensure flexibility and diversification to meet demand of individual learners, and dynamic national requirements. Adoption of learning innovation and information technology will feature prominently. The underlining principle of learner-centered learning, central to the education reform, will be observed at higher education level. Analytical skills, critical thinking and learning motivation are key attributes of the new era. Moreover, management of higher education institutions will place importance on research, accumulation of knowledge and technology for development of the nation.

Internal Assessment and Evaluation

Capability of higher education institutions to carry internal assessment and evaluation of academic and management performance will be strengthened. This will lead to improvement of education quality. Moreover, it reflects accountability of the higher education system to the public support.

Higher Education Standards and Quality

Pursuant to the discussion above, an internal quality assurance mechanism will be set up within each institution. A national body mandated to undertake external quality assurance as stipulated by the 1999 National Education Act will be established. This agency will be in charge of external evaluation of all educational institutes, from primary to tertiary levels.

The Ministry of Education, Religion and Culture, through the National Commission for Higher Education will set up common standards for higher education institutions while procedures for accreditation will be developed by the national body on standards and education evaluation. Professional organizations will be called upon to take active roles in higher education standards setting and quality assurance.

To support the work of standards setting, quality assurance and assessment, information systems, databases, quality indicators for higher education will be developed.

Critical Success Factors

To attain the goals of the higher education reform several critical success factors have been identified. They have to be closely activated.

1. Public awareness of roles and importance of higher education to national development and competitiveness needs to be stimulated. Building of consensus on the goals, strategies, and measures for the reform is important. Stakeholder cultivation is new but has to be promoted.

2. Good coordination between MOE, MUA, ONEC and higher education institutions are required.

3. Clear and coherent government policy with continuity must be secured.

4. Adequate basic logical and physical infrastructures development, especially management mechanism, manpower improvements, IT supports, will lead to capacity building of higher education and success of the reform.

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Development Thoughts of Thai Higher Education in the 1990s

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This article on ***Development Thoughts of Thai Higher Education in the 1990s*** originated from a documentary research aiming at developing a database on higher education, with funding support from the Office of the National Education Commission (ONEC). The research was part of a series of works providing supporting background for the Thailand-US Education roundtable with the objective of promoting cooperation and exchanges in the field of higher education between the two countries. The roundtable was held for the first time in 2001. The research thus had the aims of studying, collecting and synthesizing salient points from important academic papers and documents on the subject, with a view to ***reflecting the Development Thoughts of Thai Higher Education in the 1990s,*** or approximately from the beginning of the decade 1987. The research provided the basis for exchange of relevant information on higher education between the Thai and U.S. specialists in this field. At the same time, it served as a source of study for those interested in higher education in general.

For the above research, a selection was made from important publications; research works; articles; seminar reports; and essential documents of both individuals and agencies, reflecting the prevailing views on development in various aspects of Thailand's higher

education during a period of about 10 years. A framework of 12 major issues was accordingly identified. A synthesis of the salient points on each issue was then made for preparation of a report. The synthesis was subsequently posted on the ONEC web site. The framework of these 12 major issues includes: 1) Vision of Higher Education; 2) Production of Graduates; 3) Student Affairs; 4) Research Activities; 5) Provision of Academic Services; 6) Cooperation with Private Sector; 7) Information and Communication Technology (ICT) in Higher Education; 8) Internationalization of Higher Education; 9) Administrative System of Higher Education; 10) Resources and Financing of Higher Education; 11) Higher Education Personnel; and 12) Higher Education Quality Assurance.

Nonetheless, even though the origin of the research mentioned above was linked to the word **"database"**, which sounded like an activity combining informatics with library science, in actual fact due to its objectives and time constraint of only 3 months at the researchers' disposal, the research was confined to selecting only important academic works in order to synthesize major concepts of higher education development in various aspects. The researcher therefore, with the approval of the Steering Committee for the Thailand-US Education Roundtable, gave the title of "Development Thoughts of Thai Higher Education in the 1990s" to the research, which more accurately reflected the content of the presentation.

During the past decade, the Thai society was faced with several turmoils. We still recall the days of the bubble economy, which rapidly expanded early in the decade beginning 1987, bringing along many dreams and aspirations to the Thai people. The bubble economy also affected enormously our thinking and reflection on higher education. The rapid growth of the private business sector together with expectations of the new labour market on manpower production by higher education institutions, as well as Thailand's **"attractiveness"**

as a rising economic star in the region, resulted in increased opportunity for cooperation in higher education with various countries. All these contextual factors suddenly jolted Thailand's higher education to formulate a new vision in support of the new roles of the country. The Programme for Acceleration of Manpower Production in the Fields of Science and Technology during General Chatichai Choonhavan administration, which was initiated during the period 1990 - 1991, and the establishment of the Thailand Research Fund in 1992, were examples of significant milestones, reflecting the new image of higher education, with its priorities on manpower production as well as research for creating new knowledge aligned with the progress resulting from globalization.

Besides, there was pressure from expansion of leading higher education institutions in foreign countries, which expanded their services to the Thai youth right here in Thailand. There were also those which attracted billions of Thai children from rich families to further their education abroad each year. All these resulted in an urgent demand on Thailand's higher education to improve its quality and standard, in order to meet the needs of the Thai children as well as to sustain the faith and trust from society. Furthermore, the continuous success of secondary education expansion throughout the decade 1987 led to a rapid increase in Thai youth's demand for education at higher levels. Although there were already 2 open universities, they did not seem to be able to cope with the ever increasing demand. Several higher education institutions had to adjust themselves through increased admission of students; opening of specialized courses; and providing some long-distance courses similar to those given by the open universities. Since then, **there were greater expectations from society as well as from the higher education community. These included demand for promoting national competitiveness through accelerated quality development of manpower to meet the requirements of modern labour market;**

and spearheading of research to accommodate industrial expansion. Many expectations were made of Thailand's higher education, from the efficiency of the higher education system dominated by bureaucracy for so long to expanding opportunities for Thai youth, who increasingly and continuously crowded the path of higher education.

Even after the beginning of the economic slump from 1996, expectations of the Thai children, Thai people and Thai society did not seem to decrease. Crucial issues, such as attaining excellence for national competitiveness and Thailand's survival in the world community; provision of opportunity for all for social equality; and efficiency in utilizing public resources, have emerged as the goals and permanent tasks of higher education to satisfy the present social needs.

Chronology of Important Milestones in Development of Thai Higher Education during the Past Decade

1989 : Ministry of University Affairs (MUA) prepared a Long-Range (15 years) Plan of Higher Education, based on 23 policy research projects and with active participation of more than 100 academics from various universities. The plan served as a starting point for development of an offensive higher education policy, which has been on-going to the present time.

1990-1992 : Accelerated graduate production program in approximately 10 areas of shortage, especially in Science and Technology; social science-oriented universities e.g. Thammasat University and Silpakorn University, gradually inaugurated Faculties of Science and Technology.

1991 : Establishment of Suranaree University of Technology as Thailand's first autonomous university.

1992 : Establishment of the Thailand Research Fund (TRF), with an endowment fund of more than 1 billion THB.

1993 : The bills for transforming 16 higher education institutions into autonomous universities were not legislated by the House of Representatives due to its early closure.

1995 : H.M. the King graciously granted the title of "Rajabhat Institute to all teacher colleges nationwide. Since then, these Rajabhat Institutes rapidly expanded with introduction of courses in various fields to meet the local needs of the respective areas.

1995-1997 : Continuous expansion of higher education system with inauguration of several private higher education institutions and the project on establishment of 5 additional Rajabhat Institutes. In regard to state higher education institutions, 2 autonomous universities were established, namely: Walailak University and King Mongkut's University of Technology Thonburi.

1998 : Establishment of Mae Fah Luang University as the 4th autonomous university.

1999 : The number of students of Rajabhat Institutes increased to around 400,000 from over 100,000 in 1995 due to introduction of Special Courses for In-Service Personnel.

2000 : Establishment of the Council of Autonomous University Presidents of Thailand .

Other milestones additionally testified to the **diversified tasks** of Thailand's higher education system. These included the pressure to establish autonomous universities to meet the demand for efficiency from higher education institutions, and the trends of continuous increase in the number of higher education institutions as well as student population, especially local higher education institutions. The most prominent trend could be seen in these institutions' gradual attempt **"To provide necessary services for all"**, particularly the rigorous efforts of several institutions to open more and diversified courses as well as their accelerated graduate study programs.

On the whole, it could be stated that, during the past decade, Thai higher education community became highly enthusiastic and extensively aligned itself to social demands. During the decade, essential knowledge and numerous concepts emerged from academics of both higher education institutions themselves and the central education agencies of the country. More than 200 important academic papers were presented, reflecting the main development thoughts of Thai higher education in the 1990s in various aspects. Following a stringent selection and synthesizing the salient points of these papers, based on framework of the 12 major issues, several points of interest regarding the **"thoughts"** of Thai higher education academic community have emerged, as can be seen in the following main concepts for higher education development in various aspects.

Vision of Higher Education: Strong Social Paradigm: Nation with Competitive Edge

Our vision of higher education had as its origin the pressure to create the people's competitive capability during the economic boom of 1987-1988. As a consequence, central agencies as well as academics proceeded to present **Higher Education Strategy for National Competitiveness** as an agenda for the beginning of the decade 1987. Pressure was borne upon formulation of policy and strategy for higher education development through the new vision to enhance Thailand's competitiveness and to strengthen her important role in the world community. Among the significant milestones was the Long-Range (15 years) Plan for Higher Education Development prepared by the Ministry of University Affairs, the output of which included a large number of policy research works and academic achievements in 1987-1989. At the same time, there emerged the perception of **the role of higher education as an instrument for creating social equality and concurrently lessening economic disparities.** Such developmental strategy resulted from the problem of income distribution gap between the people living in urban and rural areas, as well as other facets of social problems deep-rooted in Thai society. Emphasis was placed on continuous effort to expand higher education to the various regions. Among the important milestones was the task of MUA's ad hoc committee to study and provide recommendations on regional mapping of higher education institutions in 1988.

Other than continuing the policy of strengthening national competitiveness and at the same time attaining social equality, the problem from the delay in implementing the above-mentioned development policy resulted in the mid-decade concerted effort to push forth the concept of **higher education efficiency** in all aspects - administration; personnel; financing and budgeting; as well as quality of education. Central educational agencies as well as several universities provided the forum to spark off the concept of higher education efficiency in the various aspects referred to. These included the Project on Assessment of the 6th and 7th Higher Education Development Plans undertaken by the ONEC and the MUA. Among many noteworthy seminars was "Thailand's Higher Education in the Next Decade" organized by Suranaree University of Technology in 1994. All these activities highlighted efficiency of higher education system as an important issue of concern in the academic community.

Following the 1995 economic slow-down to the present time, Thailand's higher education vision seems to have reverted to the emphasis on public higher education, and to increasingly carry out its diversified tasks in our multi-faceted society. Among the important milestones was accomplishment in 1995 of the Commission on Thailand's Education in the Era of Globalization, which was the starting point for grouping and clearly defining the role of educational institutions i.e. manpower production-oriented institutions;

those in transition to become research-oriented universities; and those with emphasis on providing higher education services to meet local needs. The current trend also includes the concept of empowering the community, which has arisen later from the Sufficiency Economy Philosophy. The philosophy is an answer to the question of overall national development, with an emphasis on strengthening the economy in accord with the local capability. Such concept therefore attaches unequivocal importance to the role of higher education in enhancing quality of manpower in all production section - both modern and traditional. The concept was indeed well received in the period of the 8th Higher Education Development Plan to the legislation of the National Education Act. Institutional development plans also followed a similar direction of expanding educational opportunity through various means, and at the same time providing academic service to the community. Such predominant direction was quite apparent among the group of institutions closely linked to rural areas, as can be seen in the loud and clear assertion by the Rajabhat Institutes.

Production of Graduates: Catch-Word of Quality under Quantitative Exigency

Our concept of production of graduates endowed with desirable attributes was continuously highlighted and discussed in the academic community, since the publication at the beginning of the decade 1987 on **"Basic Knowledge Advocated for Thailand's University Graduates"** by the illustrious M.R.Kukrit Pramoj. At the same time, the Council of University Presidents of Thailand seriously dwelled on the issue of the future direction of Thailand's production of university graduates. Their collective concern clearly reflected reaction of the Thai society, which did not seem to be overly satisfied with the output of its higher education. However, following the rapid

economic boom, together with the government policy at that time to *"Transform the battlefields into fields of commerce"* led to **the concept of manpower production to meet the dynamic exigency of the labour market in the age of globalization in concrete measures.** The concept could be clearly discerned in several policy research outcomes at that time. Particular attention should be drawn to many policy research works required for preparation of the MUA's Long-Range Plan for Higher Education Development. These included: projection of degree-level manpower requirements; behavioural study on labour market for graduates; and future trends of global and national development affecting the direction of manpower production etc. Such pressing demands led to several important milestones e.g. Project on Planning for Production and Development of Manpower in Science and Technology, and the Accelerated Graduate Production Program in Areas of Shortage of the MUA etc. In the course of time, identification of the role of higher education in human resource development has become an important conceptual basis, concurrent with the commitment to produce and develop manpowers with all the attributes of thinkers and knowledge creators. These are undeniably **desirable characteristics of the graduates** harmonious with requirements for development of a producer-society rather than a consumer-society, resulting in the **reform of higher education curriculum and teaching-learning activities** with an emphasis on self-learning. Even at the present time, the academic output of the Project on Thailand's Education in the Era of Globalization, which was the latest reflection, is still indicative of the conceptual commitment to produce manpower with avidity for knowledge and self-adjustment capability for *"Steady Steps in Keeping with World Progress"*. Besides, the strong determination to enhance the quality of manpower has led to continuous **development of graduate studies,** as can be seen in the study of the trends of requirements and manpower production at higher bachelor's degree level conducted by

the central agency, together with attempts made by several higher education institutions to adjust their graduate study structure.

Student Affairs: Attempt at Reviving the Forgotten Path of Learning

Reference has often been made to the importance of student affairs, which has not been given its due recognition in practice during the decade under review. It is often referred to from the perspective of identifying suitable models and activities in order to further enhance the ambience, and spend their university life in the contextual requirement of developing graduates endowed with desirable characteristics and enjoying full development in all aspects. In the present age of globalization, we have started to advocate strengthening commendable attributes of the graduates regarded as consumers in the information age. We also commend student activities as instrumental for **enhancing learning ambience.** Central agencies, e.g. the MUA, have played a catalytic role in pushing forth such movement, as can be seen in the national seminars on *"Thailand's Ideal Graduates"* or *"New Dimensions for Developing Higher Education Students"*. These reflected attempts at advancing the new vision of student affairs. Noteworthy was the concept of **effective integration of student affairs with teaching and research activities** with a view to meeting the objective of producing well-rounded graduates. Emphasis on the **students' moral problems** is another issue of concern in the academic community at present. There have been several seminars in the higher education circle on strategy for development of students' personality and morality. Besides, in the world of research at doctoral degree level, more people have shown their keen interest in studying the students' cultural and moral life. The latest issue, which has given rise to continuous pressure for reform movement during the immediate past is **the policy and guidelines for selection of students.** In this connection, the MUA, MOE and ONEC have joined efforts in experimenting with the methodology and criteria for the new student selection system by giving greater weight to the students' cumulative Grade Point Averages attained in their upper secondary education. Such initiative is aimed at increasing equal opportunity, decreasing undue pressure from students' competitiveness, and paving the way for higher education institutions to select the students in accord with their own philosophy and practices in future.

Research Activities: Paradigm for Creating Wisdom for National Development

Our concept of research was stimulated from Thailand's strong desire to become a New Industrialized Country (NIC) at the beginning of the decade 1987. As a consequence, the government began to revise and more clearly identify the **role of the public sector in research activities,** with emphasis on the benefits of high-level research. Indeed, research served as an instrument for development of national production sectors to attain self-reliance and competitive edge in the global trade market. Based on such concept, research activities, both basic and applied, were accorded high recognition in the 6th and 7th Plans for Higher Education Development. However, following the worrying signs of the economic slow-down and the apparent income-distribution disparity between the urban and rural areas, the task entrusted to higher education institutions' research activities was consequently revised for transformation into an intellectual strategy for development of national equilibrium. Various academic achievements - from the Project for Formulation of Long-Range Plan for Higher Education Development in 1989, followed by the Project on Thailand's Education in the Era of Globalization towards the end of the decade, to the MUA's study on *"Trends of Thailand's Higher*

Education in the 8th Plan", all placed an emphasis on attaining a balance between research aimed at "competitiveness" in the fields of Science and Technology on the one hand, and that for **"security"** in Social Science on the other, has become more pronounced. Establishment in 1992 of the National Research Fund, serving as an essential mechanism for promotion of research at national level, resulted in generating keen enthusiasm for research at higher education level in almost all disciplines, including institutional research for increased internal efficiency of the respective institutions.

Such enthusiasm in Thailand's higher education research community has led to the concept of **research-oriented university** and creation of a strong research community. The enthusiasm also had a consequence on the move to reform higher education regarding the structure and academic culture of higher education institutions. The reform was aimed at knowledge-building for national development, together with creating an **efficient research management system.** Such enthusiasm has been extended to the Rajabhat Institutes and the Rajamangala Institute of Technology, which began to formulate their vision of research for promotion of local wisdom, regarded as one of their important roles.

Provision of Academic Services: On the Income-Generating Era Path under the Catch-Phrase "For the benefit of the community"

The task for providing academic services was given strong impetus by the continuous demand for higher education opportunity in the course of the decade. Such demand for higher education institutions to wide open their doors to the general public resulted in the **expansion of the higher education institutions' role in providing continuing education** to all the target groups - urban, rural and production sectors. Since the preparation of the Long-Range Plan for Higher Education Development more than 10 years ago, provision of

academic services had constantly been emphasized. Apart from being regarded as a mechanism for meeting social needs, such provision was also considered as a mechanism for **strengthening the institutions' capability in income-generating.** During the decade under review, there emerged several concepts and innovations through the models and mechanisms for academic service provision by higher educational institutions along such line; for instance, establishment of the Technopolis of Suranaree University of Technology, serving as the source for providing academic services through various models for the benefit of local industrial entrepreneurs, and at the same time serving as income-generating source for the university etc..

Up to the present time, the parameters and definition of provision of academic services by higher education institutions seem to be constantly expanded, with the inclusion of academic services provision to the communities in accord with **the policy of empowering rural communities,** and with several groups of institutions seriously responding to the demand for this new role e.g. the Rajabhat Institutes etc..

Cooperation with Private Sector: Partnership Paradigm for Thailand's Higher Education in the New Era

The concept of cooperation with the private sector emerged since the time of the economic boom. The early pieces of work of importance during the decade under review were policy research works required for MUA's preparation of the Long-Range Plan of Higher Education Development. The research included studies on both the roles of the private sector and higher education as well as those of private higher education institutions. Significant recommendations emanating there from resulted in policy implementation to the present day. These include collective efforts in **providing teaching-learning as well as training activities** or the so-called *"cooperative education"*;

joint investment for research and development; and the demand for the state to provide more concrete measures to **attract participation** and contribution from the private sector. At present, there have been academic accomplishments which more clearly highlight this view, as can be seen in the proposed concept of the Commission of Thailand's Education in the Era of Globalization in seriously regarding the private sector as partner in education provision as well as stakeholder in the output of higher education.

Information and Communication Technology (ICT): Attempt at Creating Fiber Optic Infrastructure for Higher Education in the New World of Learning

The concept of the role of ICT in Thailand's higher education during the decade under review tended to give prominence to **investment in computer and ICT infrastructure** in higher education institutions, continuously considered as one of the main issues of concern. There emerged at a later stage additional concepts and guidelines on development of **new models of higher education institutions' academic services through application of ICTs** i.e. concepts of IT Campus, Cyber Campus and Virtual University; proposed concept on application of ICTs for study and research; and more intensive efforts for development of **e-library network in higher education institutions** etc.. In this connection, academic achievements of the central agencies and several higher education institutions have contributed to continuously pushing forth this concept e.g. MUA's preparation for formulation of the Long-Range Plan for Higher Education Development, which included a study on Thailand's future trends in becoming a NIC, and development in the fields of Science and Technology; ONEC's study on effects of ICTs in teaching and learning in developing countries; the series of documents on National ICT Policy by the Secretariat of the National ICT Committee; and output of Sukhothai Thammathirat University on direction of long-distance education through application of new ICTs etc..

Internationalization of Higher Education: Paradigm of Education Export and Graduate Internationalization

The concept of higher education internationalization emanated from the ardent desire to become **regional human resource development hub** in the days of the economic boom. The MUA provided a strong impetus in the preparation of the Long-Range Plan for Higher Education Development, which highlighted internationalization as one of the 4 pillars of Thailand's higher education development. Besides, a series of national seminars on the subject were organized for continuous advocacy of the concept in later days. Although at present, the aspiration of becoming a regional HRD centre seems to have become less ardent, the concept of higher education internationalization is still highly recognized, as can be seen in accomplishments of central agencies, e.g. MUA, ONEC and Department of Technical and Economic Cooperation (DTEC) etc., as well as those several academics. The prevailing concept, however, seems to give priority to **international cooperation network, graduates' international outlook** and efforts to identify **appropriate international curriculum** suitable to the context of the Thai society.

Administrative System of Higher Education: Leadership Crisis in the Tide of Autonomous Universities

Our concept of higher education institutions' administrative system emerged from dissatisfaction with **efficiency of higher education.** Noteworthy achievements early in the decade under review included those of the Council of University Presidents of Thailand on self-reliance in state university system. These led to selection of

several issues on internal administration of higher education institutions for indepth analysis. The studies were both independent research undertaken by the respective institutions and doctoral degree theses e.g. analysis of the role of the university council; analysis on requisites for appointment to the post of university president; analysis of the status and role of a department head etc.. The prevalence of such concept and pressure from central agencies resulted in development of the **system of autonomous higher education institutions** endowed with freedom, flexibility and accountability, culminating in establishment in 1991 of the Suranaree University of Technology, the first **"autonomous university"**. This has led to continuous conceptual repercussion on almost all groups of higher education institutions, both in regard to readiness to leave the civil service bureaucracy as well as creating **professionalism required of higher education administrators,** with participation of the institutions attached to both MUA and MOE e.g. the Rajabhat Institutes and the Rajamangala Institute of Technology, which are actively engaged in this movement at present.

Resources and Financing of Higher Education: Paradigm of Self-Reliance and State Support Reform

Our concept of higher education resources was stimulated by an analysis of the **capital and gain of higher education,** reflecting its disparity and inefficiency in budget allocation. This led to the concept on the **system of budget allocation for higher education in terms of block grant,** together with commitment to **resources mobilization for higher education.** Such concept emanated from academic studies on the capital and funding sources for higher education carried out by ONEC and MUA, with significant influence from early in the decade 1987 to the present time. Other central agencies e.g. the Budget Bureau, have also studied and proposed relevant strategies on budget support for education. At present, suggestions have been made on allocation of bonuses to stimulate quality improvement of education and research, as well as imposing the concept and method of calculating per head expenditure for students, thus forming the basis for the new method of budget allocation.

Higher Education Personnel: Catch-Words of Brain Drain and Professionalism of University Personnel

Our concept of higher education personnel originated from the crisis of *"brain drain"* or **personnel loss** of the system, leading to the crucial need to **improve higher education personnel system** for modernity and efficiency, so as to be able to attract competent and desirable personnel, commensurate with the increasing challenges facing university personnel in future. Important academic papers included studies on higher education personnel, and those on their academic freedom carried out for preparation of the Long-Range Plan for Higher Education Development by the MUA. There were also other academic papers of the MUA for the project on solving the problem of personnel shortage in state higher education institutions. These noteworthy works significantly contributed to pushing forth the concept of higher education personnel policy early in the decade under review, leading to attempts to identify suitable models for personnel administration of higher education which continue to the present day. Besides, the concept of continuing personnel development as well as efforts required for stringent **quality assessment** of personnel, based on academic achievements, have been increasingly highlighted at present.

Higher Education Quality Assurance: Attempt to Create Modern Organization Culture in Higher Education Community

The concept of higher education quality assurance originated from widespread **criticisms on the quality of higher education graduates** together with the **prevalent advocacy for quality assurance worldwide,** leading to attempts to develop **models and guidelines for quality assurance of higher education institutions** attached to various agencies. Noteworthy academic achievements included policy papers on guidelines for higher education quality assurance of the MUA, and ONEC's research on models of higher education quality assurance in different countries. Besides, the concept of ranking universities/higher education institutions, and the concept of indicators for higher education institutions' quality have also been receiving increased interest. The demand for quality assurance is spreading to the higher education community worldwide, due to the continuous quantitative expansion in almost all countries in the past 2-3 decades. This has led to the problem of higher education output. The stronger relationship and greater commitment of higher education institutions to society and various bodies have resulted in the demand for and expectation of quality from higher education institutions in carrying out their different tasks.

Models of NOn–Baccalaureate Higher Education Institutes

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Background

The National Education Act of B.E. 2542 (1999) and B.E. 2545 (2002) has classified the levels of education as basic education and higher education. Subsequently, the higher education is divided to non-baccalaureate level and baccalaureate level. By the structural administration, the non-baccalaureate level higher education institutes will be put under the jurisdiction of various offices in the Ministry of Education (MOE).

When the education reform has been effective, the basic education graduates will be tremendously increased. It is estimated that by the ends of 9^{th}, 10^{th} and 11^{th} National Social and Economics Development Plans, there will be 990,000; 1,350,000 and 1,780,000 basic education graduates respectively (ONEC 1999). There will be a number of graduates among this total numbers who will not be admitted in either state higher education institutes or private ones; both at non-baccalaureate and baccalaureate levels, approximately 200,000 persons annually. This research thus aimed to study with regard to the system development of the possible structure of NHEI in order to serve the continuing education of the people in the locality.

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* Researched by Assoc. Prof. Dr. Thong-in Wongsotorn, Assoc. Prof. Dr. Prayoon Sriprasart, Dr. Pranee Sanykatavat, Dr. Suchin Visavatccranon, Dr. Narimol Tanthasuruscth and Dr. lira Tamiey

The Present State of Organization of Thailand's Non-Baccalaureate Institutes (NHEI)

The organization of NHEI at present is responsible mainly by the Ministry of Education (MOE). Additional, some other agencies may organize education at this level in a form of semi-professional and vocational specialization, in order to serve a man power demand of that particular unit or department. All curricular of the institutes at this level are vocation-oriented and are administered in conjunction with other curricular e.g. with upper secondary education and baccalaureate classes. This has been so because, there is no law for establishing any institute to offer non-baccalaureate degree level. For a private institute which runs this type of curricular, the Private Education Act of B.E. 2525 (1982) stipulates it be called "a school", and cannot be called otherwise. All institutes of this type, both government and private, are mainly located in urban areas. In some provinces or educational service areas that are not big cities, there are hardly this type of educational institutes.

The State of Management of NHEI in Foreign Countries

The management of NHEIs in foreign countries has similar pattern. That is, it has somewhat 1-3 year curricular which may be general, vocational or specialized. The institutes are under supervision of the state academic standard agency which are subject to quality assurances. The NHEIs are both governmental and private. This characteristic leads to differences in personnel administration while the budget allocation for the governmental institutes depends on the country's economic standing and its educational objectives. With regard to the transfer of credits which is focal to the educational at this level, it entrails many forms. However, each form has an aim to ensure the high quality of education in this level and provide the fullest opportunity for baccalaureate study as much as possible. Each country also considers the outside index of accomplishment, i.e. the concerned agencies such as the upper secondary schools which produce the applicants, the baccalaureate level institutes which accept graduates for further education, and the private sector which participate in organizing education of this level. And also the suitable values of the community to the education of this level.

Proposals Regarding Types, Establishment, Structures, and Administration System

Types of NHEI can be classified into 4 categories; (1) the state institutes; (2) the local administration institutes; (3) the university's institutes; and (4) the private sector institutes.

Models and Establishment

The State Institutes

The state institutes which are under MOE may be established by adjusting the present MOE colleges in the same educational service area and placing them under the same administration system. Then, they may be expanded to offer diversified curricular, both academic and vocational streams, terminal curricular and transferal curricular (two more years of so for baccalaureate level). For some institutes which are national identities can be organized as a college solely for vocational teaching. For educational service area which does not have and NHEI may establish NHEI as extension sections of upper secondary schools by using the local resources. In one educational service area, there should be only one state NHEI.

The NHEI under the other ministries can be established as specialized institutes to respond to the ministries' specific needs in manpower.

The Local Administration Institutes

The local administration organizations which are ready and the locality has needs of such education, they can establish NHEI. This NHEI will offer specialized courses or both general and vocational education. The idea is to enable the graduate to continue their education or take vocational careers. The model of establishment should be mainly based on utilization of existing local resources.

The University's Institutes

The university's institutes belong to the universities. This type of institute is established according to the university acts which allow universities to establish NHEIs by setting up campuses or gathering the NHEIs in the local area as its network.

The Private Sector Institutes

The private sector as individuals of a group can establish an educational institute as, a newly establish NHEI, network of a private university, or an extension of an upper secondary school which uses local venues and resources.

The Administration System

The NHEI is administered by the committee both at policy and administrative levels and it is subject to the educational service are committee and it's office in considering their establishment of all jurisdictions. The administration, however, decentralized its administrative authority to the NHEIs as much as possible. These institutes still have to follow the regulations of the department they are under. In the matter of finance and budget, each educational

institute allocated the support budget in various forms and certain proportions. Still, the educational institutes have opportunities to earn their revenue from their own resources.

The Curriculum Provision

The curricular emphasized diversity in courses and means of instructions. There will be professional organized to control the educational standards and ensure the quality, and also a system for transfers of credits, curricular and learning results between institutes and levels of education.

Policy Proposals

Major Proposals

The state should consider with a view to approve the matter regarding types, model of establishment, structures and administration systems of the NHEI.

The Operational Proposals

When the state has approved the major proposals, it should undertake the following measures regarding the NHEI.

Proposals on the Establishment and Administration of the NHEI:

- The state should lay down policies regarding the organization of NHEI in all aspects such as establishment, types, models, management of the institutes and means of support. And also separation of responsibilities in the establishment and management between the state and the private sector, and between the state and local organizations.

- The state should legitimize the NHEI by having the essence covering their title; tasks; finance; educational standards; the organizations responsible for the control and evaluation; the resource support from the state, local administration organizations and the private sector, revenue acquisition; welfare; and so forth. Also, the state should have regulations regarding revenue allocation; welfare and benefits; etc. At the same time, there should be the issues of ministerial regulations and procedure for NHEI establishment, merging, and dissolving (The National Education Act of B.E.2542 (1999); section 23)

- The state should issue ministerial regulations and means of establishment of NHEI.

- MOE should issue the ministerial regulations to decentralize the authority to educational service area on the matters of establishment dissolving, controlling, follow-up, monitoring and evaluation of a NHEI in an educational service area.

- The state should lay down clear policies and measures on participation of the private sector, local administration organizations, and other ministries or departments of the organization of NHEI.

- MOE should issue the ministerial regulations to decentralize the administrative authority on personnel administration of the NHEI.

- The state should conduct and experiment of establishing NHEIs in various models so they will server as guideline to improve the quality and standard of NHEI, and also used as the prototype of other NHEIs.

Proposals on Quality and Educational Standard

- The Office of Standard Assurance and Educational Evaluation should develop criteria, norms and means to evaluate the external quality of NHEI.

- The institutes that have functions in producing and developing teachers and educational personnel should identify policies and work plans of producing teachers and educational personnel which are systematic and continuing.

- The Office of Higher Education Standards of the Higher Education Board should identify the standard criteria, and standard evaluation process of the NHEIs so as to make them standardized.

- The organization concerned should identify the structure and criteria of one and two-year certificate curricular of NHEI.

- The organization concerned should identify the criteria and means for accreditation and transfers of credits between colleges, and between universities as NHEI.

- A law should be passed to identify diploma and certificate titles of the graduates who take the first 2 year courses of baccalaureate-level institutes. They may be such as “associate degree” or else. The reasons are for the graduates’ benefits in furthering their education or matters of salary.

- The organization concerned should identify means and strategies to promote academic cooperation of all types of NHEI located in the same educational service area.

- The state should plan and undertake the quality development of the NHEI management so as they are recognized by

baccalaureate-level institutes in order that the latter will accept the former's graduates for further education.

- The state and baccalaureate-level institutes should have the policy to accept NHEI in the same educational service area as the members of their network. Subsequently, the baccalaureate-level institutes should take up as their responsibility to enable the NHEIs to develop the educational quality and standards; and accept the latter's graduates for further education.

Proposals on Educational Resources

- The state should identify criteria, means and proportion of the budget allocation to support the organization of all 4 NHEI categories.
- The state should pass the law on educational tax and support the local administration organizations in order to better support the NHEI which operate in the locality.
- The state should develop the system and measures for mobilization of resource from the community for a purpose of supporting the NHEI.
- The state should set up a fund to support the private sector institutes.
- The state should identify means to support and encourage the NHEIs to set up their own endowment funds.

Proposals on Joint Burdens in Education Organization

- The state should amend the private education act to enable the private sector to establish NHEI which are called in various names such as college, institute, etc.

- The state should pass a law and issue regulations on the evaluation of the local administration organizations needs and readiness in organizing NHEI.
- The state should identify policies, work plans and proportion of enrollment which the universities will accept from the NHEIs graduates to further their education in the third and the fourth year.
- The state should support and develop cooperative network between NHEIs in the educational service area and other community organizations. This is to develop the partnership for non-baccalaureate-level of education management in the education service area. At the same time this will respond to the local's need.

Proposals on the Establishment of the NHEI

- The NHEIs of all categories must submit the requests for establishment to the Office for Education, Religion, and Cultures (OERC) in the area where the NHEIs are located.
- The NHEIs of all categories must be under the same standard criteria; namely curriculum, Instructors, educational administrators, educational personnel, materials, equipment, educational media, library, and size of the institute.
- There should be only one state NHEI in an educational service area. However, if the local administration organization or the private sector or the university in that area wants to establish a NHEI, this will be rested upon the readiness of the local administration organization and private sector, and the needs of the university.

Development of Virtual University in Thailand

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Introduction

The rapid development and pervasiveness of information and communication technologies (ICT) encompassing computer, telecommunications, and the internet over the past few decades have had vast impact ranging from changes in lifestyles to national innovations. Higher education is no exception. In most countries, ICT applications in education deliveries and services play an increasingly important role in formal education, extension education, and life-long learning in general. Their dynamic capabilities offer new educational dimensions via easy accessibility and free flow of information and knowledge apart from the revolution of personal communications. However, the virtues of ICT have yet to face the traditional challenges and issues in education namely quality, equity, and efficiency.

Although there are various meanings, a virtual university is generally defined as an online institution - an institution which offers opportunity and facilitates learners to gain access to, learn, and develop knowledge. The uniqueness of such an institution is that the learners can manage their learning process in the "anywhere-anytime" setting. Such system may produce outcomes ranging from developed skills to degree granting.

This paper, commissioned by the Office of National Education Commission, aims at proposing policy and measures in developing a virtual university system in the Thai context. In doing so, the study examines the scope, structure, and the environment of a virtual university.

Experiences in Other Countries

By examining some of the foreign experiences, it is found that the concept of a virtual university has been developed as part of the educational innovation in response to the demand in education especially in the developed countries such as the U.S. and the U.K. This development extends the opportunity in higher education both in the domestic and foreign market. In addition, some programs aim at providing education services and training to the workforce both in the form of capacity and skill building and re-training. As for the developing countries, limitations in information infrastructure and personnel are the main obstacles. Hence, the development of a virtual university usually aims at providing services to target groups and curricula that respond to the need of regional development. In addition, some would focus on training the trainers program.

From the management point of view, it is found that there are four major forms in developing a virtual university, i.e.

- Universities that develop their online learning by extending from the existing classroom curriculum, manage by committees under the schools or universities with regard to the standards issue in mind.

- A virtual university can be administered via cooperation from several institutions and can be categorized in two ways. The first is in the form of a "clearing house" where several

institutions bring their contents up on the same website, each institution then independently manages its own curriculum and delivery. The other is in the form of "collaboration" where several institutions jointly set a common policy and curriculum in such a way that they can develop and use the content together.

- Newly created virtual universities may be developed via cooperation from networked institutions or in the form of a corporate entity. Such entity seeks to respond to market demand, then acquires and offers education resources from reputable institutions. Evidently, this kind of setup has a competitive edge in its investment platform when compared with a physical university due to its outsourcing and cost saving nature.

- A virtual university that is developed by corporate enterprise to provide online education service. Most concentrate on training programs for the existing workforce.

Lessons Learned

There are a number of lessons that the country can learn from existing practices:

- The development process of a virtual university must be flexible and accommodates changing needs such as the demand for online learning in the workforce.

- There is a tendency for an increase in number of players in online learning especially content providers as a result of cooperation among universities. In addition, there will be competition in online services from non-university organizations such as private companies, libraries, art institutes, museums etc. These phenomena may enhance efficiency in online learning.

- There is an increasing concern on the quality and standard of online learning. Apart from the quality control system of the university administration, the responsible public agencies must enforce rules and mechanisms in order for the newly formed virtual universities to establish and maintain their qualities that lead to proper accreditation.

- At the outset, both university personnel and the students may tend to resist online learning. There is a need to create awareness and understanding as well as incentives for the implementation of online learning.

- To operate a virtual learning environment, a team work has to be in place involving supporting and consulting staff as well as technicians, educational psychologists, designers, producers, and teaching staff.

- The choice of online technologies depends on the appropriateness and readiness of the institutions.

Issues to be Considered in Developing Thai Virtual University

The following highlight major issues to be considered in the Thai context:

- It is estimated that limited-admissioned public universities will be able to absorb about 63 percent of the applicants due to the expected increase in high school graduates as a result of the

National Education Act B.E. 2542 which decrees that the State must provide opportunity for basic education up to 9 years minimum. The rest will be absorbed by the open-admissioned universities and the private universities as well as online learning.

- Virtual university system is deemed to be one of the innovations in education that opens up more choice to the public. This is timely as higher education budget (per student) from the government has been declining. There is certainly a limit to the expansion of physical universities.

- The advent of a virtual university in the Thai context requires some support from the university and the government in the form of pilot projects and some financial assistance.

- The distribution of physical universities in the country is somewhat unevenly distributed. A large number of universities are concentrated in the Bangkok Metropolitan area. Furthermore, the disparity in family income of students also poses problems in providing equal opportunities in education.

- Digital divide also creates unequal opportunity in education. A lack of information infrastructure in many areas of the country poses a major obstacle to education delivery and services not to mention the quality aspect.

- Although the focus here is in utilizing information technology, other technologies and education processes are also appropriate in many circumstances and technology integration should be considered. Online and classroom-based activities are usually integrated for maximum effectiveness.

- The return on investment of a virtual university can be justified from the economies of scale and cost savings point of view. However, subject to examination on a case by case basis, decisions have to be made on the choice of virtual university which could be either supplementary or supplant mode of investment.

- The issue of interaction is always paradoxical. On the one hand, online learning has a disadvantage of insufficient face-to-face interaction between students and teachers and among students. On the other hand, many online activities prove to have intensive interaction via the "anywhere and anytime" advantage in addition to the ability for learners to gain access to the vast pool of information and knowledge through the internet.

- Although there is no statistical proof on the issue of effectiveness between the online and the traditional mode of education delivery, more studies have to be conducted to scrutinize the products from the two approaches.

- The development of a virtual university should be considered along with the Thai context encompassing economic, social, cultural aspects. The goal should be the model that adds value to the education resources and delivery.

- The paradigm shift resulting from the online education should be further studied.

Policy Recommendations

The following recommendations focus on the development of virtual universities in Thailand:

1. The government should support the development of virtual university in order to reduce the disparity in educational opportunity

By considering not only the disparity in telecommunication access, the government should also recognize the disparity in computer and internet accessibility. More importantly, there is a vast disparity in computer literacy and other related skills. As for the national infrastructure, the government needs to set a policy of universal access to information and knowledge that is both equitable and affordable. Such measure should be monitored and enforced by the National Telecommunication Commission- the country's regulatory body in telecommunications.

2. Create awareness to higher education institutes on the issue of virtual university and support capacity building programs

The government should create awareness among universities on the future of virtual university in conjunction to capacity building programs. This ranges from the curriculum and content development, the establishment of e-library and learning resource and the required human resource development including infrastructure provider, content provider, and facilitators.

3. Encourage participation from the private sector and non-governmental organizations

For virtual university system to grow, the government should encourage the private sector and NGOs to participate. This includes those who are content owners, content delivery service providers, and education service providers.

4. Set relevant standards and quality assurance mechanism for virtual education at both domestic and international levels

This is to ensure that students or consumers are well protected against fraudulence and mediocrity in education quality. There is a need for proper accreditation process and system to provide the public with proper assurance. Apart from the government's rules and regulation on this matter, there may be some activities that can be self-regulated among stakeholders such as fellow universities, trade and industry associations, professional societies. The case should be applicable to both domestic and international providers.

5. Support research and development for virtual education

The public funding agencies should provide R&D funding support to online education with at least three purposes in mind, that is, to make the best out of technology transfer, to produce online education that are appropriate to the locals, and to develop our own technology and system which would in turn reduce imports. Themes for research in this area include the management system, curricula that are appropriate to virtual education, effectiveness of online delivery, quality of graduates, new paradigm shifts in higher education, for instance.

6. Support pilot projects and prototyping of virtual universities for future expansion

Two models that can contribute to effective expansion of virtual university system include pilot project on newly-formed online institution and one that extends from the existing traditional university. Both models should provide insights into how to invest and promote virtual universities in the long run.

Some Recommendations on Measures and Activities

Following the policy guidelines, the following are some measures that would enhance the development of virtual universities in Thailand

- Establish digital opportunity project
- Provide capacity building program to higher education institutes
- Establish necessary standards and accreditation for online education
- Set up a fund to support research and development in virtual education
- Conduct pilot projects to test the feasibility of a virtual university

Science Education

The First Thailand–US Education Roundtable

Profile of Science Education in Thailand

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It is a great honor for me to join so many distinguished scholars from the U.S. and Thailand to exchange views on educational policy research and to present a profile of science education in Thailand. I should begin this profile with an overview of the past and present of science education in Thailand and then an analysis. At the end, I will present the general consensus of vision and action. The details will be presented in the group discussion tomorrow.

Past and Present Profile

In 1916, with the establishment of the Faculty of Arts and Science at Chulalongkorn University, the Kingdom of Thailand's first university, it became, what can be considered, the first formal educational institution for science education in Thailand. Later on the faculty spilt into two faculties, on of which was the Faculty of Science.

Originally, the faculty's mission was to provide basic science for medical and engineering students. In thirteen years, the faculty began to offer a three-year program for prospective science teachers. Five years later, the country's first bachelor's degree programs in basic science and mathematics were introduced. In those days the faculty attracted top students. Science was very exciting and promising.

In 1949, the College of Education (now Srinakharinwirot University) was established and was the first higher education institute to confer bachelor's degrees for teachers, including science and mathematics teachers.

Thailand's modern science education development can all trace their origins back to these two centers-which were founded with the recognition of the important role that science would play the nation's development. Today, faculties of science and faculties of education are integral parts of a majority of Thai universities. Unfortunately the two faculties do not attract top students as much as they used to in the past.

In 1972, the Institute for the Promotion of Teaching Science and Technology (IPST) was established to promote inquiry and hands-on teaching and learning of science in schools, originally in the secondary schools. It has functioned through curriculum, instructional media and teacher development. Recently it has extended its function to include science and mathematics curriculum development at the primary school level, as research has shown that the root of science education problem in Thailand lies in the poor foundation of science and mathematics at the primary education, in terms of scientific knowledge as well as process.

In 1979, the Ministry of Science, Technology and Environment was established by consolidating several small science and technology-related offices into one ministry.

In 1991, the national Science and Technology Development Agency (NSTDA) was founded, representing another milestone in the nation's commitment to development in these fields.

Indeed, the fields of science and technology have been ranked among top priorities in all eight of the national social and economic five-year development plans in the past 40 years.

Other examples can be used to illustrate the level of support and promotion of science, technology and education in Thailand:

Article 81 of the 1997 constitution contains a provision requiring the state to provide science and technology assistance for national development.

The 1999 National Education Law, which is viewed as the education reform law, is now in effect. Item 23 of this law recognizes science and technology as one of the five key components of education that the state must provide for all Thai citizens.

Item 25 of this same law requires that the state provide adequate and efficient continuing education facilities such as public libraries, museums, art galleries, zoos, parks, botanical gardens, science and technology parks, sports and recreational centers, information sources and learning resources.

In short, these initiatives underline the high regard for science, technology and education in the Kingdom of Thailand.

Eighty-Four years have passed since the first science education institution was established in Thailand. Let us pause to reflect on the nature of achievements in science education and its counterpart science and technology in Thailand from a global perspective.

According to the studies of the International Institute for Management Development reported annually in the *World Compositeness Yearbook*, Thailand's level of scientific and technological achievement ranked 46th in 1999 and 47th in 2000 of the 47 appraised nations from around the world.

In 1994, the Third International Mathematics and Science Study (TIMSS) of the International Education Association (IEA) rated 3rd and 4th grade Thai students below average in 24 and 26 countries respectively. However, among 7th and 8th grade students from 39 and

41 countries respectively, Thai students scored a little above the average. Its repeat (TIMSS-R) in 1999 of the 8th grade students showed that Thai students scored around the average of those from 38 countries.

In the International Science Mathematics Olympiads for 1995 to 1999, Thai students were ranked in the sixth place after Chinese, Taiwan Chinese, Korean,Vietnamese and Singaporean students.

All indications point to the fact that, despite an attempt to promote science, technology and science education, our performance as educators is reflected in the below–average and average performance of our students. This realization begs the questions: What has gone wrong? What can be done?

Analysis

Many seminars, conferences and studies have identified the shortcomings of science and technology in Thailand, and one major factor that has been agreed upon is the weakness in science education. The following analysis represents the general consensus of the key issues involved in science education problems in Thailand.

Incomplete Science Education

Science education started in Thailand as the foundation for engineers, medical doctors and scientists, and it development as the education for a wider perspective has never been completed. So science has been promoted among a limited group of people with a specific objective, and it remains mostly so.

The three complete core objectives of science education are: first, the dissemination of the body of scientific knowledge as general information for good citizenship and as a foundation for higher education. Second, the development of teachers, teaching materials and curricula for teaching and learning of science and third, the development of scientific thinking - reasoning and problem-solving abilities - that will enable the application of science in everyday life.

The burden of this inability to meet the three core objectives of science education is only slightly alleviated by the performance of a relatively small group of students who pursue careers in various fields of science and technology - careers in basic sciences, engineering and health sciences.

Inadequacies in primary education science teacher training and a lack of primary level science education during the children's formative years, represent the rule, not the exception to the rule. This is the most serious problems of science education in Thailand.

Therefore despite the apparent promotion of science education, the consequences of a less-than-complete science education program are evident in the general level of science illiteracy among the population and only few real applications of science in society.

Inadequacy of Technology Education

Technology education, one of the most useful tools for the discovery of science, is inadequate in nearly all levels of Thai education. In schools, technology education is not well defined and so vaguely integrated into the science curriculum and mostly consists of knowledge transmission while ignoring those methods of scientific thinking, that not only lead to advancement but instill the values of responsible use of technology.

As a consequence, Thai consumers are affected by a type of tunnel vision that is marked by an over-consumption of imported modern technology with little technology education.

The fact that technology education can lead to understanding and discovery of science and *vice versa* is mostly overlooked in Thai

curricula, teaching and learning. The result has been a general weakness of both technology and science.

Compartmentalization of Education and Science

A disturbing trend that could, if left unchecked, result in a growing weakness in science education has developed from the compartmentalization of the various academic disciplines, science from non-science and further subdivisions within science and non-science.

Education in schools and universities is partitioned into levels and subjects for convenience and management, but the various disciplines have grown apart; leading to a lack of wholeness and relevance to real life. At the higher levels, science is further partitioned into biology, physics and chemistry. Many aspects of science, like geology geography and material science, or integrated topics, like environment, water, energy and space science, are either ill-defined, fragment or left out.

Science educators and scientists are separate. Furthermore, there is little interaction with others outside one's own discipline while most real-world problems and phenomena require multidisciplinary solutions.

Science and non-science disciplines have grown apart, oblivious to their own similarities and the fact that scientific behavior, i.e., scientific thinking, science process skills and scientific research, can be applied in all disciplines.

For this reason science education in Thailand is gradually removing itself from mainstream society and all of its problems, and has fallen behind in the race for scientific and technological progress.

As a consequence, students regard science, especially physics, the foundation of science, as a remote subject, while mathematics, the even more basic cornerstone of science, is regarded as the most difficult. Good mathematics and science teachers who can make their subjects interesting and easy to understand are a rare find indeed.

Even though primary school teachers have to teach science and mathematics, almost all of them have no proper training in science and mathematics and so there is no proper science education at the primary level. Primary school students are only exposed to science as it is incorporated into other subjects and in a knowledge transmission manner.

Student Assessment and University Entrance Examination

As an instrument for professional advancement, the national university entrance examination is the single, most-important determinant of the student's academic and professional careers. Consequently, students' academic achievements are closely linked to performance on a series of multiple-choice written tests. Critics of the university entrance process claim that it creates a negative impact as students and teachers ignore hands-on methods of science education in favor of multiple-choice test tutoring in preparation for examinations. This perpetuates a cycle of neglect of scientific methods and scientific thinking at the school level where its long-term effects on society are the greatest.

Authentic assessment in which students' portfolios are tools additional to traditional written tests has recently been introduced, but is still far from replacing the conventional method of students' assessment.

Insufficient Teacher Development

Currently the emphasis on professional development for teachers is marked by a shift from pre-service teacher training to in-service professional development programs. This shift has become necessary

due to the rapid nature of scientific and technological advances. However, a lack of teachers' access to in-service brush-up training and information means that the science education curriculum in public schools has become obsolete.

In order to make science applicable to everyday lives, we as educators must realize that science curriculum in our schools exposes students to a level of technology that is far below the level that students in urban areas experience outside the classroom on a daily basis. On the contrary, the same curriculum is far beyond the level that those in remote rural areas see in their villages.

Science and mathematics teaching is a hard-working but lowly-paid profession. The socioeconomic status and the career path of teaching profession are not yet attractive to talented people in science and mathematics.

Rapid Changes in Society

Scientific and technological advances are contribution to the rapid changes in the society and the phenomenon of globalization. They are further enhanced by a growing accessibility an affordability among people of a wider range of income. In less than one lifetime, the traditional values and lifestyles of Thai society are being challenged and replaced by those that characterize a more convenient modern lifestyle. There is a greater and greater disparity among Thai people based on differential abilities to purchase modern technologies.

Today many Thai children have been raised by nannies with little education in dual-income households and have developed a set of values that are based on the tenets of consumerism while important traditional values are forgotten. Sadly, scientific thinking and problem solving skills that our predecessors used to develop so many

indigenous wisdom, values and technologies are among these forgotten values.

Perhaps the greatest obstacle to science and technology education, however, is the growing disparity between urban and rural communities and also "haves" and "have-nots".

This rapidly accelerating disparity has contributed to a type of fragmentation of society that grows more difficult to overcome as students and teachers from different environments and economic status find less common ground in their attempts to learn and teach science.

Vision and Action

Vision

Policy makers and educators, if they are to address the challenges that face the country, need to envisage and accept the following five points.

1. His Majesty the King's philosophy of Sufficient Economy emphasizes the well-rounded, prudent application of knowledge that will counter the effects of internal and external shocks to the nation. It is based on reasonable moderation, perseverance, diligence, patience, honesty, wisdom and balanced development to cope properly with challenges arising from rapid changes in the globalized world. These values should be the philosophy of and the direction for appropriate development of science and technology education in Thailand.

2. Sustainable national development relies on the nation's science and technological capacity. This capacity is based on effective science and technology education for human resource development.

Policy decisions must be based on the principle that modernization without indigenous science and technology development is harmful socially, culturally, environmentally and economically.

3. It is true that there is a type of synergetic relationship between science and technology, it is also true that a similar relationship is enjoyed by science education and technology education. The advancement of both relationships depends on scientific behavior, which enhances problem-solving abilities. Therefore, the closer integration of science education and technology education is imperative, and so we should develop science and technology education together, not one after the other, not separately. This integration of science education and technology education is conducive to the three main objectives that both disciplines share.

These three objectives -- science and technology education as the building blocks of productive citizenship, science and technology education as the tools for the advancement of science and technology, and science and technology education as an integral and indispensable part of education -- are essential in the healthy development at all levels.

4. Thai people need exposure to science and technology early in life and, in order to incorporate science and technology into the Thai lifestyle. This exposure must continue throughout life. Through everyday exposure, remote technologies of today will be common technologies tomorrow, and science and technology will not be some foreign ideas or imported products in the Thai society.

5. The general consensus is that the basic necessities for sufficient quality of life can only be met, while preserving the country's cultural, social and environmental integrity, on the condition that we understand our top priorities. Agriculture, medicine, value-added

materials, energy sources, information technology and environment are areas of development that require our full attention.

Actions

Over the next two decades, as the nation works to pursue these visions, the following actions are necessary.

First is the need for major reform in curriculum, instruction and assessment. Curriculum, instruction and assessment reform must be based on a student-centered, inquiry, problem-based, project-based, hands-on and heads-in approach to science and technology education instead of a simple knowledge transfer. They must be designed to account for differences between urban and rural environments and emphasize scientific behavior development.

Second, an integrated, community-related whole-organization approach to science and technology education reform underlines the need for comprehensive reform at all levels of education. The main objectives of the whole-organization approach are to make the reform process sustainable by encouraging community participation at all levels. The keys to this approach are group process and R&D, in which plan-do-check-act quality and problem-solving cycle becomes a common practice.

For example, a whole-school approach involves all those in the school and those associated with the school. A whole-municipality approach involves all schools, all institutions in the municipality and those associated with that municipality. This pattern continues up to the national level.

Third, teacher development is the most urgent task for both in-service and pre-service teachers. All teachers must have basic training in science education. Secondary school teachers must have a deeper knowledge of science and technology in order to implement more

complex hands-on, project-based, problem-based science and technology projects.

In-service teacher development is needed in mass, and pre-service teacher training curriculum needs revision on a major scale that includes the involvement of science and technology educators, scientists and technologists. Science and mathematics teachers must be a more attractive profession for gifted students.

Fourth, talented students in science and mathematics must be supported and guided to pursue their graduate study up to Ph.D. and to enter research career afterwards. Promotion of research and research-based careers for researchers and young graduates, in universities, businesses and industries should help break the country's dependence on imported science and technology. Scientific and technological development must be liberally applied in all sectors of education, businesses and industries to improve standards at a significant level.

In addition, during implementation and incubation, promotion incentives and protection must be provided to ensure attractive career opportunities for researchers.

Fifth, lifelong science and technology education must continue, through the use of those resources provided by mass media, information technology and resource centers beyond formal education, to play an important role in educating the public about science and technology.

This scientific and technological literacy is necessary to reverse the recent trends in conspicuous consumption that are characterized by import-oriented, environmentally aggressive behavior and to build an environmentally friendly and self sufficient society.

Conclusion

At present levels, science and technology education and its development in Thailand are grossly inadequate to either cope or keep up with the rapid changes in science and technology. To think that, in response to these inadequacies, Thailand could resort to closing its country to the outside world, turning against science and technology or returning to the lifestyle of the good old days is absurd.

Therefore, we find ourselves forced to make forward decisions based on clear vision. In order to guide Thailand into the 21st century, substantial advances in science and technology are necessary; not to gain a competitive advantage but rather to maintain integrity and enhance balanced development in a rapidly changing world.

Sustainability, sufficiency and efficiency are not some static conditions to be achieved. Instead, the dynamic nature of the modern world requires constructive, adaptive and immune mechanisms if Thailand is to sustain security and sufficient prosperity during this important stage in the country's development.

Science Education Reform in Thailand

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Significance of Science and Technology

Among the outcomes of worldwide, large-scale changes that have taken place during the globalization process in the past decade is the fierce competition in various aspects including the free market trade with the super-power countries at the forefront. Within this context, Thailand is forced to adjust itself to increase quality products with least adverse affects towards the environment to achieve sustainable development. However, this sort of development is viable only when the country has founded a strong and solid base of science and technology.

In the development of science and technology, both the creation of the body of knowledge that benefits and contributes to the increase of competitiveness and the development of the quality of life must be taken into account. Here it means that knowledge of science and technology must be utilized in a way that it posts no threats either to natural resources or the environment. To achieve this goal, people must be scientifically literate enough to be able to select and use appropriate, environmentally friendly technologies in a way that they are agreeable and in harmony with the nature.

The Problems Concerning Thailand's Science and Technology

Against the backdrop of the significance of science and technology as mentioned above, it is alarming to realize that Thailand has not attached importance to the status and the development of its science and technology as it should.

A research paper of the IMD Institute revealed that in the year 2000, Thailand's competitiveness in science and technology was ranked at the 47th -- the very last in the list. This was one step down from last year's rating. The main reasons behind this negative trend were attributed to the low-level budget share allocated for the research and development (R&D) of the country which was around 0.8% of the GDP and lower than most Asian countries, and to a small number of research and development personnel which was as low as 2 per 10,000 population while the corresponding numbers of Thailand's neighbors were much greater. The ratio of Indonesia, for instance, was 13 per 10,000 population or more than 5 times higher than that of Thailand.

In this light, a valid conclusion can be drawn from the success of development work in the developed countries and the newly industrialized countries (NICs) that the level of investment in R&D and human resource development in this area is a vital contributory factor in their achievement. Investment in R&D in the developed countries is as high as 2-3% of the GDP while the NICs allocate around 1-2% of the GDP for this purpose. The proportion of scientists and researchers in the developed countries is around 50-70 per 10,000 population while the corresponding ratio in the NICs is around 20-30 per 10,000 population. Moreover, the research culture has been well established in the overall socio-economic and political contexts of these countries along with efficient managerial and administrative systems, and is well integrated with other systems of the countries. Therefore, if Thailand aims for sustainable development through science and technology, it needs to urgently

improve its R&D system and put enough investment in human resource development in this field to achieve both the quantitative and qualitative outcomes.

The Overview of Science Education in Thailand

The Curriculum

The curricula presently in use are the B.E. 2533 (1990) revised version of the B.E. 2521 (1978) national curriculum for primary school and lower secondary school level, and the B.E. 2533 (1990) revised version of the B.E. 2524 (1981) national curriculum for upper secondary school level. The principles, theories and contents of these curricula lack coherence and are irrelevant to real life experiences. Consequently, students lack opportunities to practise skills, both in the scientific process and the thinking process, which are essential for math and science learning.

At present, the Institute for the Promotion of Teaching Science and Technology is in the process of modifying and revising the curricula for science, math and computer science education in accordance with the principles and guidelines stated in the education reform policy. In a new system of 12-year basic education which will start from B.E. 2545 (2002) academic year, these subjects will be inserted throughout its duration, being labelled as core subjects for the 9-year compulsory education period.

Pedagogical Arrangements

Pedagogical arrangements in the present education system can be summarized as follows:

Formal Education

Formal education services are arranged systemically from pre-primary level to lower and upper secondary education, providing students with many opportunities and choices to continue with higher education in the preparation for their future careers according to their preferences and aptitudes. However, old-fashioned pedagogical methods prevalent at all levels of formal education services. These methods are mainly based on the lecture approach which requires teachers to give explanation or demonstration while students usually focus on textbook-reading, note-taking and memorizing what have been explained to them. Such approaches certainly do not induce enough practice of the much-needed scientific process skills.

At primary education level, the subject of science is grouped with the "life experiences" category of the 5 learning experience groups. Unfortunately, with the above-mentioned obsolete teaching-learning methods and the fact that time allocated for science education is increasingly shrunk as students advance into higher grades, the way in which science education is delivered fails to encourage children and youngsters to develop positive attitudes towards science education and to apply scientific process in their daily life, apart form causing managerial and administrative problems.

While science education in lower secondary school does not articulate the significance of science and technology, science education at the upper secondary level earnestly aims to encourage students to benefit from scientific process and appropriate technologies in the improvement of the quality of life, as well as the development of their local communities and the country. Yet it is difficult to achieve the aim when the objectives of science education lacks coherence. Other elements further aggravate the problem; the curriculum contents in the upper secondary education are

considerably large while time allocated for science education is rather limited. This results in unavoidable quantitative teaching-learning process, which deprives students of profound knowledge and sound understanding of the subjects. Without coherence of subject contents, students also face difficulty in relating what they have learned at upper secondary level to what is taught at higher education level.

The arrangement for science education in higher education is multi-leveled qualification and each level demands depth of each specific scientific branch rather than inter-disciplinary integration. Hence social sciences or humanities students do not have a chance to pursue their study of scientific subjects and are consequently deprived of solid base of scientific knowledge needed to be capable citizens of a country.

Non-formal Education

The main purpose of non-formal education is to encourage those who have missed formal education to re-participate in educational programs and vocational skills training specially provided. To this end, the teaching-learning process is focused on what is practical and useful for learners' daily life, and their ability to apply scientific process to real problem solving. The goals can be reached with the help of proper learning centers, for instance, science museums, which effectively enable learners to become acquainted with scientific process and thinking.

Informal Education

Informal education services concentrate on helping people in local communities to expand their knowledge, broaden their views and develop thinking skills through leisure activities in daily life. Consequently, self-directed learning process of the people can be developed.

Informal education services at present are diversified, especially when delivered through various mechanisms of the mass media, for instance, radio and television broadcasting, newspapers, magazines, scientific periodicals or journals and learning centers. Nevertheless, scientific substance disseminated through these channels are inadequate, both in term of quality and quantity. Findings from recent surveys are a strong evidence of this conclusion; only 4.89% of television weekly broadcasting time is scheduled for scientific topics while daily newspapers give a meager 0.8% of their total printing space to scientific articles or documentaries. It also reflects that very few mass media people themselves have sufficient knowledge, sound understanding and positive attitude towards science. In this circumstance, it is difficult to rely on mass media mechanisms to cultivate scientific mind for the society Likewise, it will be a long road for the Thai society to transform into a scientific one as long as the majority of the people believe that science exists outside their everybody contexts of life and work, is difficult to understand and is only there for scientists.

Teaching–Learning Materials

Teaching-learning materials for scientific subjects mainly compose of printed-matters, audio-visual equipment and laboratory tools. The printed materials are carefully designed to make them synergetic with the teaching methods that encourage learners to search for knowledge and build up their own body of knowledge basing on activities similar to those used in the learner-centered approach. Most of the diversified audio-visual equipment and laboratory tools are designed with local technologies and materials. Most teachers have the autonomy in selecting appropriate learning-teaching materials. Still, there are serious concerns in the issue of learning-teaching materials. The majority of the schools do not have sufficient materials

and equipments while what are available to them tend to be obsolete and substandard. Most teachers are inexperienced both in producing and utilizing teaching-learning materials. Some schools are lucky enough to have a large inventory of teaching-learning materials but usually those tools are not well maintained and not much effort is made to make a full use of them. Other pertaining problems include a lack of well-resourced environments for students to carry out their research work and the difficulty for teachers to obtain raw materials for making teaching-learning tools.

Teachers

There are both qualitative and quantitative concerns about the state of science and math teachers. Most primary school teachers do not have pertaining degree in scientific disciplines and those who have ones account for only 23% of secondary school teachers. (Department of General Education : 1998).

In general, teachers do not have sufficient knowledge, understanding or skills needed in organizing and preparing learning activities. This drawback seems to derive form the structure of the teacher-training curriculum in which the major or specialized subjects constitute no more than 40% of the total courses that students are required to take (which are grouped into four curriculum areas-core basic subjects, specific subjects, vocational subjects and free elective subjects).

These facts and figures clearly indicate that, at all levels of education services, there is serious shortage of suitably qualified science teachers who have academic background or training in science and math. Besides, enormous demands are placed on teachers of the modern days including administrative burdens. This significantly discourages people with high caliber and high level of education from entering the teaching profession while a small number of new qualified recruits cannot catch up with the number of those qualified

and highly experienced teachers who will reach their retiring age in the near future.

Assessment Strategies and Evaluation of Learning

Students are usually assessed for what they have memorized and rarely for scientific process skills while the assessment of the development of attitudes towards science is virtually non-existing. Therefore, the main purposes of science education are limited to memorizing subject contents rather than the development of the students' creativity and other desirable attributes. This explains why most upper secondary school students refuse the teaching-learning approach that emphasizes scientific process, skills practice and development of attitudes and are in favour of intensive tutoring approach that focuses only on how to pass university entrance examination.

Learners

Learners or the end-products of science education process are those who have completed each level of education. For the purpose of this report, learners are categorized into 2 groups: students in primary and secondary schools, and higher education graduates who hold pertaining degrees in science, technology or math.

Students in Primary and Secondary Schools

In the subjects of science and math, the learning ability of learners in this group still falls short of expectation. They lack scientific thinking process skills and fail to develop analytical and critical thinking ability. Hence their achievement of scientific process learning is low, as evidenced by the result of the assessment of the quality of education carried out by the Department of Curriculum and Instruction Development in 1997. It was found that test scores of

most students were rated as mediocre down to poor and need to improve.

Learners in this group also fell behind their peers in international comparison. In the Third International Mathematics and Science Study (TIMSS) conducted by the International Association for the Evaluation of Educational Achievement (IEA), they scored near the bottom of TIMSS participating nations. During the 1995-1999 competitions of the Academic Olympics, the overall competition records of Thai students were always the lowest among the 5-Asian-country group which was consisted of Thailand, Taiwan Korea, Vietnam and Singapore.

In shorts, the delivery of math, science and technology education services in Thailand faces multi-faceted problems. International comparisons attest to low learning achievement of Thai students; they achieve low average scores, do not perform well on applied knowledge and problem solving skills and cannot express their ideas in writing. Things are a little better for upper secondary students. The results from the Academic Olympics reveal that Thai students attain high level of achievement when compared with other countries in theoretical parts but show serious weakness in practical parts where they cannot solve most of the test problems.

Higher Education Graduates Who Hold Pertaining Degrees in Math, Science or Technology

Higher education is in crisis, it fails to efficiently accomplish its task of producing middle and high level workforce for the labour market and the industrial sector, as social sciences and humanities graduates have been produced far more than what is needed and outnumber science and technology graduates by a ratio of 63 : 37. This is a critical situation because the engines of growth in Thailand are industries that demand science skills. Besides, the number of math,

science and technology graduates who actually become scientists and engineers is still very small when compared with

industrialized countries and other Asian countries. The ratio of scientists and engineers per 1 million populations ranges form 5,183 in Japan, 2,305 in Singapore, 1,343 in Korea to 107 in Thailand. (UNESCO : 1993)

Working towards the Promotion and Development at Scientific Learning Process

The promotion and development of scientific learning process is carried out in many forms by government agencies, non-government organizations and various foundations. These agencies share the common target groups of primary and secondary math and science teachers both in government-controlled and private education services, students at all levels of education, scientist, institutes and people concerned with science and technology and the general public.

The promotion and development work is carried out by 4 types of activities namely 1) human resource development seeking to produce and promote people with high potential or caliber in science learning 2) development of learning process 3) creating of activities and environments that facilitate learning and 4) a systematic development of national talent by providing incentives for the gifted and the talented by means of competition, honouring and rewarding.

Strategies for the Development of Science Education

To develop science education, it is essential to carry out a comparative study on the status of science education in various countries and how those countries work to achieve their goals in science education

development. Lessons learned from this study are to be adapted to the local contexts and hence well-planned strategies can be adopted.

Countries selected for the comparative study are the United Kingdom, the United State of America, Japan, Germany, Singapore and Vietnam. To compare science education process in these countries, particular interests are paid to topics of curriculum, pedagogical process, teachers, assessment, environments favorable to science learning and science education for the gifted and the talented. The comparative study concludes as follows;

Curriculum

The level of curriculum enforcement varies. The United States and Germany enjoy a high degree of freedom in the application of curricula because these countries do not have national curricula and only curriculum frameworks developed by local governments or local education authorities implemented. However, where national curriculum is enforced, as in the United Kingdom, Japan, Singapore, Vietnam and Thailand, the level of enforcement also varies a great deal. The national curricula of the United Kingdom and Japan are merely main conceptual frameworks from which schools and local governments can develop and design curricula that are well suited to local environments. Likewise, Thailand's national curriculum also leaves ample room for schools to accommodate local needs into their lesson design. On the contrary, national curricula of Singapore and Vietnam are uniformly applied nationwide.

Differences are also evident in the way science is integrated with other subject areas of the curriculum and how science is separated as a specific discipline. In the United Kingdom, Japan and Singapore, science is separated from other subjects from primary school onwards. In contrast, primary school curricula in Germany, Vietnam and Thailand integrate science with other disciplines and these countries begin to identify science as a separate subject at lower secondary level. The United States also begins to single out subjects in the fragmented courses at lower secondary level.

Teaching–Learning Methods for Science Education

All countries apply a variety of teaching-learning methods in science education. The United Kingdom puts the weight on pragmatic approach and practical work while Japan selects different methods for each level-question-answer approach in primary school and lecture method in secondary schools. Likewise, Thailand emphasizes on the lecture method to ensure that all contents needed in preparing for university entrance examination are covered. As for the United States, the focus is on enquiry and investigation. The latter methods have also been tried out in Thailand but so far have not proved to be a practical and popular approach for the country.

Production and Development of In–Service Teachers

Although recruitment for science teachers in the United Kingdom, the United States, and Germany takes many forms, most of the candidates are university graduates. In the United Kingdom, new recruits for science teachers are either those who graduated in education majoring in science or those who graduated in science and have taken additional teacher-training courses. The latter trend is on the rise. Thailand has also started to follow this trend. One of its current projects aims to promote science teacher production by providing scholarships to selected scientifically and mathematically talented university students. After these sponsored students get their bachelor's degrees in science, they are to take an extra 1-year teacher-training course. Unfortunately the project has not gained popularity yet.

Germany's teacher production is carried out through a very strict system. Apart from being university graduates, new recruits must pass a government-controlled examination and serve as trainee

teachers for a period of 2 years. New teachers in Japan, Singapore and Vietnam can be recruited from university graduates who have bachelor's degrees or college graduate who have certificates, but their education background will be used as a criterion for the classification of the teaching staff.

New entrants to the teaching profession in the United Kingdom, the United States, Japan, and Germany are required to receive proper training or pass a test to obtain a teaching license. In this regard, Thailand is now embarking on the enforcement of teaching licenses as required by the B.E. 2542 (1999) National Education Act.

In most of the countries, the development of in-service teachers is carried out regularly and systematically but the processes used are diversified. For instance, teacher training in the United Kingdom mainly relies on the information and communication technology (ICT) and the cooperation between schools and universities. At every 5-or-10 year intervals, Japanese teachers are required to receive formal training at academic centers. The United States and Germany require that their teachers select some university courses to attend while teachers in Singapore are encouraged to do some research work. Thailand, however, does not have clear policy directives concerning teacher development. Teacher training as available in Thailand is arranged by various institutes according to the policies of individual executives of those institutes and therefore tends to be unsystematic, faces constant changes and lacks coherence.

Assessment and Evaluation

While some countries require students to pass examinations at key stages or exit points to certify the completion of each level of education, others do not. Students in Singapore and Vietnam have to take examinations in their final year of both primary and secondary levels and some states of the United States follow the same procedure. Japan and Thailand, however, do not require such a practice.

Despite such differences, all countries share some common tools including central or national standardized examination to assess students' competence. The United States and Vietnam have state or provincial standardized examination in addition to the nation ones. Throughout compulsory education, students in the United Kingdom have to sit for standardized examinations in the last term of each key stage, while their peers in the United States are required, as a general rule, to take national or state standardized examinations in grade 4, 8 and 12. American students also have to take central examinations the score of which will be taken into consideration when they apply for university enrollment. German and Thai students share a common practice of taking central university entrance examination, but the procedure is far more arduous for German students as they have to take three written examinations and one oral examination. Students in Japan and Singapore are required to take central examinations the scores of which are treated as parts of accumulated scores needed to further their study in the upper secondary and higher education levels.

There is a growing trend towards practical and authentic assessment in most countries including Thailand. Authentic assessment can be made by diverse means such as observation, interview, experiment, student portfolio and presentation of work as well as subjective tests. The weight of subjective and objective questions also differs. Although examination papers of the United Kingdom, Japan and Vietnam comprise both subjective and objective questions, Vietnam attaches so much importance to subjective tests that they are included in university entrance examinations. On the contrary, objective tests are so predominant in Thailand that they have a detrimental effect on students' skill in articulation of ideas and informative messages.

Out–of–School Contexts Which Facilitate and Contribute to Science Learning

Out-of-school sources for science learning which are abundant in the United Kingdom, the United States, Japan, Germany and Singapore mostly come in the forms of museums, science centers, botanic gardens and zoos. Scattering around the country, these facilities for science learning are easily accessed. In contrast, very few sources like this are available in Thailand, while Vietnam's limited resource has let the country with only a few lifelong learning centers, public libraries and no science museum.

Science services can be ideally delivered through the information technology (IT) such as homepage dedicated to scientific experiments, bulletin boards for the exchange of ideas and networks to provide scientific news and information. The IT tools are extensively in use in Japan, Singapore and the United States. As for Thailand, it has launched "SchoolNet" project which has become an epitome of its endeavour to render science services trough IT. However, only around 2000 schools are able to access these services and students' low English proficiency poses yet another difficulty in acquiring knowledge from those sources.

How much the mass media in each country contributes to the promotion of science, through mechanism such as television and radio broadcast, newspapers and magazines, varies a great deal. In the United States, science and technology columns in daily newspapers tend to be reader-friendly and use jargon that is easy to understand. Some Vietnamese newspapers allocate as many as 4 pages a day for educational purpose. Certain math magazines for youth have proved to be highly popular among Vietnamese students.

Science Education for the Gifted and the Talented

Identification of the gifted and the talented at different ages is now a common practice in the United Kingdom, the United States, Germany and Vietnam. In particular, the United State strives to identify its gifted and talented youngsters at the earliest age possible; American pre-school children are to undergo psychological and physical health tests even before they start kindergarten. German middle schools are labeled by level of difficulty into three groups. After the first four years of education, German children are selected to attend these schools according to their level of competence as assessed by their school performance records. United Kingdom's talented children include those aged 11-14 (key Stage 3) whose competency is rated at level 8. Vietnamese students are placed in secondary schools through systematic selection that involves multi-leveled screening and grading at village, district, provincial and regional echelons. On the contrary, Japan upholds the value of hard working as the key to all success and is of the opinion that to differentiate youngsters it to hurt their feelings. Hence, Japan does not believe in differential education for students with high academic proficiency. As for Thailand, well-designed and systematic identification of gifted and talented youth has yet to be fully developed.

Each country has its own diverse ways of nurturing national excellence. The United States and Singapore share a similar system. While the United States introduces various forms of pull out program including individualized program and cluster groups, Singapore applies the same curriculum across the board to students at the same level, but also offers enrichment programs in upper secondary schools. Both countries offer advanced study program of dual enrollment which enables gifted and talented upper secondary schools students to enroll in universities' first year courses. Earned credits quality them for the second year higher education courses right after high school graduation.

Policy Advice for the Development of Science and Technology in Thailand

As the central and coordinating agency in the planning and development of national education plans, the Office of the National Education Commission (ONEC) is well aware how science and technology play integral roles in driving Thailand towards a knowledge-based and learning society which, ultimately, will increase the country's international competitiveness. ONEC's visions and missions, together with some policy recommendations, have been accordingly formed to serve as frameworks for the development work in science and technology, and are as follows:

Vision

"Science education is a **crucial tool for building a knowledge-based and learning society;** it provides opportunities for all learners to achieve **well-balanced** self-development to their **full potential,** attain sound basic knowledge and understanding, capable of **analytical thinking** and able to live a safe and sound way of life. To realize these goals, **learner-centered approach** should be applied in all types of education service; be it **formal, non-formal** or **informal education,** while curriculum contents must be **relevant** to real life experiences and kept abreast of advances in pertinent fields. Other **contributory elements** include a sufficient number of good quality **learning centers,** the **promotion of** scientifically **talented youngsters** who will contribute to the building of knowledge for the future development of the country, and **the promotion of lifelong learning** which can elicit cooperation from the mass media and the entire community".

Mission

Missions to translate the above-mentioned vision into reality are:

- To ensure equity of access to science and technology learning to all, along with the promotion of lifelong learning.
- To reach and uphold high quality math and science education by means of continuing improvement of key factors involved such as teacher development curriculum, teaching-learning materials and assessment techniques which give the importance to thinking process evaluation.
- To keep curriculum contents updated and abreast of advances in pertinent fields and synergic with local wisdom and local ways of life.
- To reform pedagogical techniques towards more interesting and challenging methods, in particular, the learner-centered approach which encourages learners to acquire knowledge through experiments and practical work, and effectively develops learners' skills in analysis, synthesis and conclusion making with a base in science.
- To promote, qualitatively and quantitatively, human resource development in science and technology. In this regard, special measures will be applied to the scientifically gifted and talented to prepare them for the leading role in future academic work and research to build up national body of knowledge that will contribute to the development of the country.
- To promote the role of mass media and elicit cooperation from all parties involved, both in the government and private sectors, in order to increase public understanding of the importance of science and technology education.

Policy Recommendations

On Opportunity for Lifelong Learning

Basic education is expected to prepare learners to be competent members of the society who have attained sufficient scientific and technological knowledge and understanding, environmental awareness and ability to adapt new technologies to everyday activities. Hence they can live a safe and sound way of life. Higher education is expected to raise the level of those attributes so that graduates in all disciplines deeply appreciate the importance of science and technology and form a highly qualified workforce. In particular, graduates in science and technology must live up to expectations and be highly competent in pertinent work.

Apart from formal education, lifelong learning should be promoted to further increase knowledge and skills for people in working age so that they can better develop their work. To promote lifelong learning, in particular, through self-directed learning, sources of knowledge in science and technology should be made widely available and easily accessible to the public. This can be done with the help of long-distanced educational technology and other information technologies. Science learning centers should be expanded to regional areas, while other forms of information centers in local communities should also be promoted to provide services to the local public. To provide and develop sources of scientific and technological knowledge for the purpose of lifelong learning, it is necessary to elicit cooperation from the private sector and local communities.

To enhance the learning process of individuals and communities, various institutes and communities should be encouraged to organize scientific activities, and local participation should be secured in the development of the diversified bodies of knowledge of the nation.

On Quality of Science Education

The quality of science education can be raised through reforms of its key factors, in particular, teachers of science. The production and development of high quality teachers of science and technology should be promoted and teachers of science and technology should be entitled to continuing professional development including regular training. The career path of personnel in academic band also needs an urgent reform to make it equitable to and as rewarding as the path of those in executive band.

On Curriculum

Curriculum and teaching-learning process in formal, non-formal and informal education need and urgent reform and should be more diverse and flexible to accommodate and relate to local contexts and problems. In this regard, local communities and industries should be involved in the curriculum development.

Seamless education should be aimed for. To reach the aim, curriculum contents and teaching-learning process need to be properly adjusted. Contents of science and technology should constitute the right proportion of curriculum area at each level of education. For primary and secondary education, contents of math and science inserted should be sufficient to lay a foundation for a more advanced level.

For vocational education, skill practicing should be emphasized while the sound base of fundamental knowledge of science and technology must be maintained, so that learners can manage new technologies of the future. As for undergraduate level, more learners should be encouraged to take courses in pure science such as physics, chemistry, biology and math, as the bodies of knowledge of these subjects are far more crucial to the long-term development of science and technology than applied sciences. And for graduate level, the

focus is shift to the ability to innovate (new body of knowledge, new problem-solving techniques, new theories and other innovations) which will be a great step forward in the production of high quality researchers in science and technology.

On Learning Process

The teaching-learning process in science should focus on principles instead of delineated contents. It should be reformed in a way that it can effectively help learners to capture main concepts and build a strong knowledge base where from learners can further develop the ability to innovate and wisely apply science and technology to accommodate and cope with rapid academic and other changes in the modern world.

On Human Resource Development and Promotion of the Gifted and the Talented

Science and technology personnel is one of the target groups in human resource development. In preparing for science and technology personnel, curriculum contents for science and technology should constitute no less than 20% of curriculum time at basic education level in formal education. Besides, the future need of the workforce in the 7 leading industries (agriculture/manufacture/ trade and services/education, culture, health and welfare service/ environment/energy/telecommunication) should be closely monitored, so that relevant curriculum and other strategies can be adjusted accordingly.

The quantitative goal of science and technology personnel development should be clearly stated, so that relevant parties such as those in education services can adjust their work plans accordingly. To this regard, it is expected that the minimum number of annual production of teachers of science should be 5,000 while the number

of the annual production of graduates in science and technology should reach 200,000 for first degree holders, 20,000 for master degree holders and 2,000 for doctorate degree holders. Graduates in mass communication majoring in science and technology should reach the ratio of 3 per 10,000 population in the workforce.

Achieving these goals should raise the number of science and technology personnel in different professions to the effect that 10% population in working age group hold bachelor's or higher degrees in science and technology. The ratio of 30 researchers per 10,000 population in the workforce (equivalent to 110,000 researchers) should be achieved by 2020. It is also expected that 70% of people working in scientific and technological careers should participate in lifelong learning (at least one subject a year).

Priority should be given to the promotion of the scientifically gifted and talented. High-performing students should be encouraged to enroll in science subjects. Special measures should be applied to develop knowledge, skills and competency of the gifted and the talented to their full potential. These measures should include special training and additional study of specialized subjects. The gifted and talented graduates should be encouraged to enter pertaining profession in science and technology.

As higher education should have prepared learners and graduates for research and development work that meets international standard, the profession of scientific and technological research should be projected as a prestigious career to attract people with high caliber to the profession. However, sufficient financial support is an indispensable force to make the advancement of research and development work. Therefore, it is important to secure sufficient allocation from national budget or seek additional sources of financial support.

The promotion of research and development work should aim to encourage the innovation of goods and services that help improve the quality of life.

Besides, research and development work should be carried out in a way that local needs are accommodated and existing bodies of knowledge at all levels can build on and benefit from such work. The promotion should also aim to increase linkages between the government and the private sectors in order to relate technological development to manufacturing sector.

On Public Participation

To ensure success of activities that affect and involve people, public participation should be secured. For the development of science education, local communities and industries should be involved in the curriculum development. Likewise, the provision and development of sources of scientific and technological knowledge for the purpose of lifelong learning should elicit cooperation from the private sector and local communities.

While science knowledge is increasingly made known and dispersed to the public, it is essential to promote science ethics concurrently as well as to establish legal norms to prevent undesirable ill-usage and abuse of science knowledge.

The Second Thailand–US Education Roundtable

The University of Pennsylvania, the United States
April 8–9, 2004

Higher Education

The Second Thailand–US Education Roundtable

Management Innovation in Thai Higher Education

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It is realized that higher education worldwide has faced with changing needs of society at institutional and national levels. Budgetary constraint, financial necessities, technological advancement as well as an increase of higher education demand have significantly accelerated the various changes and affected both the management and conceptualization of higher education.

This paper presents the results of the research study on Management and Innovation in Higher Education both in Thailand and abroad with the focus on new approaches to management, i.e. academic management; general management; research management; financial management; and human resource management. Necessary data were obtained for formulating policy and strategic recommendations for development of higher education institutions and provision of education at this level in Thailand with the view to increasing the quality, efficiency and educational opportunity. The samples comprised fifteen Thai higher education institutions of both public and private sectors, representing the five groups of institutions, namely, comprehensive university, research university, specialized university, community college, and open university. The paper is divided into four parts: 1) New approaches to higher education institution management in selected countries; 2) Reform of higher education in Thailand and management innovation in Thai higher education

institutions; 3) Problems and obstacles in management innovation of Thai higher education institutions; and 4) Policy and strategic recommendations.

New Approaches to Higher Education Institution Management in Selected Countries

A study on the management of higher education institutions in USA, Australia, United Kingdom was conducted by documentary research and case study. From the study, it was found that innovation in higher education institutions management in selected countries shared similarities in four aspects: 1) use of ICT in management of academic and operational affairs; 2) co-operation with external agencies and networking; 3) income generating and expenditure control; and 4) focus on quality control and improvement of functioning for increased operational efficiency and effectiveness.

Reform of Higher Education in Thailand and Management Innovation in Thai Higher Education Institutions

Reform of Higher Education in Thailand

The results of the study showed that the development of Thai higher education institutions has followed the policy set by the Ministry of University Affairs at that time. An important milestone was the MUA's initiative in formulating for the first time the Fifteen-Year Higher Education Development Plan (1990-2004) which served as guidelines for institutions to develop themselves towards desirable directions, meeting the country's needs as well as preparedness for the future by giving the priority to: 1) equality in educational opportunity; 2) administrative efficiency; 3) pursuit of excellence; 4) internationalisation; 5) management flexibility and promoting the role of the private sector. It was worth noted that long-term plan or

vision for Thai higher education came into existence and shaped the development of higher education institutions, followed by the government policy for state higher education institutions to be no longer under civil system, in the conviction that flexibility in management of the organization, specially personnel and finance will lead to their proper functioning and hence greater efficiency. The results of the study also showed a broader interpretation of higher education from the emphasis on scholarship and intellectually superior to a continuation of basic education, comprising academic and professional disciplines for employment. It provides an opportunity for those wishing to further their education in general, and lifelong learning.

Significant Factors Conducive to Management Innovation in Thai Higher Education

The study revealed four important factors leading to the adoption of new approaches to higher education management, namely; the increasing need for higher education; institutional management of limited resources and focus on quality and efficiency; advancement of ICTs in various forms; and institutional autonomy, as follows:

Increasing need for Higher Education

This factor has led to quantitative expansion of the institutions and new models of which have been created. The existing curricular have been adjusted or new ones adopted to serve the requirements of diverse groups of learners. The learners' market have been actively sought. Thus education at this level has been considerably expanded and called upon to serve lifelong education more than that in the past.

Limited Resources and Focus on Quality and Efficiency

The introduction of external assessment and quality assurance enacted by the state have made it necessary for the institutions to

change their management practices by adopting those for business administration for greater efficiency. Strategic plans have been implemented for cost-effective utilization of resources. Evaluation and accountability have been introduced as practice of the institutions.

Advancement of the ICTs

This factor has accelerated the internal institutional changes in several aspects. Their functioning has become more open; the personnel concerned have access to information from various sources far and wide. New models for teaching-learning activities have been developed. In the functioning, speed and systematization are aimed at and not to be hampered by the confinement of place. Co-operative networking has led to sharing of resources both inside and outside the institutions.

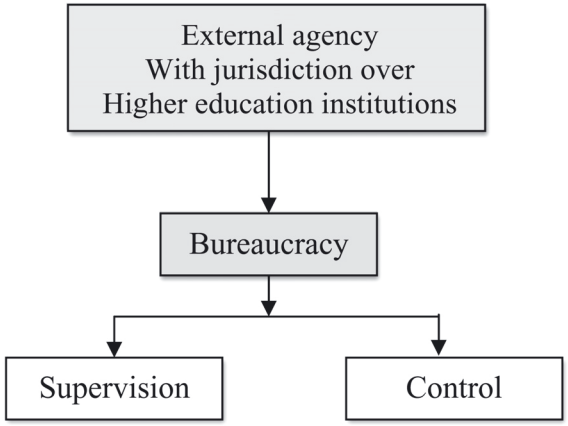
Institutional Autonomy

This factor has arisen from the government decentralization policy for self-governing by the institutions. They will thus be accountable for their functioning; gain strength in management; capable of new initiatives and self-adjustment to various changes on a continuous basis.

Management Innovation in Thai Higher Education Institutions

Results of the study, also showed that relationship between the parent organization with jurisdiction over the institutions and the institutions themselves still follows the bureaucratic system with state control and supervision, as can be seen in Figure 1.

Figure 1: Chart Showing the Relationship between Parent Organization and Higher Education Institutions in Thailand



It should be noted, however, that although the relationship between the parent organization (i.e. the Ministry of Education), government agencies concerned and higher education institutions at the "national level" is based on bureaucracy, with authority for supervision and control, the models of internal management at the "university level" have diverse development. The four models adopted are: 1) organization focusing on process; 2) business venture or company; 3) enterprise or innovation; and 4) network or consortium, as illustrated in Figure 2.

Figure 2: Management Models of Thai Higher Education Institutions

Model 1 Organization focusing on process	Model 2 Business venture/ Company	Model 3 Enterprise/ Innovation	Model 4 Network/ Consortium
• Emphasis on consultative and participatory process • Internal organs have authority to act/ decide • Intent on attaining consensus • Emphasis on observing rules and regulations in functioning	• Clear policy and direction from central authority • Control details of operation • Emphasis on planning of achievement	• Availability of strategic plan • Decentralization of responsibility • Emphasis on achievement and success of business	• Co-operation between/ among institutions • Sharing of resources for maximal outcome • Building of academic strength • Teamwork

Source: Research team 2003

Further clarifications on these management models at the institutional level are provided below:

Model 1: Organization Focusing on Process

Many long-established universities have adopted this management model with clear rules and regulations for administrative purposes. The focus is on the participatory and consultative process through committees represented by different faculties or agencies concerned. Decisions are made on consensus of the committee members. With such power in decision-making, personnel of the internal units are able to gradually learn about the functioning of the institutions as well as acquire the necessary experience. The work process may be slow. Good teamwork is indeed essential.

Model 2: Business Venture/ Company

This model is representative of the functioning of private universities. Emphasis is along the line of business administration under the direction of the institution's owner or founder. Administration is rather centralized, with planning, achievement presentation and evaluation based on the business concept. Decision-making is fast. Control over the functioning may require many details. One drawback of this model is that some academic initiatives, which do not provide short-term business advantage, may not receive the necessary support, due to over-preoccupation with the business interest.

Model 3: Enterprise/ Innovation

This model has been adopted by autonomous universities free from the bureaucratic system or by universities autonomous units run along the line of the private sector. Administration can be adjusted in accord with the strategic plan. There is decentralization of responsibilities. Most internal units enjoy flexibility and focus on the success of their performance.

Model 4: Network/ Consortium

Management on a network basis largely depends on inter-institutional cooperation. The trend of which is on the increase. It is aimed at building academic strength; sharing of resources; social services; teamwork; exchanges of knowledge and mutual learning. The condition of success of this model of management depends on an efficient communication system and sharing of clear common goals.

It is to be noted that each institution uses a combination of the various models, depending on the philosophical concept, historical background and vision of the administrators. These models are not entirely exclusive.

The 5 aspects of internal institutional management can be thus summarized:

The institutions selected for case studies are fully cognizant of the different dimensions of the change agents, both internal and external, inevitably affecting their functioning. These include the enactment of the 1999 National Education Act; the government policy for higher education institutions to leave the civil service system or to be autonomous; the trend towards decreased government subsidy; the graduates' quality not meeting expectations by employers, both in terms of academic achievement, moral and ethical values; increased demand for higher education; capacity for international competitiveness; and change in the world economic order. These changes have, on the whole, been unexpectedly fast and had repercussions on one another due to the rapid advancement of the ICTs. Any higher education institution not adjusting its management to attain quality, efficiency and effectiveness, will unavoidably suffer a set back.

General Management

All the institutions selected for the study gave preference to modern management strategies by bringing in business administration techniques e.g. analysis of the environment; application of the SWOT analysis; formulation of mission, strategy and work plan on short-term and long-term basis; and application of modern evaluation techniques e.g. prescription of indicators. The relationship between the university council and the rector also plays a most important role for introduction of management innovation in the institution. Regarding structural adjustment, some of the state institutions have been found to reform themselves in preparation for leaving the bureaucratic system. Private higher education institutions, however, focus on businesslike administration, attach importance to unit cost, organizational development, and flexible management system.

Academic Management

Various universities have given higher importance to the students. These have been analyses of their needs, disciplines demanded by the market and application of marketing techniques in grouping the students. Many state universities have introduced new courses called "External Programs" to respond to the requirements of diverse groups of learners. Several have utilized market strategies regarding location, credit fees, etc. However, these innovations in the curriculum and teaching-learning techniques have resulted in the concern that they might be preoccupied with income generating rather than contributing to the creation of knowledge for the benefit of the universities, learners or the society. Besides, many institutions have developed academic cooperation and networking. More institutions have increased their links with those in the provinces e.g. sharing of faculty-staff; organizing courses with credit transfer between institutions; sharing of learning sites, libraries, laboratories, and computer data bases in providing education. Priority is given to the needs of the community and that of the local area. Cooperation with the business sector has also been established. Some universities have expanded learning facilities through the internet or the satellite for the benefit of Thai students abroad. Mobile buses have also been arranged, enabling those living in remote areas to study.

Research Management

Higher education institutions, particularly state universities, are keen to support research so as to become leading research universities of the country, the Asian region and ultimately the international academic world. Research funds and centres of excellence have been established. Faculty staffs have been encouraged to carry out research in conjunction with international bodies. Graduate programs in cooperation with institutions in other countries have been launched. Publication of research papers in international journals has also been

encouraged for dissemination of information. Nobel Prize laureates have been invited to visit for exchange of knowledge and experience with their institutional researchers and those in other interested institutions. An agency to coordinate research at the institutional level has been established.

Financial Management

The pressure on state universities to leave the bureaucratic system has forced them to focus on the necessary reform, streamlining the financial system and income-generating methods. Educational services in various forms have been offered to generate additional income. Some universities have initiated establishment of endowment funds. Attempts have been made to decrease proportion of the government subsidy and increase the income from the universities' intellectual services. Alumni associations have been founded for mobilization of resources from the alumni. Agencies offering commercial consultant services have also been created. Private higher education institutions focus on financial management with classification of profit centres or cost centres, so that the return of each unit can be distinctly discerned. Others use the financial management system of their affiliates in other countries so as to facilitate performance evaluation and audit by the representatives from abroad.

Human Resources Management

Most state universities have shown alternatives in personnel administration i.e. changes in the methods of personnel recruitment and selection and remuneration different from that of civil service. Former civil servants have become "university employees". More widely practiced is recruitment on contractual basis. Newly recruited personnel receive salaries on a higher scale than that of "civil servants". They are, however, subject to six months or annual

evaluation in accord with the regulations of the respective institutions. Some institutions have shown an intention to put in place the contractual system for both instructors and employees. Other universities have used outsourcing service contracts e.g. security guards, cleaners and drivers, etc.

It is to be noted that these institutions have their own distinct features. They differ in philosophical outlook, commitment, historical background, ownership (i.e. state-owned or belonging to family business), leadership etc.. Interviews conducted by the researchers have shown common features of the management innovation already mentioned. Besides, two important factors conducive to management innovation have also been identified. The first concerns vision and leadership of the administrators. Most higher education institutions have a clear vision; they distinguish themselves from others; the rectors are professional administrators, with extensive academic experience. Modern business administration strategies have been applied as well as various technologies. The second factor is that higher education reform in Thailand has pressured all institutions to adjust themselves to become more self-reliant. The external quality assurance requires the universities to reform themselves or adapt their management for higher efficiency and effectiveness including transparency in management ready for internal and external evaluation.

Problems and Obstacles of Higher Education Management Innovation in Thailand

Result of the study on Thai higher education management innovation have shown differences in internal administration. Each of which has its own distinct characteristics and has faced different problems and obstacles. Hence the following analysis will cover 2 different groups, i.e. public and private higher education institutions.

Public Higher Education Institutions

Both state and autonomous universities face the following problems:

- Decrease in government subsidy while expenditure remains the same or increases, thus limiting the fund for institutional development.
- The rules and regulations governing personnel are not yet clear. New approaches cannot be readily implemented, as positions of the staff and human resource management system is linked to general administration as well as fiscal and budgetary management. It is difficult to adjust salaries and wages or allowances which are not part of salaries. The remuneration may not be commensurate with the cost of living, nor does it provide sufficient incentive to maintain or attract highly qualified staff.
- Regarding management structure, newly established universities can easily adjust or set the administrative system, organizational structure and relevant rules. Older institutions, however, have to face with many initial and boundary conditions. Coordination between the universities and outside agencies concerned is not clear. Official rules and regulations are inflexible and cannot be adjusted to accommodate the universities' changing needs, attitudes and understanding of the staff members. Officials of external agencies still follow the existing rules and regulations. Management innovation involves new practices e.g. reimbursement for persons or agencies. The staff members do not clearly understand and are not so sure of the management innovation.
- Management has not given sufficient recognition of the students' interest.
- The policy of sharing resources has given rise to problems because of difficulty in accommodating timetables to suit both parties. Special charges also have to be paid to agencies providing services.
- The aim of education for all to graduate at the Bachelor's degree level has affected the academic quality. The further education curriculum has not fully yielded the desired results due to academic background on the learners' part.
- Regarding research, the fund available is limited or not continuously provided. There has been lack of readiness and willingness of the persons concerned, both faculty staff and supporters. Different groups have different interests. The research outcomes may serve individual preference rather than commercial application. There is also a lack of interdisciplinary research.
- Communication between academics of various institutions or between the academics and the community has been hampered by the time constraints, communication methods and teamwork culture. All institutions need self-adjustment and learning from one another, especially in working through networks.
- The personnel's capacity in computer technology and ICTs has not been fully utilized and has not therefore yielded maximal benefits.

Private Higher Education Institutions

The findings of the study are as follows:

- Management innovation in private institutions relating to general and personnel administration has been flexibly implemented. The business strategy has been adopted right from the beginning. Administration follows the institutions' own rules and regulations.

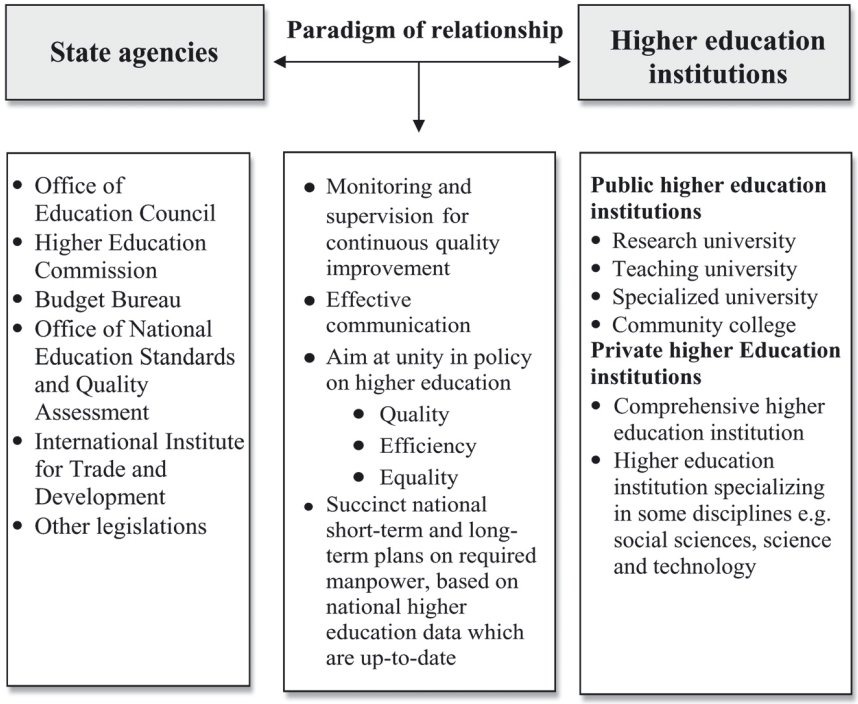
- There are limitations regarding financial management due to extensive dependence on tuition fees, leaving limited fund for creative activities in support of research and social or public services.
- Besides, private higher education institutions are severely affected by the policy of increasing educational opportunity by public universities, which have more freedom due to their institutional act in offering varied teaching-learning services both in regard to curriculum and location.
- The adoption of aggressive market strategy by higher education institutions has augured that, in the future, the competition in higher education provision between private, public and foreign universities will be increasingly severe, unless a clear conceptualization of the total scenario of higher education in Thailand is made.

Policy and Strategic Recommendations

Policy recommendations are presented in two parts: the first showing the nature of the relationship between higher education institutions and their parent bodies, while the second concerns strategic management at the institutional level.

Relationship between Higher Education Institutions and Their Parent Bodies

Figure 3: Paradigm of Relationship between Parent Agencies and Higher Education Institutions



Source: Research Team, 2003

Figure 3 presents a paradigm for building the relationship between public agencies and higher education institutions in Thailand to promote management innovation of quality, efficiency and effectiveness, comprising the following four aspects:

- Change from control to monitoring and supervision;
- Creation of effective communication for cooperation;
- Creation of unity in policy regarding quality, efficiency and equality;

- Preparation of short-term and long-term manpower requirements to guide the Thai higher education institutions in meeting the needs of the country.

Categorization of Thai Higher Education Institutions for Quality, Efficiency, Effectiveness, and Satisfaction of Learners' Needs

To realize the above objectives, and based on the limited national resources, the government should classify higher education institutions into 3 categories:

- Those aimed at academic oriented and research should focus on expanding postgraduate programs and development of specialized research centres for leadership.
- Those focusing on the teaching of various disciplines are aimed at reaching excellence in teaching-learning innovations that meet the market needs. Links should be established to enhance learning between higher education institutions, industry, business enterprise and community.
- Local higher education institutions e.g. community college focusing on providing the community members with opportunity to learn according to their wishes without restriction on academic and personal qualifications. The focus is on education at lower-than-degree level.

It is to be emphasized that all 3 categories should collaborate through networks as well as cooperate with different organizations at both national and local levels. Details of missions for each category are provided in Table 1.

Table 1: Categories of Thai Higher Education Institutions and Their Missions to Promote Management Innovation

Category of institutions	Missions
1. Institutions aimed at academic oriented and research and leaders in discovering new frontiers of knowledge	● Expansion of Master's degree and Doctoral degree programs ● Establishment of specialised centres of excellence covering groups of disciplines for which they are ready as well as multidisciplinary programs ● Production of young generation of researchers in various disciplines that respond to national needs ● Cooperation with the state sector, industry and business ● Cooperation with international networks ● Serving as national academic resource centres ● Require learners with high academic potential
2. Institutions aimed at expertise in teaching various disciplines	● Focus on programs that respond to market needs ● Creation and development of effective teaching methods within and outside the institutions; presentation of lessons on the internet; virtual classrooms ● Cooperation with industrial and private business sectors enabling learners to have work experience and learn from actual situations

Category of institutions	Missions
	● Development of new methods of assessing and evaluation learners to enhance their capacity in gaining knowledge, skill and quality ● Development of classroom research to attain maximal effectiveness of the learning process ● Learners seeking knowledge for the purpose of learning or for career
3. Local higher education institutions e.g. community colleges	● Meeting diverse needs of people in the local communities ● No basic requirement of learners' academic background ● Cooperation with local organizations in providing education ● Lower-than degree programs

Strategies for Development of Management Innovation in Thai Higher Education Institutions

The following are recommendations on strategies for development of management of Thai higher education in 5 aspects:

- General management;
- Academic management;
- Research management;
- Financial management; and
- Human resource management.

General Management

Sustainable culture for quality and efficiency in the institutions should be developed.

- The council of an institution should be represented by scholars from a variety of organizations. The council members should be able to advise the administration on efficient functioning and building of cooperation with external agencies.
- Suitable management model should be adopted; attaining achievement should be aimed at effective functioning.
- The organizations top executive must have expertise in the discipline, leadership and skills in modern management approaches. A Council's search committee should be established to search and select the most able candidates for appointment of top executive from internal and external candidates. The term of appointment should be flexible depending on the institutional and executive performance.
- Division of marketing activities should be clearly defined.
- The institution needs to have a clear vision. Systemic organizational practices should be adopted, with clear conception of vision, missions and distribution of responsibilities among different sup-units.
- Periodic evaluation of the performances of both personnel and the institution should be carried out with continuous personnel development. New changes introduced should be communicated clearly to the personnel.
- Change the culture of the organization; adjust the various practices; the main aim should be to satisfy the needs of the learners and continuous quality improvement.

- Maximal benefit should be obtained from application of computer technology and ICTs for teaching-learning activities, research and management. Maximal benefits should also be obtained from inter-institutional sharing of resources.
- The size of a limited-admission institutions should not be too large which will otherwise weaken the relationship between faculty staff and students.
- Databases with up-to-date and accurate information should be established.
- Authority in decision-making should be decentralized to operational units. There should be indicators to measure the institution's performance and monitoring of its functioning by internal audit unit.

Academic Management

- Focus should be given to strategies on establishing inter-institutional networks e.g. opening of joint programmes of study or transfer of credits.
- The institution concerned must recognize the importance of faculty staff development by adjusting their roles so as to be ready for cooperation with other institutions. In their capacity as instructors, they must learn the role of facilitators and advisers, as the future trend for education is the direction towards non-formal, informal or multidisciplinary approaches.
- The institution should provide special support to some disciplines which may not give profit in terms of business, but are academically important.

Research Management

- An institutional research development committee should be established. The institution's agenda of short-term and long-term research should be prepared. Faculty staff must be supported by availability of a research fund, research support facility, the amount of which will be determined in proportion to the annual budgetary expenditure.
- Availability of a unit capable of seeking external research fund should facilitate the institution in its functioning and provide incentives to those interested in conducting research work.
- An institution should adopt a strategy of establishing inter-institution cooperation, constituting a consortium responsible for large and long-term research projects beneficial to academic progress and advancement as well as responding to national needs.
- A plan should be made for creating a new generation of young researchers from graduate programs and from centres of excellence. Students should also be involved in research projects.
- Incentives should be provided to attract staff members to conduct research e.g. research work should be a component of performance evaluation criterior to encourage the faculty staff to initiate research project.
- A database on research outcomes of the institution should be established.
- A unit responsible for coordinating research activities, patent registration and following-up on research undertaken should be set up.

Financial Management

- Focus should be given to making the institution different from others so as to gain a competitive edge in the long run.
- The institution must have an up-to-date financial database, providing information to the administrators for rapid and efficient decision-making. Priority is also given to the control of unit costs.
- Preparation of projects for additional income generation; creating allies e.g. alumni association, committee campaigning for fund mobilization.
- Preparation of short-term and long-term financial plans, showing sources of funds, investment, recurrent costs, scholarships etc.
- A committee should also be established for administering the fund for income generation for the benefit of the institution.

Human Resources Management

- Adoption of a variety of methods of recruiting faculty staff, employees and other personnel on part-time, full-time and contractual basis. A clear pay scale should be prescribed.
- Initiation of a culture that honours good and competent personnel.
- Initiation of a performance evaluation system which is fair and with measurable indicators.
- A work manual should be prepared, with clear indication of the functions of the faculty staff and employees.

- There should be a university-level committee responsible for personnel administration and making proposals for submission to the university council.
- Sharing of personnel across disciplines, departments and faculties should be encouraged.

From the study and analysis, the management innovation in Thai higher education institutions on the whole has similar trends to those of other countries, with priorities given to building cooperative networks in administration, academic affairs and research work. The focus is on offering academic services to diverse customers or groups of learners. Technologies have been increasingly used in institutional management and in organizing teaching-learning activities. Regarding the success in introducing management innovation in organization to gain the competitive edge, efficiency and educational quality, each institution must take into consideration its commitment, historical background and other internal cultural conditions. Of course, changes in the institutional management methods will be increasingly needed to cope with the rapid social and economic progress and technological advancement.

Financing of Thai Higher Education: A Leverage for Quality Improvement Reform

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Introduction

Since the establishment of the first university, Chulalongkorn University, in the country 88 years ago, higher education in Thailand has progressed remarkably. Higher Education is divided into 3 levels : lower than bachelor's degree or diploma programs, bachelor's degree and graduate level. The 2001 figures show that there are 782 post-secondary-education institutions, which offer four-year graduate degree programs and two-year diploma programs. The total student amounts to around 2.12 million. Of these, 2.05 million are studying at the undergraduate level. The budget for the operation of these institutions averages US$ 1,550 million per year, 61 percent of which comes from the government and the rest come from fees paid by students for their tuition and related services.

Categories of Institutions

There are eight categories of post-secondary-education institutions in Thailand. These are public universities with limited admission, autonomous public universities, open universities, the Rajabhat University, the Rajamangala Technology University, private universities, public vocational colleges and private colleges. All, except private universities and private colleges, operate on budget allocated by the government. This study covers only institutions at the tertiary level which offer four-year programs of study leading to a bachelor's degree.

Significant differences can be discerned among these categories of higher education institutions. Firstly, they differ in the quality of their graduates. Secondly, they differ quite markedly in their tuition fees. Thirdly, they differ in the per head cost of graduates. In public universities with limited admission, autonomous public universities are also included in this category, the highest in all the groups and the student's success is almost guaranteed. In an open public university, the per head cost is a mere, US$ 116 per year, however, only 1 out of 18 of their students succeed in graduating. Private universities, with a necessarily more efficient financial management, can keep the per head cost at around US$ 785 (Figure 1). It can be noted that public universities have the benefit of both the government and the non-government budgets, which are derived from students fees and other income from the university own resources.

Problems in the Quality of Thai Higher Education System

The Thai higher education system is facing both qualitative and quantitative crisis. A major proportion of graduates are not sufficiently component in their fields of study and there is a surplus of graduates in social sciences but lack of qualified graduates with technological and professional fields. The causes which contribute to the current crisis are 1) inefficient and ineffective government subsidy ; 2) inadequacy of public budget ; 3) uneven distribution of

* The author would like to express his deep gratitude to the late Professor Dr. Sippanondha Ketudat for his valuable comments and suggestions which helped improve the contents, making this paper more legible and apprehensible.

high quality students ; 4) uneven backgrounds of student intake ; 5) lopsided growth, particularly in the fields of social sciences ; 6) poor remuneration for university teaching staff ; and 7) lack of interest in research.

Problems in the Financial Management

Five factors which seem to be the root causes of financial mismanagement in public education institutions are as follows : 1) The two accounting systems-a budget allocated to universities by the government and the revenue generated by or with in the university itself. The separation of two types of finances makes it difficult to be effectual in the way it handles its finances. 2) Lack of effort to identify the actual production cost, so it is not possible to identify the true cost of production of a graduate in public university. 3) Lack of systematic accounting practice leads to no systematic accounting records and no time-specific financial statement and accountability. 4) Discrepancy in the budget year and the academic year, it is not possible to identify and analyze the financial performance of the institution. 5) Decentralization of the accounting system, there is no centralized and systematic way to control the revenue. The financing of the projects are not always fully recorded and accounted for. The projects revenue should be pooled and used for the benefit of the university.

Recommendations

Recommendations are presented to the Thai government with the aims of mobilization of resources and the use of these resources to enhance the development towards academic excellence.

Recommendation 1

Abandon the existing method of budget allocation based on line-item approach. A new method using the concept of performance-based budgeting is recommended. The university revenue from the government grant should be merged with revenue from other sources. Single annual budget shall be prepared for academic year and be approved by the University Council.

Recommendation 2

A new accounting system consistent with standard accounting practices of any corporation must be prepared. Financial records should be classified according to profit / cost centers. The director of each profit / cost center should be entrusted with financial authority within the limit of approved budget. A transparent financial statement must be required to all public universities in the same way that it is required of all private universities.

Recommendation 3

The universities should allocate its budget to the various sub-accounts set up for specific purposes. The same regulations on sub-accounting allocation, imposed on private universities can be adopted.

Major sub-accounts consist of the following : 1) General sub-accounts 2) The Permanent Asset sub-accounts 3) The Research Fund sub-accounts 4) Other sub-accounts.

The financial statement of these sub-accounts can be made available to the administrators of the university as well as to the general public.

Recommendation 4

Mobilize revenue of all public universities by doubling their tuition. Government budget will account for only 50 percent of production

cost. An increase in tuition fee does not imply a reduction in financial support by the government. It is aimed at increasing the university's income to be spent for quality improvement. Financially needy students are encouraged to request for a loan from the government education loan program. Increase of fees for any public services is always a politically risky proposition. The case of higher education fee increase must approved and fully supported by the government.

Recommendation 5

Addition revenue can be generated through various special projects such as evening study program, graduate and doctoral degree programs, training programs as well as research projects supported or commissioned by private, public, or even international organizations, and etc. Revenue from these services, if managed carefully, can amount to no less than US$ 250 million per year. These services should be expanded and the revenue be transparently and comprehensively accounted for.

Recommendation 6

The number of students in Thai higher education institutions in the past ten years has increased at a progressive rate of 7 percent. This quantitative growth poses a grave problem of quality of graduates and no way for the quality to keep up with the quantity. Lack of adequate resources especially lack of qualified instructors, can lead to an increased number of graduates in the unneeded disciplines. It is recommended that building of new structures for government universities be curtailed. Annual budget for the expansion of higher education facilities, around US$ 280 should be cut by half with a saving of US$ 140, and diverting to promote investment in private universities.

Recommendation 7

To accommodate the enlarged student body, the existing resources must be managed more effectively and in more efficient ways of delivering education services must be employed. There are three ways which the government can accommodate the continuing growth of students. Firstly, the existing classroom space must be used more efficiently. At present only 20 percent of classroom space is being used during regular hours. Secondly, space at universities with limited admission could be utilized outside regular hours. Thirdly, promote and strengthen the potential of private universities to admit more students by reducing the disparities between public and private universities. Additional support from the government for an expansion of the existing private universities will make it possible to absorb as much as 50 percent of the future students. Accommodating a greater number of students means not just more classroom space but more importantly an increase in the number of qualified faculty members. A caution must be taken to ensure the enrollment increase either at public or private institutions accompanied by quality insurance measures.

Recommendation 8

A reprioritization of the government budget, is a natural consequences of the previous recommendations. Less funds should be allocated for construction and supporting fixtures and more must be channeled into the increase of teaching personnel.

Classification as a Strategy for Improvement

Higher education system in Thailand can be more effectively managed and financed. Classification of the institutions, the instructors and the graduates are imperative.

Classification of Institutions

Universities in Thailand should be grouped as research-oriented with good academic standing ; open universities ; comprehensive universities ; technical colleges (with 2-year and 4-year curricula) ; and community colleges (with a 2-year curriculum).

Classification of Faculty Members

It can be grouped as follows : faculty members responsible for administration work ; faculty members who devote themselves entirely to research work ; faculties members who teach mostly and occasionally conduct research ; faculty member who perform only teaching function ; faculty members who focus on students' activities ; and faculty members who lack the requisite qualifications and need to be rehabilitated.

Classification of Graduates

Graduates can be grouped according to the level of quality and type of work for which they will be hired as follows : outstanding graduates who are trained to be academic and administrative leaders ; white-collar professionals ; general office workers with a wide range of duties ; and casual graduates who only wish to seek more knowledge which may or may not be instrumental for their career advancement.

The classification can be fine-tuned and used as criteria for more efficient classification and for future measurement of program.

Mobilization of Fund for Development

Development projects require financial support. At least two sources of funds are income earning through various services as listed above in the section of Recommendations, about US$ 300 million per annum and the other source of budget is derived from the annual

national budget where a larger amount can be allocated for higher education development which could yield US$ 200 million. It is believed that the total amount of US$ 500 million per year could be mobilized and spent entirely on the pursuit of excellence of higher education in Thailand. This additional US$ 500 million cannot be obtained in full in the first year. It would take at least five years to reach this level of revenue. A way to accelerate the mobilization of funds for development would be for the government to grant an additional budget for development programs. To enhance this development, the additional budget should be granted to the universities on competitive basis, based on the merit of development project, and so on.

Recommendation : the Development Programs for Quality Improvement and Excellence

With additional financial resource of US$ 500 million per year, development programs for enhancing quality and excellence could be introduced as follows :

Staff Development

The recruitment of more doctoral degree holders into the system is one of the most important projects, especially in universities with limited admission. For these universities, the number of faculty members with doctoral degrees should be doubled (from the present 6,000) within the next 10 years, rising the average proportion of Ph.D. holders from 30 percent to 60 percent.

Increase of Research Budget

The revenue generated could be also spent to support research programs, and to build up new research facilities as well as create research networks among universities. The amount spent for research

activities at present is only US$ 50 million per annum, a meager amount comparing with research spending at any university of some international standard. As a start, the amount should be doubled to US$ 100 million annually and to increase further to absorb fund for quality research.

Additional Compensation for Qualified Instructors

Additional budget could also be spent on extra compensation to highly qualified instructors who teach as well as do research. Universities could create the position of Research Fellow as well as Teaching Fellow and offer these to this group of specially qualified teachers. If, an extra compensation of around US$ 400 is added to their monthly salary, the required budget would amount to US$ 50 million per year.

Scholarships for Students

Tuition fees in higher education institutions will have to be raised. Part of the additional revenue obtained by raising of tuition fees by about 25 percent or US$ 60 million could be paid back as scholarships for students which can be divided into 1) scholarships for 'outstanding' undergraduates ; 2) partial scholarships for students in the middle-income group ; and 3) tuition and living allowance grants for a needy students.

Implementation Strategies

Projects for the development of higher education in Thailand have to be implemented in a gradual manner and in accordance with the increase in the amount of revenue earned and the budget granted annually. The government could pay special attention to : increased tuition fees ; new method of allocating budget by block grants, thus enhancing flexibility ; employing the method of demand-side financing ; and a new accounting system for all higher education institutions. The new accountings systems will be accompanied by transparency of administration via good governance and are readily subject to control and auditing.

These development plans need to be internally initiated by the institutions themselves and implemented within a framework mutually agreed upon by the academic communities as well as a joint carried out by the government. The time frame of the projects is to be determined entirely by each individual institution. The importance and the merit of the projects are to be taken as the criteria for the allocation of development funds.

It is recommended that there must be a paradigm shift on the part of the government and the university administrators as well as faculty members. The government would have to acquiesce to and initiate these changes.

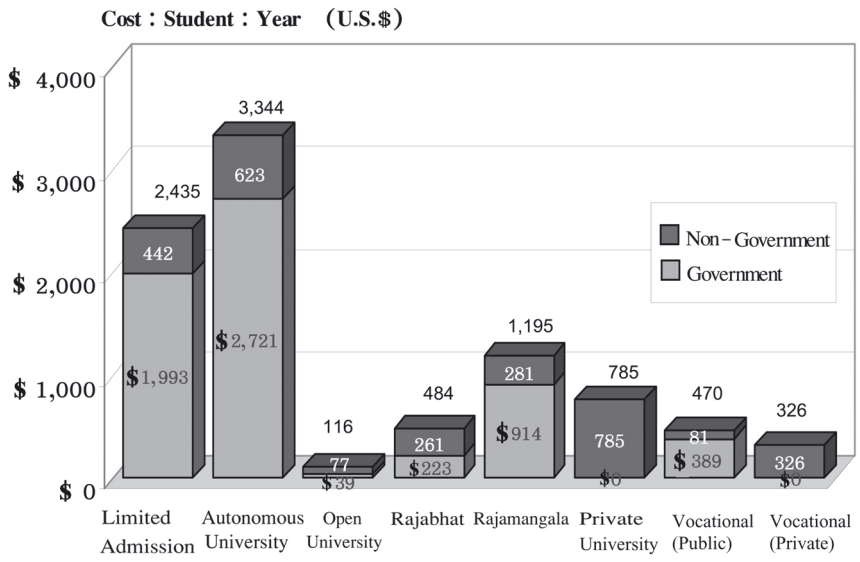
Epilogue

It is expected these financing recommendations will make it possible for the Thai higher educational institutions to compete and excel in the international arena. The recommendations are outlined by a basic assumption that these development programs can be implemented and effect changes within a one-year timeframe. However, in the Thai bureaucratic context, changes usually occur slowly and at different rates in different institutions. In some institutions, it will take about 10 years to fully accomplish all the projects recommended and not all projects will be equally successful in implementation in all institutions.

The management of changes requires careful planning. Any change, which affects a community, especially and academic community, has to be careful planned and implemented. Changes need not to be exactly the same as the recommendations proposed or neither do they

need to be implemented at the same time and across the board in all higher education institutions. Allocation of resources for the various development projects can vary.

Figure 1: Cost per Student per Year Classified by Source of Budget, Academic Year 2001



	Limited Admission University	Autonomous University	Open University	Rajabhat	Rajamangala	Private University	Vocational (Public)	Vocational (Private)
% Government to Total Budget	81.8	81.4	34.0	46.2	76.5	0.0	82.7	0.0

Note : High cost of Autonomous University is due to the fact that some universities are not fully commissioned.

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Faculty Development in Thailand

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To understand the on-going and to recommend the future development of academic (faculty) staff in Thailand, it is imperative to become acquainted and familiarized with the history and development related to education system in general and higher education system in particular, so as to enable interested readers to fully appreciate what has been going on and the goals intended to transform higher education in Thailand in the future. An account of related history as well as developments concerning higher education system will therefore be presented, and to be followed by the urgent for faculty development in higher education in Thailand.

A Brief History

The first 'official' university was founded by King Rama VI on the 26th March 1902 and named after his father King Chulalongkorn. It was originally consisting of only 4 faculties, viz. the Faculty of Medicine at Siriraj Hospital, the Faculty of Public Administation, the Faculty of Engineering, and the Faculty of Arts and Sciences. However, the origin of higher education can be traced back to the founding of the first medical school in Thailand, later known as the Royal Medical College, as Siriraj Hospital by King Chulalongkorn (Rama V) in March, 1889, i.e. only one year after Siriraj hospital, also the first hospital in the country was established by the same king in 1888, The first day to the medical curriculum in Thailand was actually started on the 5th May, 1991, laying a firm foundation for higher education in Thailand. The most remarkable period in the earlier history of higher education in Thailand was between 1921-1932, when the Rockefeller Foundation gave substantial assistance to the Medical School as Siriraj, then a faculty of Medicine of Chulalongkorn University, enabling the school to successfully upgraded the standard of medical education to that of American medical education at the time.

The University of Moral and Political Sciences (now known as Thammasat University) was the second to be founded in 1933. After a major reorganization of higher education system in Thailand in 1943, three new universities were established mainly by transferring faculties of existing universities to the new ones, i.e. the University of Medical Sciences (now known as Mahidol University, the University of Agriculture (now known as Kasetsart University) and the University of Fine Arts (now known as Silpakorn University). The first provincial university was founded in Chiang mai in 1964, followed by Khon Kaen in 1966 and Songkhla in 1968. (now known as Prince of Songkla University). Since then the number of universities and higher educational institutions in Thailand have been increasing in line with the international trends i.e. transformation of higher education for the 'few' to higher education for the masses.

Universities and Higher Education Institutions in Thailand

There are at present 634 universities and higher educational institutions in Thailand under 10 government agencies and 1 independent body, as follows:

1.	Ministry of University Affairs	65
2.	Ministry of Education	489
3.	Ministry of Defence	24
4.	Ministry of Public Health	43
5.	Ministry of Agriculture and Cooperatives	2
6.	Office of the National Police Commission	2
7.	Bangkok Metropolitan Administration	2
8.	Ministry of Communication	4
9.	Ministry of Science, Technology and Environment	1
10.	Ministry of Justice	1
11.	The Thai Red Cross (An independent body)	1
	Total	634

Note: The Asian Institute of Technology (AIT) is not included although the Institute receives partial financial support from the Thai Government Budget through the Office of the National Education Commission.

Current Reforms in Education

The system and structure of higher education of the present day differ greatly from that of the old days. Admittedly, this could be construed as a result of globalization. A number of factors are believed to contribute to these developments, particularly, the rapid development of Science and Technology, the advancement of knowledge, the changes in economic, social and political structures as well as the nature of works of the present day. Other important characteristics that have played an important role on these rapid changes are the distinctive shift of philosophies and objectives of higher education in keeping with the impact of on-going globalization. Not only that, the future trends of higher education must be taken into account if we are to compete in the world of today.

The rapid development and progress in the fields of Science and Technology, especially those areas pertaining to telecommunication and information technology, has made the modes of knowledge acquisition considerably, if not totally, different from the old days. In addition, the advancement of knowledge in every field of study, both in the core subjects and applied subjects, has become enormous in the past few decades. As a result, the content of knowledge in any subject is at present so overwhelmed up to the point of making students incapable of absorbing its full content in depth with the traditional period permitted in university education. The focus of higher education has shifted to 'learning how to learn' and 'lifelong learning' which will equip future university graduates better capable to do their future jobs and assignments with a good prospect of adequate competencies that will keep them in touch perpetually with the changing world at large. Inevitably, academic staff are not spared from the impact of these changes and need to be even more re-orientated to the new paradigm.

The past few decades have witnessed enormous changes in higher education in Thailand. The most prominent developments were the expansion of both student numbers as well as the number of universities and higher education institutions in the country. In parallel with the development higher education in more developed countries, Thailand has been witnessing the real shift from 'higher education for the elite or for the few' to 'higher education for the masses' and, as a matter of fact, the number of students entering higher education sector at present is still growing at a rapid pace. One prominent phenomenon resulted from this development is the rapid expansion of private universities and higher education institutions in Thailand, which as it stood at present, has outnumbered the government or public universities and higher education institutions. Furthermore, the methods of delivery of higher education programmes have attracted a large number of student

enrolments, particularly in the extramural or 'special' programmes. The enormous influx of students is seen not only in the undergraduate level, but may be more so at the graduate level. Inevitably, the question of standard and quality in higher education in the country soon followed from different and varying sources, notably from the educators, well-known personalities, employers and the general public at large as well as mass media. Even the well-known international weekly magazine the Economist did not spare similar criticisms, whilst only a small number of Thai universities appeared in the Asia magazine's ranking did not pair very well with other universities in Asia and Australia. Even worse was an apparent accusation that some of these institutions might have been the places for 'certificate mills'.

Responsible Organizations, the Quality of Academic Staff and Graduate's Deficiencies

The numerous factors mentioned above have unavoidably invited the many criticisms and disappointments related to the functions and achievements of the bodies, governmental as well as non-governmental, concerned in the various operations and varying responsibilities related to the quality of higher education in the country. The relevant organizations, particularly universities and higher education institutions and their administrators, are at the centre of this untoward criticism, but the main ministries directly related to higher education, namely the Ministries of University Affairs and of Education, as well as a host of other ministries with higher education institutions under it offering higher education programmes could hardly escape this blame. Initially, these criticisms were not apparent, or surreptitious, and only a few had been known wildly for some time, but soon became more opened at least since on former prime minister had made a devastating remark in front of a gathering labeled as an annual academic meeting of the Council of Government Universities where almost all presidents of public universities were believed to attend. His remarks showed the genuine concern of Thai higher education, when he said that the quality of higher education of the country was sub-standard and the staff and personnel working in the government universities and higher education institutions did not want to be released from the 'slave' status. Unfortunately the remarks were made at the time when the government policy was to encourage government universities and higher education institutions to be more 'autonomous' by voluntarily released themselves from the government civil service system. This move of the government policy was a total failure as not a single university or higher education institution was out of the government civil system during the period when his government was in office. It must also be mentioned that up to this date this presumably sound policy of the following governments have not been materialized.

Academic (Faculty) Staff

Staff Qualifications

As of the 1st October 2003, the total number of academic staff of the 24 universities and higher education institutions formerly under the Ministry of University Affairs (and are now a part of the Commission on Higher Education) was 20,658 with bachelor, master and doctorate degree holders in the proportion of 9.3, 45.2 and 25.5 percent respectively, On the other hand, the 41 Rajaphat Institutes formerly under the Ministry of Education but are now under the same Commission on Higher Education has a total number of academic staff as of 1st October 2003 of 6,814 persons with bachelor, master and doctorate degree holders in the proportion of 21.4, 71.1, and 7.5 percent respectively, The Rajamagala Institutes, with more than 40 campuses spread around the country and also previously under the Ministry of Education, has 5,273 lecturers with bachelor, master and

doctorate degree holders in the proportion of 31.4, 63.5 and 5.0 percent respectively, The proportion of doctorate degree holders in the whole 3 groups of universities and higher education institutions shows ample evidence of the stage of stagnation of academic faculty development for a long period which in the developed world would have meant the discontinuation of accreditation of many of those universities and higher education institutions had it not been for the only sake of the institutions belonging to the government.

Academic Ranks

The current practice in Thailand for promotion of academic staff belonging to all public universities and higher education institutes under the former Ministry of University Affairs is of 2 tiers, namely the promotion from lecturer (or instructors) to Assistant Professor and Associate Professor rest with the University Council of individual university, whereas for the rank of Professor which is particularly unique in Thailand where the final process requires an approval by the Ministry of University Affairs before the official appointment could be made after the Royal consent.

It should be noted that because of this measure, the total number of academic staff holding the Professor rank as of June 2003 stands at 375 which is a small percentage compared to the total number of academic staff of public universities and higher education institutions in Thailand. Furthermore, more than half the number of current Professor ranks in Thailand are in the areas of Medicine and Related Health Sciences. This figure is also indicative of the amount of research activities of acceptable standards currently carried out by academic staff of public universities and higher education institution in the country. It is also to be noted that urgent needs for the relevant development of faculty staff in the area of research.

The Burden of Work

One common feature of academic staff in universities and higher education institution, both public and private, in Thailand is vicious and irretrievable circle of 'underpaid-overwork of teaching-moonlighting'. This may be a prominent feature of faculty staff of universities and higher education institutions in underdeveloped and developing countries. The burden of excessive work, particularly in the enormous amount of teaching duties has inevitably resulted in the failure to keep themselves up-to-date with the rapidly changing developments of Higher Education in the world of today. As a result, the quality of education in Higher Education, has been affected and discrepancies in quality between universities and higher education institutions in the underdeveloped and developing countries as compared to similar organizations in the more developed countries are understandably increasingly wider even further.

Centre (Institute) for Teaching and Learning

In order to expedite the entire academic staff of universities and higher education institutions in Thailand, the author wishes to propose the establishment of a national centre (or institute) solely for the purpose of developing academic staff the capability of all areas related to Teaching and Learning. The 'virtual' nature of the Centre of Institute would help lowering the cost of the expected limited funding so as to enable the Centre to function as soon as possible. At the initial stage, its main function may encompass only the transmission of relevant new trends in the Teaching and Learning in Higher Education so as to assist academic staff of all universities and higher education institutions acquainted themselves with the rapid development in all areas of Teaching and Learning in Higher Education. Assistance can also be sought from expertise outside Thailand via electronic transmission. After the initial period of the

establishment of CLT or ILT, the Centre may endeavour to become more apparent in structure by initiating regular training workshops relevant to Teaching and Learning in Higher Education, for example on the Concepts of Modern Teaching and Learning, Strategies, Planning and Delivering Effective Teaching, Problem-based Learning, Small Group Teaching as well as the various areas pertaining to Graduate Studies, both by course-work and by research. The Centre could also be a national reference resource in Teaching and Learning in Higher Education where academic staff can ask for assistance and retrieve required information.

This National Centre (or Institute) for Teaching and Learning may venture to assist academic staff in areas related to Research-Led Teaching and the Supervision of Research to graduate students. This function will also enhance academic staff the ability to pursue their research, which in turn, will expedite their own promotion through academic ranking.

The Third Thailand–US Education Roundtable

Dhurakij Pundit University, Bangkok, Thailand
November 7–8, 2005

Opening Remark
and
Keynote Presentations

Opening Remark

Sippanondha Ketudat
Chairman,
Thailand-US Education Roundtable Steering Committee

Your Royal Highness,

The year 2005 is the joyous occasion of Your Royal Highness' 50th Birthday Anniversary. The whole nation of Thailand has therefore been celebrating this most auspicious milestone all year round. Indeed we, all the Thai people, are deeply grateful to Your Royal Highness for your care and concern as well as your compassion for the well-being of your loyal subjects and others. We greatly admire your extensive knowledge, profound wisdom and ingenuity in all vital fields, these include education, science and technology. May I, on behalf of the Steering Committee for the Thailand-US Education Roundtable and on behalf of all of us in this gathering, submit to you our loyal greetings and warmest wishes for Long Life, Good Health and Happiness.

Furthermore, may I also express our profound gratitude to Your Royal Highness in having accepted to serve as Honorary President of the Research Project on Science Education and Higher Education. In spite of your busy schedule, Your Royal Highness has graciously accepted to preside at the opening of the Third Thailand-US Education Roundtable and to give a keynote address following the inauguration.

As we are all well aware, the Research Project has been conceived in response to Your Royal Highness's recognition of the importance of education. Through your royal initiative and under Your Royal Highness wise guidance, the Thailand-US Steering Committee for the Project has mutually agreed to undertake research on two most relevant topics, namely: Science Education and Higher Education. Consequently, the Thai and US academics involved have been carrying out pertinent research activities. Their experiences have been exchanged in a series of Thailand-US Education Roundtables. The First Roundtable was held in Thailand in 2001, hosted by Srinakharinwirot University in collaboration with the Office of the Education Council. The Second Roundtable was organized in the United States in 2004 with the University of Pennsylvania acting as host. Both roundtables had the privilege of having been graciously inaugurated by Your Royal Highness.

On the joyous occasion of Your Royal Highness' 50th Birthday Anniversary, the Steering Committee deems it appropriate to organize the Third Roundtable in Thailand to commemorate this happy event. Prior to the present roundtable, Dr. Cheng Davis, Vice Dean of the Graduate School of Education, University of Pennsylvania, kindly invited the Presidents and Deans of education and science faculties of higher education institutions in Thailand concerned to participate in consultation on technical cooperation. The results of the deliberations at the President and Dean Summits will be submitted for consideration of the Third Roundtable, so that subsequent concrete actions can be taken.

After the roundtable is concluded, there will be a programme of visits to the area of Chiang Rai Province. There, the participants will have the benefit of observing activities of the Royal-initiated projects, educational institutions at basic and higher education levels, temples, museums, and various places of historical and cultural interest of our country.

Before Your Royal Highness gives the inauguration and the Royal address, may I present Dr.Siriporn Boonyananta, Duputy Secretary-General of the Education Council, Thai Secretary of the Thailand-US Steering Committee, on behalf of Thai members and Dr. Cheng Davis, Vice Dean, Graduate School of Education, University of Pennsylvania, US Secretary of the Thailand-US Steering Committee, on behalf of US members, to receive gifts on behalf of the Committees from Your Royal Highness.

After the Inauguration and the Royal Keynote Address, may I present H.E. Mr. Chaturon Chaisang, Minister of Education, H.E. Mr. Ralph L. Boyce, US Ambassador to the Kingdom of Thailand, Prof. Dr. Rebecca Maynard, Professor of Education and Social Policy, University of Pennsylvania, Dr. Krissanapong Kirtikara, President of King Mongkut's University of Technology Thonburi, and, finally, Assoc. Prof. Dr. Khunying Sumonta Promboon, Chair of the National Sub-Committee on Manpower Policy in Science and Technology. Each of them will present their relevant topics as stated in the program.

At this auspicious moment, may I request Your Royal Highness to inaugurate the Third Thailand-US Education Roundtable, and proceed with the Royal Keynote Address, which, I am sure, will be most beneficial to all of us present at this roundtable.

Education Reform Strategy

Chaturon Chaisang

Minister of Education, Thailand

Your Royal Highness,

President of Dhurakij Pundit University,

Members of the US and the Thai Committees of the Roundtable,

Distinguished Participants,

Ladies and Gentlemen,

Globalization is characterized by the rapid and unlimited free flow of human resources, finances, knowledge, information, products and services worldwide. This movement has inevitably affected Thailand in various ways. It is therefore necessary for us to anticipate and prepare for the impact it may have on economic and social development in the country.

Education reform plays a key role in responding to the challenges of globalization. The reform process aims to build a knowledge-based society to ensure that Thailand, or rather Thai people, develop the appropriate strategies so that they not only survive or adapt in this rapid changing world, but are also able to compete in the international arena.

The 1999 National Education Act provides the legal framework and guidelines for education reform in Thailand. Much has already been achieved in certain areas, for example the reform of overall administrative structure. Here we have seen the merger of authorities responsible for the provision of education to create greater unity in educational policy, and the decentralization of the educational administration to local authorities as well as schools and educational institutions. However, the Act also highlights other key areas and in the on-going process of education reform. It is time to seriously turn our attention to issues of quality.

Therefore improving the quality of education at all levels is our main goal. In order to prepare responsible global citizens, who can actively participate in a new world community of cultural diversity and complexity, we must cultivate learning ability, thinking skills, working and everyday life skills in the context of lifelong learning. In addition, we must promote moral and ethical values and foster a sense of public mindedness so that people can live together as members of a peaceful and harmonious society.

Change in the teaching-learning process must be accelerated through a shift from teacher-centered to learner-centered methodology, encouraging the development of critical thinking and problem solving among students of all ages. As for basic education, learners should be given strong foundation in mathematics and science, and at the same time develop complementary skills which will facilitate their access to information from worldwide sources. Of particular importance are computer literacy and language skills. With regard to language skills, student should be competent in both their mother tongue and at least one additional foreign language. As for the early childhood or pre-primary education, the emphasis will placed on child's readiness in physical and mental factors taking into consideration the brain-based development.

For the above happen, we must encourage and enhance the development of our teachers. Our strategy is to accelerate the

development of in-service teachers and instructors through training. In this way, teachers will be in a position to lead improvements in curriculum and the use of learning media. At present, we are in the process of developing a master plan for professional development of teachers and are identifying training programs relevant to their needs, which will soon be implemented.

Dramatic improvements are necessary with regard to vocational education, in order to meet effectively the needs, industry and services sectors, at this is the foundation of country economic development. Currently, Thailand is facing human resource shortages in terms of both quality and quantity of mid-level workforce. Vocational education reform and the approach adopted tackles this problem from two sides : firstly by encouraging close collaboration between vocational institutes and private sector to ensure the inclusion of relevant content and skills ; and secondly by encouraging and promoting enrolment in vocational education through the establishment of quality standards and guaranteed employment prospects.

Your Royal Highness,

Ladies and Gentlemen,

The policy for higher education, which is the main point of this round table discussion, focuses on qualitative development through strategies to raise the standard of our universities and other higher education institutes in line with international standards. Our aim is to enhance Thailand's competitiveness at international level and to support good, quality education institutes to becoming world-class universities. In this way we can ensure that the country has high quality human resources that correspond to key sectors where Thailand has a competitive edge.

Measuring standards and ensuring quality higher education necessitate the adoption of certain strategies. Firstly the development of a quality assurance system : internal quality assurance and external assurance with a system for linkage between the two clearly formulated. Improving the quality of higher education institutions that stay behind is an urgent endeavor.

Secondly, there is need for financial reform with a move away from supply-side budgeting to demand-side and cost-sharing mechanisms encouraging quality improvements through market competition. From 2006, Income Contingent Loans (ICL) will be implemented, in other words the government undertakes to advance tuition fees to students with repayment linked to future income. In the meantime, students who need additional financial support will be provided with opportunities for part-time work or some grants in order to generate additional income.

Another strategy is to strengthen the capacity of faculty staff, encouraging and supporting professional development through training and research as well as the provision of scholarships for master and doctorate degrees. Increasing capacity for research and development would be promoted to empower the role of higher education institutions as sources of knowledge creation and accumulation in addition, the managerial system is adapted to allow academic freedom as well as good and effective governance. For instance, the removal of public universities from bureaucratic system are undertaking.

In terms of science education, the Ministry of Education gives high priority to maths and science teaching and learning, as fundamental to development. Special schools are being expanded to maximize on the intelligence and creativity of especially gifted students. ICT must be applied and extra curricula activities should also be encouraged

from various sources. This meeting provides an opportunity to exchange ideas further on this topic.

Another important aspect of this strategy is to encourage lifelong learning through both the formal and non-formal education system. Those who lack education opportunities and who want to acquire additional knowledge or career skills should have access to basic education, career skills, innovation and modern technologies in order to improve their employment prospects and upgrade their quality of life. With regard to this, informal learning should also be encouraged with more effective use of media and technologies such as TV, radio and ICT in order to create the learning society for children and adults.

If education reform is to succeed there are three main courses of action: First, an action plan should identify projects, activities, duration, budget as well as responsible agencies. Second, lessons and experiences from developed countries regarding English teaching methodology, child development and brain-based learning as well as research conducted by various universities should be recognized and adopted.

Finally, Thailand should seek cooperation at national and international levels. At a national level and integrated approach should be encouraged whereby the Ministry of Education works in close collaboration with other Ministries and relevant organization and community. At the international level, the Ministry should work towards new bilateral agreements in the form of MOUs and multilateral cooperation through government and non-government organizations.

May I thank you, Your Royal Highness for your kind attention and that of this distinguished gathering.

Relationships in Education between Thailand and the United States

Ralph L. Boyce
US Ambassador to the Kingdom of Thailand

Educational partnership represents a key part of the broader foundation of personal relationships that exist between Thailand and the United States. The exchanges of ideas through educational program, such as this roundtable, whether officially sponsored or privately pursued is important for several compelling reasons.

First, liberal democracy like ours with prosperous economies depend on a well-educated citizenry. A quality education provides a basis for economic growth and as markets grow and prosperity increases, people seek further knowledge as their right. A quality education also provides the information necessary for free people to govern themselves. Therefore, a quality education becomes the master key that unlocks the door to both economic prosperity and to effective governance.

In addition, in an increasingly globalized world, our citizens must understand the forces and realities that lie beyond our own shores. If we are to prepare our students, Thai and American for life in the 21st century, our educational efforts must reach out to other societies and cultures. Doing so is not only in our national self-interest, but is a requirement for international harmony. Indeed, the long-term health

of our international relationships, such as the bi-lateral relationship between the U.S. and Thailand, are dependent on the degree to which we possess accurate knowledge of each others' societies, institutions and values.

Further, we live in an age in which we are reminded daily that ignorance breeds extremism and intolerance. It is education that can provide the next generation with the knowledge and understanding that will enable us to replace that intolerance with that Thomas Jefferson described as "a decent respect to the opinions of mankind".

As I have said, Thailand is one of our closet partners in this region, and I believe that education is one of the lynchpins of our partnership.

Through the decades, the U.S. government -- the Department of State, USAID, the Department of Education, the Department of Defense - and private organizations, particularly countless American universities, such as the University of Pennsylvania have combined their efforts to produce educational partnerships and to enhance U.S. cooperation with Thailand through exchanges and support for educational reform.

In recent years for instance, the U.S. has been instrumental in helping Thailand set up a community college system, and the State Department continues to support a formal educational partnership between the Thai Ministry of Education and a coalition of community colleges in the U.S. to build and strengthen the community college system here. And our Peace Corps Volunteers, now numbering nearly 100, are working today to strengthen the knowledge base at the provincial level and to improve tumbon-level administration.

At present, approximately 305 Thai students and 20 Thai teachers are in the U.S. under the AFS high school exchange program, and 11 American students and 10 teachers are in Thailand.

Through the Fulbright Program, over 7,000 grants are awarded annually around the world, and for more than 50 years thousands of Thais and Americans have traveled for study, research and teaching in each others' countries. There are now nearly 50 Thais in the U.S. studying, teaching and doing research, and a dozen Americans here in Thailand doing the same. Thai and American Fulbrighters return to their home institutions, not only academically enriched, but also better informed about U.S. and Thai society and values as well.

Even in the area of military education, 21,000 Thai officers have gone to the U.S. over the last 50 years under the International Military Education Training program - the most from any country in the world.

Educational partnerships have helped to develop civil society institutions, and the growth in Thailand of NGO's that are active in promoting democracy, the rule of law, human rights, women's issues and political reform is in no small part due to the power of educational partnerships to introduce new ideas and ways of doing things.

But such officially sponsored exchanges represent only a fraction of the total educational exchanges between the US and other countries. Last year, nearly 600,000 foreign students studied in U.S. colleges and universities, of which over 9,000 were Thai, placing Thailand in 9th place globally. Hundreds of American students come to Thailand each year to study in Thai universities, and there are over 400 formal academic cooperative agreements between U.S. and Thai educational institutions, both public and private.

The U.S. Embassy here in Bangkok works with our educational advising partners to provide accurate and useful information about American schools and universities so that Thai students will choose the United States for their continuing studies. Education is one of our most valuable exports and nothing would make us happier than to see

every eligible Thai student choose the United States for their education. I'm certain our colleagues at the University of Pennsylvania would welcome even more Thai students.

While I am here, I would like to say something about student visas, since it is a subject of interest to many Thais, and there is considerable misinformation about visas that I would like to take this opportunity to correct. I cannot stress enough that the United States welcome Thai students to study and take advantage of the wonderful opportunities that the U.S. has to offer. Although we have had to implement new measures to make our borders and the traveling public more secure, we have not changed the criteria for visa eligibility to visit or study in the United States. Unfortunately, many students mistakenly believe that it is difficult or impossible to obtain a visa to enter the United States; this is decidedly not true. In fact, our visa issuance rates in Thailand are almost the same today as they were prior to September 11, 2001, and the vast majority of Thai students who apply for visas get them.

Our slogan is, "secure borders, open doors," and we mean both parts. We are working to strike the right balance between protecting people in the U.S. while remaining an open and welcoming society, reflecting our sense of national purpose and identity. We believe that an investment in education is an investment in homeland security - everyone's homeland, everyone's security.

So, you can see that the United States strongly supports the exchange of students and faculty, the sharing of ideas, the promotion of mutual understanding between our two peoples, and partnerships between our institutions.

I know that your discussions over the next two days, and the continuing dialogue that will then occur after the Roundtable, will

further enhance this partnership and I wish you every success for the mutual benefit of our two countries.

Your Royal Highness, thank you for giving me the opportunity to participate this morning.

My best wishes to you all.

Higher Education

The Third Thailand–US Education Roundtable

Overview of Thailand's Higher Education Development

Krissanapong Kirtikara
President, King Mongkut's University of Technology Thonburi

University Reform in the Context of the Education Reform

Charting the Road of Higher Education Reform (1999–2000)

The groundwork on the Reform started with in-depth analysis of the 1997 Constitution and the 1999 National Education Act, and their implications on the Thai society and education. Evaluations on the past and current higher education systems and trends were taken. Research on overseas higher education reforms was conducted. With all these information, critical issues of the Reform were identified. The conceptual framework was then developed. It was recognized that transition management is crucial, and transition mechanisms are required. Participation of the public and various stakeholders was brought about through public seminars and workshops. The final outcome was submitted to the Office of the National Education Commission (ONEC) for transmission to and consideration of the National Education Reform Office (NERO). NERO was a specialized public agency set up with the task of preparing the new administrative structure of the new ministry, the new personnel management system, requisite draft bills and the foundation of financing the overall education reform including the higher education. NERO presented its work, including draft bills, to the government for consideration. The work of NERO would have led to the establishment of the new ministry by August 2002.

The Missing Years

The 1999 National Education Act represents transformations unheard of in the Thai Education world, if fully implemented. It may be the most major transformation since the first transformation that introduced public education and institutionalization of schools over a century ago. According to the Act, higher education reform calls, inter alias,

- restructuring of the higher education administrative system through merging of the Ministry of Education (MOE), the Ministry of University Affairs (MUA) and the National Education Commission, and creation of the Ministry of Education, Religions and Culture (MERC),
- changing of the public sector role in public higher education institutes from regulatory to supervisory, through incorporating public institutes, presently part of the Civil Services, into autonomous agencies or public corporate,
- creation of a national agency on education quality assurance that will set national education standards and undertake systematic implementation of quality assessment,
- extensive resources mobilization and investment in education, and
- redirecting missions of higher education towards societal participation, student-centered learning and lifelong learning.

The National Education Reform Office, however, had no mandate to undertake the reform per se. It recommended that a national commission, possibly in the form of a national reform commission, or a new agency, with definite mandates and of limited operation time similar to NERO, should be constituted to follow up on the reform. But this was not taken up by the Thaksin Government

of 2001 as it was tacitly assumed that the then Ministry of Education, the target of the reform itself, would undertake the task. Unfortunately, most of the discussion and activities within the Ministry were centered on restructuring of the Ministry and education administrative districts, as restructuring would entail threats due to post creations and dissolution. Moreover, the proposed consolidated ministry did not materialize resulting in proliferation of two new ministries on sports and tourism and culture, and segregation of a new commission on vocational education from higher education.

Direction Setting on Goals, Principles and Strategies on University Reform

Within the Ministry of Education, little progress was made on implementation of the education reform after the promulgation of the National Reform Act in 1999. In 2001 and 2002, ONEC, then under the Prime Minister Office, had coordinated formulation of guidelines and roadmap on the education reform based on the 1999 National Education Act, including higher education. Under the guidelines, the goals of the higher education reform have been set as follows:

1. The Thai higher education system with distinctive division regarding levels and types. There will be a central and unified mechanism of policy formulation and integration, planning, budget allocation and evaluation, in the body of the new Ministry.

2. The higher education system with improved access and participation.

3. Achieving academic excellence, requisite standards and quality assurance.

4. Management with autonomy and flexibility.

5. Mobilization of resources from various sectors.

6. Balanced development of the Thais and Thai graduates with desirable attributes of physical and mental strength, intellect and ethics.

Being cognizant of the diversity of higher education institutes then and dynamics of global change, there are certain salient principles upon which the higher education reform is premised. With the view to accelerating the reform measures for the above goals, it is deemed appropriate to establish the following principles for higher education reform:

1) Observance of the principles of unity in policy; harmony between higher education and the direction and exigencies for national development; as well as links with the strategies for national development in various aspects - economic, social, political, cultural and educational.

2) The strategies adopted will observe the diversity and different aspects of higher education institutions e.g. functions, disciplines offered, features of graduate production, faculty staff profiles etc., with the main objectives of enhancing the quality and efficiency of their performance as well as providing equal access for all.

3) Observance of at least 4 different societal bases of Thailand namely: societies based on competition, social status, sufficiency, and underprivileged and deprivation; and

4) Observance of the links between different educational levels, namely: basic, vocational and higher, as well as resources mobilization from different segments of both the state and private sectors, including resource utilization for maximal benefits.

The higher education reform guidelines were subsequently approved by the Cabinet in 2004. Specific to higher education reform are strategies that call for

- Reform of structure and administrative and managerial system of higher education,
- Reform of higher education financing,
- Manpower production and increased access to higher education,
- Reform of teaching and learning as well as research,
- Reform of system for development of faculty staff and higher education personnel, and
- Participation of the private sector in the administration and management of higher education.

Reform of Structure and Administrative and Managerial System

Expansion of Higher Education Institutes and Ramifications

Even the birth rate is declining and the number of secondary school students has not increased markedly but by the virtue of the 1999 National Education Act that the compulsory education is extended to 9 years and the 12-year basic education is free, more students are completing grade 12. One direct consequence is that the average schooling year in 2005 is about 9.2 years. The other is that more students are seeking higher education. In 2005, the number of students in degree-granting institutes are about 1.8 million with 0.4 million in vocational colleges. There are now nearly 130 degree granting institutes and about 650 vocational colleges.

During the 1980s and 1990s, there were at least two comprehensive studies on university mapping, i.e. where new universities should be located based on demography, socio-economic growths and scenarios, and higher education access. The first one was undertaken through the Long Range (15 Years: 1990-2005) Plan of Higher Education by the Ministry of Universities Affairs. The second one, after the 1997 economic crisis, by the Office of the National Education Commission

on the renewed siting of the so-called IT campuses. However, rapid increase of universities registered in 2004 and 2005 bears little semblance of these two university mapping studies

Prior to 2004, there were 24 state universities and about 40 private universities and colleges. In 2004 and 2005 there have been important development, viz.,

- elevation of the 41 Rajabhat Institutes to 41 Rajabhat Universities.
- consolidation of the 36 Rajamankala Institutes into 9 Rajamankala Universities.
- merging of colleges in the provinces of Nakon Panom, Yala and Narathiwat into respective universities. The last two universities have been founded based on security reasons arising few years ago.

Based on the 2004 information, when one looks at these universities and colleges in terms of the distribution of students and their locations it can be seen that nearly half (73) of these universities and colleges are small, less than 6000 students. The majority of them are private universities and colleges and the newly founded Rajabhat Universities. About one quarter (35) has less than 2,000 students. The future of such small institutes should be of concern, in terms of academic matters, financial viability and management. It can be surmised that most of such institutes offer programs in social and humanities, making their adjustment into science and technology oriented institutions difficult.

In the near future, there will be more degree granting institutes coming on stream, namely, the Borom Raja Janok Institute, on nursing and public health, comprising on over 30 campuses and the group on institutes under the Vocational Education Institute, based

on some existing vocational colleges. The country should be seriously asking whether there are too many universities and degree granting institutes that the country can afford and such 130 plus institutions can be well run. The last 40 years have seen Thailand successfully expanding basic education for the increasing education so that the question of access is well answered. But this has come at the expenses of quality education. History may be repeating again for higher education which are mush more costly than basic education, that Thailand can offer mass higher education but at the expenses of quality. In the world of competitiveness, quantity cannot substitute for quality, especially education towards vocation and professions, the domain of higher education.

Merging of colleges into universities as occurring in Nakon Panom, Yala and Narathiwat deserves more study. On one hand, it is a logical approach to establish a provincial university based on existing resources, and avoiding duplication. On the other hand, turning, say, a vocational college into and engineering school is not professionally correct as both technicians and engineers are requested. Dissolution of vocational colleges runs contrary to the notion that more technicians are needed in industries and services sector.

There are approaches that the country can take to consolidate and strengthening universities and degree-granting institutes so that synergy can be promoted, economy of scale and critical mass are reached, and efficiency and quality can be addressed. For example,

- Area wise and geography wise, networking of and merging of universities and institutes at provincial and regional levels is one approach. The Office Higher Education Commission has initiated pilot projects in 2003 to enable higher education institutes at provincial level to form provincial education networks and later extended towards regional coverage. This deserves further consideration and supports. Networking

or federalization of colleges and universities, with good articulation vertically and lateral transfers between institutes of different nature, would enable respective institutes to focus and be excellent in their missions, and allow effective resources utilization.

- Discipline wise, for example, networking of science and technology universities (the 9 Rajamangkala Universities of Technology, the 3 King Mongkut's Insitutes/ University, Maejo University and Suranaree University of Technology) should be logical. These universities are founded from agricultural and technical institutes, with the exception of SUT, and primarily focused on engineering and agricultural technologies.
- Development of science and technology education and research and centers of excellence should be based on ensembles of such universities, rather than individual development.
- Mission wise, Rajabhat Universities could be clustered. Missions common to them are universities for the mass and rural development. Mutual issues of interest such as education service areas, courses development, quality improvement, staff development and research agenda can better be tackled collectively, rather than individually.

It must be reminded that such networks are not mutually exclusive. A university can be a part of more than one network.

Autonomous Universities Development

The restructuring of the university system through development of autonomous universities proved more intractable than originally thought. According the to the Long Range (15 Years: 1990-2005) Plan of Higher Education, one gal at the end of the Plan is that most of the existing state universities should make transition into autonomous universities. The reality is only King Mongkut's

University of Technology Thonburi (KMUTT) has made a successful transition in 1998. The difficulties of KMUTT in making the transition right after the 1997 economic crisis when the country had more pressing problems to deal with serve as explanation why the remaining 20 state universities were not enthusiastic on the transition.

Over the intervening 7 years, major issues that have been debated and resolved, in principle, in the transformation of state universities. Major developments are:

Funding Support from the Government

Ignorance that autonomous universities will receive less public funding and must eventually be self financing still persists among university people, the bureaucracy and the public. It is perceived that autonomous universities would be run like business corporate. Student fees would be increased making university education out of reach of poor students. Academic programs that fail to make money would be terminated and staff dismissed.

Universities want government to commit on continuing funding support and have the principle stated explicitly in respective university acts.

Performance Evaluation and Personnel Management

Public universities being part of the Civil Services, university personnel are civil servants. This being so, they are immune to rigorous performance evaluation like employees in the private sector and enjoy life-long employment until retirement. Personnel of autonomous universities are regularly evaluated like employee in the private sector and employed on a contract basis. It is feared that performance evaluation system of autonomous universities could be unfair and personnel could be poorly treated and easily dismissed. Personnel in existing public universities fear that their civil servant

status will be involuntarily changed into university employees. Life long employment would be forcibly terminated as their new employment will be on contract basis.

Since 1999, no more new civil service positions have been created within the existing state universities after staff retirement and service termination. Budgets have instead been made available to universities to create posts of university employees. This comes with performance evaluation of university employees. Such matter has been gradually accepted.

Autonomous University Governance

Autonomy in management of academic matters, personnel and finance is the 3 pillars of autonomous universities. University personnel in the Civil Services are apprehensive of autonomy governance. Dependency on bureaucratic rules imported from outside universities has become addictive. Autonomy means increase in responsibility and accountability. Many university personnel have enjoyed freedom without responsibility and accountability in the past.

On the government part, concerns have been raised on accountability of autonomous universities to public needs. In approving guidelines on higher education reform, the Thaksin government has stipulated certain accountability conditions that must be incorporated in the pending draft autonomous university acts.

Another pertinent issue is the preparation of universities and university administrators on management of academic matters, personnel and finance under autonomy system. The six autonomous universities have established the Council of Autonomous University Presidents since 2001 to exchange views and lessons leaned from operating autonomous universities as well as identifying development issues. State universities in preparation of making transition have learned from these pioneers.

Capacity strengthening of university management and governance demands more attention from the government and universities. First and foremost, university council members should be selected from a national pool of the qualified, and strong secretariat supports should be provided for the work of the councils. Presidents and senior university administrators need a national scheme on mentoring. This could perhaps be achieved through shadowing at well reputed local and overseas universities. The Office of Higher Education Commission has operated a shadowing scheme and common training programs for senior academic and supporting administrators for some time. This cannot yet keep pace with the proliferation of universities and retirement of senior administrators. Moreover, universities should be supported, finance and resources personnel, to operate their own shadowing and training schemes.

Privileges for Autonomous Public Universities and Their Personnel

There are three types of public agencies and corresponding personnel, i.e. the Civil Services and civil servants, state enterprises and their employees and public organizations and employees. Public organizations can be created either by the legislative branch through enactment an Act of Parliament or by the executive branch through promulgation of a Royal Decree. An autonomous university is of that of the first nature and enjoys considerable autonomy. Public universities being part of the Civil Services have been accorded privileges similar to all civil service agencies. Their personnel being civil servants are accorded privileges similar to all civil servants. Difficulties have arisen when a public university that uses to be a part of the Civil Services has become a public autonomous university, and when a civil servant has become a autonomous university employee. How much of the original privileges of civil service agencies and of civil servants should be accorded to autonomous universities and employees are still issues of contentions. Many of the bureaucrats

have objections to seeing similar privileges in autonomous universities. This poses an additional disincentive in the transformation. Important issues that have been resolved in principle are:

- utilization of public lands
- continuation of services between a civil service agency and an autonomous university for public scholarship holders
- customs and excise taxes and value-added services taxes
- superannuation scheme
- royal decoration

The deliberation and legal processes on transformation up to October 2005 is as follows:

1. Deliberation of draft university acts by joint committees between the Senate and the House of Representatives. This is meant to resolve outstanding issues introduced by the Senate that universities consider unacceptable. Such issues have arisen as members of the Senate have deemed that autonomous universities could become too business-oriented and may not be responsive to and be held accountable to societal needs.

Draft university acts under this category: Burapa, Khonkhaen, Taksin, Chiangmai, and Mahasarakham.

2. Deliberation by the House of Representatives: Chulalongkorn, Kasetsart, Silpakorn, Sri Nararindwiroj, Ubol Rajathani, KMIT North Bangkok, KMIT Ladkrabang, Mahidol and Ramkhamhaeng.

3. Deliberation by the Council of State: Sukhothai Dhammathiraj, Maejo, NIDA.

4. Deliberation by the Office of the Secretariat to the Cabinet: Naresuan, Prince of Songkhla and Thammasat.

5. Deliberation by the Office of Higher Education Commission: Prince of Songkhla-Pattani.

Reform of Teaching, Learning and Research

Teaching and Learning: Tacit Knowledge Education and Work Place Based Education

On of the key feature of the 1999 National Education Act is the reform of teaching and learning, throughout the education spectrum. In fact, the Article 24 (5) of the Act calls for learning through the process of research. Attempts have been made largely at basic education level to migrate from teacher teaching/teacher-centered learning to learner learning/student-centered. Not very much effort has been registered at higher education in problem-based learning and research-oriented. It seems that university lecturers are preoccupied with the "technical" or content aspect of educating rather than the learning process. University academics world-wide are aware that in the dynamism of globalization and exponential growth of knowledge, teaching students to learn as much contents as possible is becoming irrelevant. It is recognized that approach to university education should be shifted more from content-oriented/explicit knowledge education towards tacit knowledge education that is holistic, integrated and context-oriented.

For context based education, there have been numbers of different approached. At the level of **project based/problem based training and education,** quite a number of medical schools and health science programs have adopted such approach for nearly a decade. In some sense, this is a requirement of such professional education, not demanded in other discipline. **On work-place training and education,** certain private universities, Rajabhat universities and Rajamangakala Universities have for some years required full time work-place based attachment. **On cooperative education,** Suranaree

University of Technology, since its inception over ten years ago, has championed cooperative education in science and technology with admirable outcomes. Recently, the Office of Higher Education Commission has timely provided financial supports to universities that want to launch cooperative education programs. As a result, more universities, mostly the original state universities have taken these initiatives. Over the last eight years, King Mongkut's University of Technology Thonburi has adopted and adapted the **"engineering practice school"** model from MIT, in some of their graduate engineering programs. In the practice school model, student works on industrial problems proposed by host companies. University lecturers have to be present at industrial sites throughout the period of student residence within the industry. Education and supervision of students are jointly done by university lecturers and company personnel.

A lot can and should be done on these various modes of context-based education. Practical problems that have to be overcome are few. The first one is work-place partners. Business and industrial sector of Thailand need to be further encouraged to take parts in education, perhaps through financial incentives scheme. Second is the financial aspect, work place based education of meaningful technical and professional nature costs more than ordinary programs that the government, through budget allocation, and students are willing to pay. Somebody has got to pay to bring it about. Thirdly, it requires more efforts and, in some cases, time from the students than ordinary programs. This runs counter to a prevailing attitude that "complete your tuitions and fees payment, your degree is assured" or "why bother to do more and harder work". Lastly, work-place based education demands more time of university staff whereby academic and financial rewards are not guaranteed. It is difficult to have such industry-oriented work published for academic promotion according to the conventional wisdom and practice.

Research Oriented University Education

As far as higher education is concerned, education and research should be viewed as two major issues, the first one on research-oriented education and the second one on research work undertaking. The first issue has been discussed in previous section . There are few possibilities that have been discussed, but not widely implemented. The first one is though **the provision of higher education for the gifted.** The last few years have seen keen interest of agencies promoting science and technology, and gifted education that the country needs a quantum jump in high caliber manpower. This is due to the clear evident that in countries that have been successfully developed there are strong correlation between economic achievements and competitiveness ranking to scientific manpower the numbers of scientific manpower and the ratio of scientific manpower to the working population. Thailand is one to two orders of magnitude lower in terms of her S& T manpower, and need to jump start its high caliber S&T manpower production. One avenue is to expand gifted education at school and university levels, and good articulation from schools to undergraduate and graduate education. In this respect, calls are made for collaboration of schools and universities

- In the setting up advance placement programs (AP Program) to enable school students to take certain classes at university levels, and
- Establishment of "special track" or "honors degree" programs for gifted students in universities.

The AP programs and honors programs by nature are research-oriented education. Few universities and secondary schools have initiated these in the last few years, notably, Mahidol University and Chulalongkorn University.

Recently, the government has called for universities to increase their participation in its strategy on poverty eradication and rural uplifting.

A numbers of rural-oriented programs have been launched and calls for involvement of universities. Examples of these are the OTOP scheme, the SML village scheme, the CEO governor scheme, the provincial and regional strategies scheme. Up to present, universities have taken part in these schemes as activities underpinning a third university mandate on provisions of services to society. There have been no systematic linkages between mandated government agencies and universities. Most work are done on personal and piecemeal basis. The Prime Minister is aware that such schemes are not sustainable in the long run is no empowerment occurs at village and province levels. Empowerment implies that two important issues on human resources development and capacity strengthening must be addressed. Both require universities as natural partners. The government sees this as opportunities to empower both the rural villages and to engage universities in gainful national development. Properly designed, **combination of the first university mandate on manpower production/education and the third mandate on provisions of services to society** would result. Work-place based (in this case rural villages, village enterprises and SMEs) and village-based research-oriented education can materialize. A national brokering apparatus between universities and respective government agencies and working mechanism need to be devised.

Research Reform

Thai universities are principal players of research work in Thailand, as should be expected of university roles. Meaningful research works are mainly undertaken in numbers of the 24 original state universities. At a national level, a fraction of one percent of the GDP is spent on research and the country is weak on its research and research outputs. Funding for research and development, totaling few billion baht a year, has come from

- state university annual budget allocations,
- funding agencies with particular mandates such as the National Research Council of Thailand-NRCT, the Thailand Research Fund-TRF, the National Science and Technology Development Agency-NSTDA, the Energy Conservation Fund, the Health Promotion Research Fund and the Agriculture Research Fund, and
- specific projects on strengthening of graduate study and research. Recent ones are the ADB-funded seven university consortia on science and technology and the JBIC project on Chulalongkorn University whereas the World Bank loans for Rajamangkala Universities and Rajabhat Universities were essentially earmarked for staff development and acquisition of research equipment.

Since the beginning of the first government of Prime Minister Thaksin, there was a promise on a new avenue on research funding, the so-called integrated research that have specific, identifiable and immediate applications. Premised on such paradigm, it is perceived that such research approach will entail cost effective outputs and outcomes. Universities have been informed that, in principle, integration can be agenda/theme based, hot issue based, area/region based, and trans-ministry research. Considerable time and manpower have been spent on proposals preparation. Nothing of concrete results, as far as universities are concerned, in terms of research funding and research undertakings have come out of such exercises. This has raised cynicism among quite a few university staff.

This new approach occurred simultaneously with the government intention to reform and restructure the national research system, though abolition and merging of research agencies. Future of research bodies and funding agencies such as NRCT, TRF and NSTDA have been

left hanging for few years. It is of great concerns to universities, key players and beneficiaries of such agencies. In late 2005, the Thailand Academy of Science and Technology-TAST, whose members are prominent researchers and scholars mostly from universities has put forth a manifesto to the Prime Minister entitled **On the Recommendations on Restructuring Systems for Research, Development, Creation, Dissemination, Management and Application of Knowledge Towards Applications for the Country.** The essence of such recommendations are

1. The government should have a policy and strategies on research, development, knowledge creation, management and dissemination leading to coherent implementations in the country. The policy and strategies must target national competitiveness, social well beings, poverty reduction and sustainable development.

2. The government should promote and have clear mechanisms conducive to such policy. It should add on past and existing success and achievements that have been peer-evaluated as well as improvements on mechanisms and systems detrimental to achievements. Examples are time-consuming steps, unrelated systems or administration and management by the uninitiated and inexperienced.

3. Efficient research system of the country need good management, flexible and transparent system. Independence should be guaranteed on assessment of research funding and ability to evaluate research work according to the accepted standards.

4. Upon consolidation of science and technology agencies, supervision that leads to improved efficiency of respective agencies are critical. Judicious selection of management system best suited for each agency must be made. Quality assessment, efficiency and effectiveness must be emphasized, based on information from all concerned stakeholders.

5. If the government chooses to combine research and development agencies, it must not totally separate research on social science and humanities from science and technology. Moreover, it should not separate fundamental research, applied/application oriented research and development. This is because the nature of knowledge and management of knowledge into practice of various fields and disciplines are intertwined and complimentary to one another.

6. Agencies responsible for research funding for various target, namely, competitiveness, social well beings, poverty reduction and sustainable development should be independent based upon visions of respective boards in allocation of funding and appointment of senior administrators.

7. The government should be aware and informed that each step from research and development leading to applications is important and critical, requires adequate time and needs supports financially or otherwise. Development step cannot be selected for funding in isolation. This is akin to planting a tree in totality. No one single part can be selected for planting. Science is like tree roots that need to be nourished before a tree would blossom and yield fruits of technology that a country could harvest. To ensure effective and efficient scientific and technological applications, good management system is required.

It can be said at this instance that the country has yet to make up its mind on reforming a national research system. Unless such reform is achieved, university research will remain weak and the country remains weakened.

Lately, the Office of Higher Education Commission-OHEC and universities have attempted to come to common understanding on research of universities, research-oriented education and the government integrated research. It is proposed that

1. Universities should have research policy and direction to support learning of students at all levels, stipulated in the 1999 National Education Act. Some avenues are identified, namely, research process as part of learning of students, research through community-oriented learning, and research as a part of student employment in universities.

2. Basic research is left to be determined by universities. (This is the mainstream research approach aforementioned.) Application-oriented research that OHEC supports should be geared towards integrated research in 3 main directions, namely,

- on problem solving of communities. It should enable communities to become self-dependent such as the rural village fund, the SML project, the OTOP project and the CEO governor scheme,
- to increase competitiveness. It should be commercially targeted towards entrepreneurs and SMEs, and
- to support government agenda and emerging hot issues such as the 3 provinces of southern Thailand.

Quality Assessment of Higher Education

The 1999 National Education Act has brought about the significance of education quality at all levels. The Office of National Education Standards and Qualification Assessment has been set up in 2000 with a specific mandate to undertake external education quality assessment, in a 5-year cycle, of all types of education institutes stipulated in the Act. The first cycle is nearly completion. Over 20,000 schools at basic education level and few hundreds higher education institutes have been assessed. Meta-analysis of assessment results and outcomes is being done.

ONESQA has released preliminary data on nearly 200 institutes, complied as an accompanying table to this paper, covering 5 major groups of higher education institutes, namely, state universities, private universities, Rajabhat Universities, Rajamangkala Universities and Nursing Colleges and Public Health Colleges under the Ministry of Health. In summary, the major findings are

Standard 1 Quality of Graduates

Majority (over 80%) of graduates find employment and are self employed. About 7% pursues higher degrees. Satisfaction of employers is rated close to 4 (a in 1-5 scale). Employees need better proficiency in English, third languages, computer and management skills.

About one third of doctoral theses have been published or disseminated through international and national journals and conferences.

The figures on employment deserve closer look as distinction cannot be made at this stage about those newly employed, those having jobs while studying and those that are self employed. On dissemination of work at graduate level, this is done primarily by original state universities as private universities focus on bachelor degree education and Rajabhat Universities and Rajamangkala Universities have not been set with similar mandates to original state universities. Publications are still of a target that can put Thailand on a world map of knowledge creation.

Standard 2 Learning

Institutes have recognized and placed importance on learner-centered learning. Students are generally satisfied with teaching. However, little learning related activities and projects are manifesting, teaching is still dominant in learning process of students.

Not significant research work on learning has been taken.

Standard 3 Learning Supports

The ratio of teacher to full time equivalent students-FTES is high, 1:19.9. Only 8% of academic staff has doctoral degrees. The ratio of academic staff to supporting staff is unsatisfactorily large, over 1: 22. This implies that academic staff have to shoulder lots of clerical work resulting in work overload and reduction in time and efficiency relating to teaching and research. In most aspects, it reflects existence of a large disparity (in terms of staff numbers, staff qualifications, education expenses, spending on computing and library facilities) among public universities, again between the original state universities and the Rajabhat Universities.

In ranking universities on a global scale, substantial weights are put on academic staff and learning supports. Staff-students ratio, staff qualifications and library and internet facilities of Thai universities, even among the original 24, are internationally below par.

Standard 4 Research and Creativity

No significant research and creative work exist. Little publications are noted. On average, only 0.14 piece of publication and creative work per head is recorded. Unless the restructuring of a national research system and the national agenda on integrated research no meaningful research and creativity, underpinning improvement of national competitiveness and rural uplifting, can occur.

Standard 5 Services to Society

The main first indicator is services contracts/projects of staff. On national average, this is 0.31 per staff. The second is the percentage of staff serving or undertaking activities that are professionally-related or community-oriented. The figure is about a quarter. The figures should be taken as under representing as a lot of work is not registered in university system.

Standard 6 Promotion of Art and Culture

The mission on promotion of art and culture is unique to Thai higher education institutes. The indicator used is based on activities and projects which turns out to be 0.19 per staff. More meaningful indicators need to be designed in terms of outcomes or impacts of activities and projects. Many universities in the provinces host provincial art and cultural centers, and are proactive in promotion of indigenous arts and craft, and local culture. However, most activities are geared towards preservation and promotion of the national heritages. Knowledge creation and development on arts and culture are limited.

Standard 7 Administration

Key indicators are expenditures on personnel and others. On average, over 40% is personnel expenditure. About 30% is indirect expenditure (central administration and common services). Most institutes manage with limited resources.

The Higher Education Commission has recently summarized problems pertaining higher education institutes based on overall assessment results, among others. They are as follows:

1. There is no clear direction of higher education development, resulting in duplication and overlapping of services.

2. Most higher education institutes are founded on political basis. Inadequate considerations are given on quality dimension and readiness in setting up of universities.

3. There is no clear management mechanism regarding diversity of institutes. Promotion and control of education standard are incoherent, difficult and disjointed.

4. Higher education institutes lack dynamism to respond timely to changes, especially those would lead to quality and standards of education and research.

5. Higher education institutes freely offer academic programs without due concerns on education quality and standards.

6. There has been no long term planning by higher education institutes.

7. Governance and management bodies in some public and private universities need strengthening.

Finally, results of education quality assessment will be submitted to the government and made known to the public. It is the intention of the 1999 Education Act that such national undertaking on the state of Thai education system, the first of its kind of the country, will prompt policy makers, administrators and the public to act on improvement the Thai education quality.

Reform of Higher Education Financing

The Present System

Financing of the existing higher education system comes mainly form the public. Students and other stakeholders benefiting from higher education outputs (graduates, research and constancy work and services) play minor roles in expenses sharing. For public higher education institutes, an annual budget allocation is made to institutes, the supply-side financing. On average, about three quarters of operating expenses of institutes are from the public purse. Most of the investment capital comes from the government. In essence, from the beginning to present, higher education has been tax-financing, drawing taxes from everybody to support higher education students. There has been large disparity of funding, resulting in quality of outputs, among the original state universities, the Rajabhat and Rajamangkala Universities. The higher education budget over the last 5-10 years has more or less remained constant in real terms. On the other hand, private institutes had received less direct financial supports. The question of inequity has been persistent as students from less privileged background, economically and socially, have disproportionate access to good education in limited admission universities. Many end up paying higher tuitions and fees in private universities.

In 1996 the government instituted the Student Loans Fund for education beyond compulsory level. Upper secondary school students and higher education students were entitled to a loan. An annual budget allocation of about 25 billion baht is available to the Loan Program. The loan is intended to cover both tuitions and fees and living expenses. After the 1999 (2542) National Education Act, basic education being free, majority of borrowers are higher education students. Loans for school students only cover living expenses. Out of the current 25 billion baht loan annually, 16 billions are for living expenses and 9 billions for tuition and fees.

By the end of the 2004 educational year (April 2004), the amount of loans extended is 212.9 billion baht, and the number of borrowers is about 2.43 million students. Out of these, 0.88 million students are still studying, 0.59 million student borrowers are in grace period and 0.94 million borrowers have their debts payment due. On loan payment situation, about two thirds have made debts payment. One third has loans payment deferral. About 50-75% of deferred payment cases are unemployed or underemployed. Loan borrowers that are unemployed or underemployed should be of concerns. This in some way reflects quality and relevance of higher education that students receive and institutes offer. Even though one cannot yet segregate between borrowers who terminated their education at secondary school level and those completing higher education (diploma and degrees). It is likely that majority those having their loan payment deferred are graduates from higher education institutes as most secondary school students pursue higher education.

Higher Education Financing Reform : Issues on Transition Management

Massification of higher education, the 1999 National Education Act and the roadmap on higher education reform have called for extensive resources mobilization for education and cost sharing by students and other stakeholders. Moreover, shortcomings of the existing student loan program need to be rectified.

Higher education financing reform essentially shifts the higher education financing from tax financing to fee financing, and from the supply-side financing to the demand-side financing. The Student Loans Fund will be replaced by an income-contingent loan-ICL, modeled after Australian experience. A comprehensive treatment on rationale and mechanism can be found on the work of and which will be presented M. Krongkaew at this roundtable. So this issue will not be covered any longer in the paper.

On the parting notes, few issues on transition into ICL should be raised,

1. ICL is contingent upon future employment and income earned. Delinquency of debts repayment is counted as public losses, the whole country has to pay for it. This is unlike a mortgage type loan of the existing loan program where loan guarantors can be held accountable. The government must ensure that higher education institutes must offer quality education at reasonable costs. Relevance of programs to vocation, public need and personal demand must be balanced. Results of education quality assessment of ONESQA should be used towards this end.

2. Thai higher education institutes and universities in particular, diverse greatly in maturity, potential, governance and management capability, education standard and quality as well as their missions and aspiration. Studies, by King Mongkut's University of Technology Thonburi in conjunction with the Financing and Resources Forum of the Council of University Presidents of Thailand, have been commissioned by the Office of Higher Education Commission, the Office of Vocational Education and the Office of National Education Commission on nature of expenditures of degree granting institutes and vocational colleges. It is evident that past and existing public funding supports differ by many times, and to a certain extent resulting in disparity in quality of graduates and outputs. Transition into an ICL scheme, with harmonious set of funding scheme, takes time. The often quoted 4-5 year transition period could be too short.

3. To finance and restructure higher education institutes, additional funding mechanisms in addition to ICL need to be established.

The government must quickly address this and come up with definite guidelines on other funding mechanisms.

4. Lastly, it has been demonstrated over the world that more than funding instruments are required to reform higher education institutes. Leadership, governance and management of the system must be adequately addressed.

Conclusion

The higher education reform is the results of the 1999 National Education Higher education of Thailand . The six reform issues premised upon the guidelines approved by the Cabinet in 2004 are (i) structure and administrative and managerial system, (ii) higher education financing, (iii) manpower production and increased access to higher education, (iv) teaching and learning as well as research, development of faculty staff and higher education personnel, (v) system for development of faculty staff and higher education personnel, and (vi) participation of the private sector in the administration and management of higher education. The paper

highlights development on some higher education reform issues, restricted to degree granting institutions, since 2001 when the first Thailand-US Education Roundtable was held.

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TICAL in a Nutshell: or What Thailand's Income Contingent and Allowance Loan Scheme is all about *

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A major educational reform is in the making in Thailand in 2005. The Thai government under the leadership of Prime Minister Thaksin Shinawatra has endorsed a plan to change the current higher education financing system to a system based on the following characteristics: (1) The new system will use new tuition fee structures that more closely reflect the actual costs of (efficient) operations; (2) Provision for the students to pay for those fees upfront, with discount, or deferred those payments until later with the government taking care of immediate costs of education; (3) The students will start to pay back these "debts" when their post-graduation income, from whatever sources, has reached a sufficiently high level; (4) These debts are interest-free but will be adjusted annually by the existing rate of inflation; (5) The country's tax offices will be responsible for the collection of these students' debts until all debts are paid off (no time limits); (6) But whenever the students' income or earning falls below the threshold income, their repayment will automatically and temporarily stopped; (7) Apart from the government fund to pay for students' fees in advance, it will also set up another fund to give allowances for daily living of poor students; (8) Private universities will be treated as equal partners of state universities, with the same tuition fees subsidies and repayment procedures; (9) Controls on quality of instructors and the learning of students will be strengthened to prevent abuses; (10) Post-graduate education will be added to this scheme later. This new financing system is called Thailand's Income Contingent and Allowance Loan Scheme or TICAL Scheme.

The need for change to this new system stems from the fact that the present university financing in most state universities is highly subsidised. On average, students in state universities pay only about 20 per cent of the total cost of operation, with the rest subsidised by the government through general taxation. This practice is both inequitable and inefficient. But it is politically impossible to increase the students' share from 20 per cent to, say, 50 per cent under the present tuition fees structure. Moreover, the current Student Loan Program where university students can borrow money from the government to pay for their own tuitions and costs of living is experiencing a lot of problems because many of these students could not start to payback their loans after two-year grace period after their graduation. Hence the need for this new system of income contingent loan, with a supplementary grant for poor students.

Under the new TICAL Scheme, higher education institutions in Thailand will be divided into five groups, namely limited-access state universities, open-access state universities, newly organised universities from previous teachers' training and vocational colleges, larger private universities, and smaller private colleges. As of the end of 2004, there are about 1.5 million students in these five groups of universities. Courses offered by these higher education

* Material prepared for Chapter 5 of Bruce Chapman's book: Economics of Income Contingent Loan, London: Routledge (forthcoming), February 2005.

institutions will be divided into six main clusters of subjects, including social sciences and humanities; arts and architecture; engineering, science and technology; agriculture and natural resources; public health; and medical technology and medicine. Tuition fees on these six clusters of courses or subjects will differ from one institution to another depending on the actual appropriate tuition fee levels that reflect efficient costs of operations. In other words, a matrix of at least 6x5 tuition charges will be made known to all students so that they know in advance how much they have to pay for the subjects (or degrees) of their choices. On the average, the government will subsidise half of these tuition fees directly to the universities, whereas the students could pay the other half upfront with about 25 per cent discount, or receive this half in the form of a loan whose repayment is contingent on the students' future income.

In order to cushion the impacts on universities as well as students, the government will continue to allocate the same levels of public funds to state universities in the next 3 years after the launch of the TICAL Scheme. The size of the budget involved is about 60 billion baht. During these initial 4 years, any change in the number of enrolling students will be recorded, with full effects based on the actual number of students under the six clusters of subjects to determine which university will get how much from the government. This is part of what is known as 'demand-side' financing. The Office of the Higher Education Commission (OHEC), an agency in the Ministry of Education, will be assigned the main responsibility of administering this new scheme. It will coordinate with the Bureau of the Budget to approve public funds for state and private universities, and with the Revenue Department to collect repayments from students after graduation. The existence and use of unique, 13-digit, student identification numbers will greatly and effectively facilitate record keeping and the tracking of student movements throughout their lives. At present, it is calculated that the threshold income from

which students will start to payback their debts is about 10, 000 baht per month. For a typical low-income public servant, it may take about 3 to 4 years to reach this income level. And assuming the repayment rate that will start from 2 per cent upward, it may take these students about 25 years to pay off their debts.

It is expected that the new TICAL Scheme will generate a larger demand for higher education in the future. The quality of higher education should also improve due to greater competition among universities. After a few years the scheme may be expanded to include post-graduate and other non-degree, adult education. Students' repayments in the future will form a new source of public revenues hitherto unknown in Thailand.

Current Development of the TICAL Scheme

1. Two important dates that bring about the current development of Thailand's Income Contingent and Allowance Loan (TICAL) Scheme are December 16, 2003 when the Thai Prime Minister, Dr. Thaksin Shinawatra, approved a draft plan to establish an income contingent loan scheme for higher education systems in Thailand, and April 7, 2004 when the Thai Cabinet approved the framework of such scheme prepared by the Office of the Education Council (OEC) under a Special Taskforce appointed by a Deputy Prime Minister, Mr. Chaturon Chaisaeng. This Taskforce was in fact an amalgamation of three subcommittees set up under the National Educational Reform Committee to consider various aspects of higher education systems in Thailand. One was subcommittee on student loans headed by Dr. Somchai Richupan, the second was subcommittee on higher education financing headed by Dr. Boonserm Veesakul; and the third was subcommittee on higher education resources and personnel headed by Dr. Medhi Krongkaew. As a result of this Cabinet Resolution, a new committee was set up to oversee the reform of higher

education finance along the line of the TICAL Scheme. The break-through in our work came about when we decided to break away from the existing framework of higher education financing systems in Thailand, and adopted a new higher education financing system based on the Higher Education Contributions Scheme (HECS) of Australia. Once this is agreed, road blocks are lifted, and the future direction is clear.

2. The above Special Task Force was disbanded and all members reappointed as members of the new Higher Education Finance Reform Committee (HEFRC) headed by a deputy prime minister (still Mr. Chaturon), with the current minister of education as the first vice chair, and Dr. Somchai Richupan the second vice chair. Five new subcommittees were set up to make operational plans for the new system with five specific tasks, namely, the overall direction of the preparation, information technology and database system, budgetary planning and allocation in the new system, legal preparation and the merging of the old Student Loans Program into the new system, and public relations activities. The first subcommittee with the responsibility of overall strategies and direction was in fact the old Special Task Force in new cloth, and it indeed oversaw the overall workings of all other subcommittees.

3. It must be admitted that there was little concrete progress on the work of these five subcommittees during the remainder of 2004. Part of this could be said to be intentional, that is to say, members of the subcommittees were given an opportunity to get acquainted with the problems and have hands-on experience in planning an ICL system. But since everyone was new to this system, it took time for members to come to an agreement on a certain decision. Slowly common understanding and agreements were reached among subcommittee members, especially members in the original Special Task Force or the new first subcommittee on overall strategies.

Another important turning point was reached when the HEFRC had decided to change the operational center for the new system from the Office of the Education Council (OEC) to the Office of the Higher Education Commission (OHEC). In early 2005 with the main reason that the progress of the system had gone beyond planning stage into operational stage, and the government agency that run the current higher education systems for Thailand, the OHEC, should be given the new responsibility.

4. The third meeting with the Prime Minister on 3 March 2005 at the Government House had settled many unresolved issues among committee members such as the low threshold income for repayment, the low repayment rate at the start, the equal treatment of state and private institutions, the work-for-allowance program for poor and needy students, and so on. More importantly, the Higher Education Finance Reform Office (HEFRO) would be set up at the OHEC with staff seconded from various related government agencies on voluntary basis to work full-time on the preparation of the new system. The HEFRO actually started operation in early May 2005 with Dr. Medhi Krongkaew serving as Interim Director, and initial staff of about 10 seconded from the OEC and OHEC. The five subcommittees referred to above were again disbanded and new subcommittees formed (or will be formed) to better undertake the new tasks of system preparation.

5. With the full support of the Secretary General of the OHEC (Dr. Pavich Tongroach), and one of his Deputies SG (Dr. Sumate Yaemnoon), the HEFRO moved quickly to fulfil its tasks of necessary preparations. First, a new Executive Subcommittee of the HEFRO was set up by the HEFRC with the Secretary General of the OHEC as Chair, and Vice Minister of Education (Dr. Peerapan Palusook) as Advisor, and the core members of the Overall Strategies Subcommittee (or the old Special Task Force) appointed into this

new Executive Subcommittee of the HEFRO, and this group of personnel has become the collective planners for the TICAL Scheme by virtue of their frequent meeting (at least once a week), and various concurrent activities. Second, a network of 20 universities was formed to discuss and respond to the steps involved in the eventual adoption of the TICAL Scheme, especially on the adoption of the appropriate tuition fees under the new system. Third, a new legal preparation subcommittee was set up to draft a new law of the overall higher education reform (where the financing aspect is just a part). Fourth, the information technology and database management subcommittee was also set up to consider the data management requirement under the new system. Fifth, an official and formal process was started to recruit one permanent Director and one permanent Deputy Director for the HEFRO, along with five more staff to work on institutional research and public relations for the HEFRO. But the beginning of September 2005, the HEFRO is in full operation.

6. The cabinet reshuffle in July 2005 saw some changes in the operation of the HEFRC. Mr. Chaturon was appointed the new and powerful Minister of Education from his post of a deputy prime minister, and the chair of the HEFRC was given to another Deputy Prime Minister (Dr. Surakiat Sathirathai). However, this should not affect the operation of the HEFRC too much because, first, Dr. Surakiat who was a former professor at Chulalongkorn University is knowledgeable about higher education system in Thailand and is a keen supporter of the ICL system, and second, since he often travels overseas, Mr. Chaturon who is now First Vice Chair of the HEFRC continues to act on his behalf as the de facto chair.

7. One of the most critical steps in the launching of any ICL scheme is the determination of appropriate tuition fees by different subjects or subject clusters that will be used by all universities. It is so critical because once this parameter and the number of students are known, the government can calculate how much money or government budget is needed to support all universities under the new financing scheme. In Thailand, the Ministry of University Affairs and later the OHEC, had commissioned the King Mongkut University of Technology Thonburi (KMUTT) to undertake the computation of unit costs of various programs in various state universities based on the actual operating costs of those universities.[1] The results of these unit costs from multi-year calculations have been properly adjusted with appropriate price indices to bring them into the current period. Another adjustment has been undertaken to exclude data entries that show unreasonable or unjustified extreme values. The final outcome, therefore, could be considered a reasonable attempt at finding Reference Unit Costs (RUCs) or the real costs of university education in different fields or subjects, by various types of universities.[2]

8. As of the end of October 2005, the HEFRO has completed the calculation of RUCs for all universities, but the final announcement of RUCs to be used for the purpose of determining the level of state subsidies to universities and ICL loans to the students will not be

[1] Operating costs here are defined as direct costs associated with the teaching such as salaries of professors and supporting staff, costs of teaching equipment and materials, and so on, but not including costs of building and other infrastructure and research funding. These unit costs reflect the costs of higher education as they were, not the costs as they should be. If we assume that all universities operate efficiently, then these unit costs could be considered appropriate tuition fees. If not, they can be either too low or too high depending on various factors such as the number of professors per students, and the salary structures of each university and their respective costs of operation

[2] As for private universities, the actual tuition fees from all universities in the same field or subject are averaged out to arrive at a designated RUC for that field or subject. For more details on the calculation of RUCs, see Medhi (2005b).

forthcoming until all parties concerned (universities, students, their parents, general public) have had a chance to look at these numbers and give their feedbacks. The HEFRC has yet to decide on appropriate proportions of state : student share of the above RUCs in each field or subject. However, the April 7, 2005 Cabinet Resolution has already given a guideline that, on the whole, the state and student share of the cost of higher education would be 50:50. It is expected that by December 2005, the final RUCs with appropriate state to student share would be officially announced.

9. That should give a very concrete headstart to the full operationalisation of the TICAL Scheme. But the full operation still requires many other preparations. For example, a new IT system must be designed to accommodate new relationships among related organisations namely the Ministry of Education with all universities and the Revenue Department which will have the responsibility of collecting future repayments. A new law has be to drafted and enacted to give government agencies necessary power and legitimacy to enforce the new system. A new quality control of the system must be designed and put in place before the full operation of the TICAL Scheme to prevent any abuse of the new opportunities regarding student intakes and the conduct of university courses. These activities are now being undertaken by various subcommittees appointed by the HEFRC.

10. As the central government budget for Fiscal Year 2006 has already been approved and implemented, this has made it easier for all state universities to carry out their educational programs in the same ways they had done previously. However, some real change must take place for the first year students of Education Year 2006 which will start in June 2006. New RUCs by subject, with specific student's share known should be applied right away. This could mean an increase in the financial burden of students (or their parents) who pay their tuition fees upfront (but with fair discount to compensate for their time cost of money), but this increased tuition fees should not be regarded as financial burden to those students who are unable to pay, or elect not to pay, upfront because they will all receive loans from the government whose repayments are only contingent upon their future income, with no penalty at all for their inability to payback.

11. One sticky issue still remains in the business of budgetary allocation to state universities. As a major part of future funding to universities will be dictated by student choice and student number, this 'demand-side' financing is easy to understand and accepted. But as there is another part of the state budget that goes to universities not strictly on the basis of current choices and numbers of students, but on a separate consideration by the state (so-called 'supply-side' financing) in the areas of infrastructure, procurements, and research funding, the line of authority who should be responsible to decide on how much to give to each university is often blurred. The HEFRC would like to assume this authority in this new financing system, probably through a buffer body that acts on behalf of the government and the universities concerned, but the Bureau of the Budget insists that it still has this power under the present budget law. Eventually the Cabinet may have to decide on this issue if the smooth operation of the new TICAL Scheme is to be successful.

A Participation Model of the Private Business Sector in Management of Higher Education

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Background and Significance of Problems

At present, the Thai Government is trying to promote the participation of private enterprise in the management of higher education in the nation and to promote the adoption of private management styles by public institutions of higher education [The 8th Higher Education Development Plan (B.E. 2540-2544)]. An Education Reform Steering Committee was established on 9 December 2545 to propose a strategy and guidelines for reform of Thai higher education. The following criteria are specified in Strategy 6 : Participation of Private Enterprise in Management of Higher Education (Office of the Education Council, 2546 : 10-11) :

1. Support the private sector to be ready to invest in management of higher education, particularly in offering programs which are in demand by the labor market and society.

2. Allow freedom for participation in the management of private higher education.

3. Support qualified local organizations to manage higher education as required by their localities and communities.

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4. Support collaborative projects between the institutions of higher education and private enterprise, companies, communities, and localities to conduct the missions of institutions of higher education, together with supporting participation in management, control, supervision, audit and evaluation of the operations of institutions of higher education and to contribute money and other assets for education, in order to motivate and encourage participation.

Prof. Dr. Prachya Wesarach (2547:30-31) says of the role of the individual, family and social institutions in providing for education that parents, family, citizens and social institutions participate in various ways. And in order to derive the various benefits of education it must be of high quality and high standard. In addition, these social entities participate in the provision of education, which the private sector, local government or the government provide for their children, as follows:

1. Participation in making decisions concerning the education of their children.

2. Contributing suggestions about curricula, the progress of their children, and daily learning and teaching.

3. Participation in designing curricula and evaluating the results of education involved.

4. Participation in the learning and teaching in the educational institution. The parents may also participate in learning and teaching activities or other activities conducted by the educational institution. If the educational institution has good guidelines, it will lead to good results.

5. Participation in supporting educational activities through contribution of ideas, leadership, serving on committees, attending meetings, giving advice and counsel, sharing information, protecting the institution, contributing financial resources, materials and equipment as well as in operating projects and in public relations.

The 9th Higher Education Development Plan (B.E. 2545-2549) identified the main purpose of higher education as the development of Thai people with competencies, knowledge and valuable skills for developing the country. It specified that the private sector, communities and society should increasingly participate in the responsibility of providing higher education in order to decrease unnecessary educational losses by increasing support to the private sector and to local government. The local community and all concerned parties should participate in establishing the foundation and formulating perceptions for higher education development leading towards international academic excellence and competitive advantage. Graduates thus will have professional knowledge to undertake their careers, and be able to do analytical thinking, synthesis, and have creativity in applying new ways to continuously develop themselves and society with technological capability and communication skills. Moreover, they should be able to create careers consistent with their own needs and international circumstances. It is of great importance that the graduates be responsible, virtuous, ethical, disciplined, proud of their professions, entrepreneurial, leaders, and have good relationships with others, as well as adaptable to changing situations. [The 9th Higher Education Development Plan (B.E. 2545-2549)]

As mentioned earlier, it is clear that private enterprise is an important mechanism in providing higher education for the nation. The preliminary study shows that private enterprise recognizes the importance of participation in higher education management but it is noticeable that in practice there has not been much participation. Therefore, the government should support and promote both production and service industries in the private sector to participate in the management of higher education throughout the nation in order to produce personnel who have the qualifications and competencies that are in demand in the labor market.

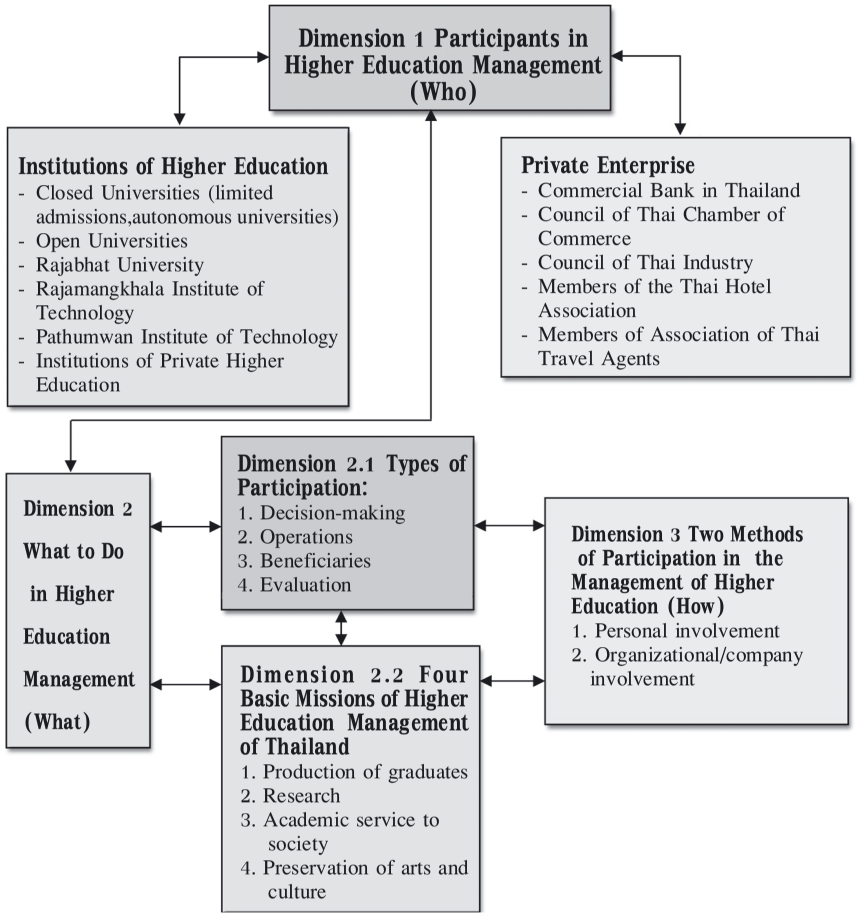
The researchers should further study how much of a role private enterprise plays at present, and what patterns and types of support or participation private enterprise has in the management of higher education. And in the future, how much private enterprise will participate in the management of higher education.

Objectives

This study is descriptive research which aims to study and compare the perceptions of administrators of private enterprise and institutions of higher education concerning models, types and methods of participation by private enterprise in the management of higher education at present and in the future. The study includes predictions concerning the participation of private enterprise in the management of higher education, and proposals of means to promote collaboration between private enterprise and institutions of higher education in the management of Thai higher education.

Figure 1: Model of participation by private enterprise in management of higher education, adapted from Cohen and Uphoff (1980)

Conceptual Framework of Participation Model of the Private Business Sector in Management of Higher Education



Research Methodology

Populations used in this research are divided into 2 groups; 124 administrators of institutions of higher education under the office of Commission on Higher Education and 1,336 administrators of private enterprise. Stratified random sampling was used to recruit 375 people for the study group and Darwin Hendel's table was used to estimate the size of the sample at a 95% level of confidence with a ± 0.025 error factor (www.soonvijai.com). The research team set the criteria by which to study this sample group, while another sample group was studied by number at random. Research data were collected from each of the administrators of private enterprise and institutions of higher education or their assignees. Instruments of research were 2 sets of questionnaires created by the research team. The content of the questionnaires covered research objectives and some portions of the questionnaires were adapted from the Cohen and Uphoff's (1980) participation concept. These questionnaires were tested on 30 qualified people from the sample group. The reliability of the questionnaires, based on Cronbach's Alpha Coefficiency, showed that the questionnaires for administrators of institutions of higher education was reliable at 0.9976 and the questionnaires for administrators of private enterprise was reliable at 0.9887.

Each of the questionnaires was sent via postal mailing to the sample group in private enterprise and in institutions of higher education. Additional information was collected by phone call and by personal contact by the research team in order to get sufficient complete data for analysis as follows: 30 questionnaires of 35 sent to institutions of higher education were returned, which was a rate of 85.7%, while 213 questionnaires the 350 sent to private enterprise were returned, which was a 60.8% return rate. When the research team received the basic data, they sent letters to recruit the sample group from the institutions of higher education and private enterprise to join a focus group to discuss and propose solutions and guidelines to promote collaboration between the private business sector and institutions of higher education. The focus group was composed of 10 people : 5 administrators from institutions of higher education and 5 administrators from private enterprise.

The data were analyzed by using frequency distribution and percentages while the comparison of difference was analyzed by using proportions. Prediction for future participation of private enterprise in management of the 4 main missions of higher education was analyzed by Logistic Regression. And the content of the proposal was analyzed from the focus group.

Summary of Research

General Information Concerning the Sample Group

The data analysis showed that a majority of the sample group from private enterprise was female managers (59.6%) and administrative staff under 50 years of age and a majority of the sample group (70.0%) from institutions of higher education was male administrators over 50 years of age.

Summary of the Results of the Research Based on the Objectives of the Research

Perceptions on Collaboration between Private Enterprise and Institutions of Higher Education in Management of Education in the Present and Future

At present the majority of administrators of private enterprise think private enterprise collaborates in the management of higher education in the three missions of production of graduates, preservation of culture and academic service to society (77.5%, 75.6% and 51.2% respectively). With regard to research, half of those in private enterprise (50.2%) think they collaborate and the other half (49.8%) think there is no collaboration. A greater number of administrators of private enterprise think that in the future there will be collaboration in management of all four missions of higher education.

100% of the administrators of institutions of higher education think that at present and in the future private enterprise has a collaborative role in administration and management of the four missions of higher education, that is, in production of graduates, research, academic service to society and preservation of arts and culture.

Perceptions about the Types and Methods of Collaboration between Private Enterprise and Higher Education in the Management of Higher Education at Present and in the Future

At present the majority of administrators of private enterprise think that they collaborate in the four missions (54.9%, 51.2%, 33.3% and 31.5% respectively) in terms of operation, followed by participating as beneficiaries, decision-makers, and evaluators (31.9%, 23.0% and 22.1%).

At present the administrators of private enterprise think that private enterprise does not collaborate in academic service to society or research, participate in the production of graduates on an individual basis, but participates in preservation of arts and culture an organization or company.

In this regard, as the researchers analyze the data, they conclude that both at present and in the future the private sector will have a collaborative role in the management of higher education without financial expense, as for instance in providing resources for training, and as special instructors or speakers, rather than through financial investments, such as providing equipment for education, funds for construction, or for student or staff scholarships.

The majority of institutions of higher education, over 96%, think that at present private enterprise has collaborated in all areas of production of graduates. However, the administrators of higher education thought

that private enterprise does not participate in the evaluation of research, in making decisions and evaluation with regard to the preservation of arts and culture. The private business sector collaborates in only one respect, as beneficiaries of academic service to society.

The majority of administrators of higher education, 96.7%, think that at present the private business sector collaborates in management of higher education in each of the missions both as individuals, and through organizations or companies, in ways that do not involve financial contributions.

In the future, 100% of the administrators of higher education think that the private business sector will be involved in collaboration and management of higher education in all four missions, through personal participation as well as participation by the organizations, both through financial as well as non-financial involvement.

The Difference Between the Perceptions of Administrators of the Private Sector and of Higher Education Regarding Participation and the Methods of Participation on the Part of Private Enterprise in the Management of Higher Education in the Present and Future

- Both in the present and in the future the administrators of higher education institutions and the administrators of the private business sector, on the whole, think that the private business sector **has a collaborative role in the four missions of higher education,** but at the different proportions with a statistical significance of 0.05.
- And both at present and in the future the administrators of higher education institutions and the administrators of the private business sector, on the whole, think that the private business sector has **participated in administration and management of higher education by individuals and by organizations or companies,** but at the different proportions with a statistical significance of 0.05.

In this respect the proportion of administrators of the private business sector who think that the private business sector participates in the basic missions of producing graduates and preservation of arts and culture is greater than the percentage of administrators of the private business sector who think that the private business sector participates in the other two basic missions of research and academic service to society, both in the present and will in the future. 100% of the administrators of higher education think that the private business sector has a collaborative role in all four missions, both at present and in the future.

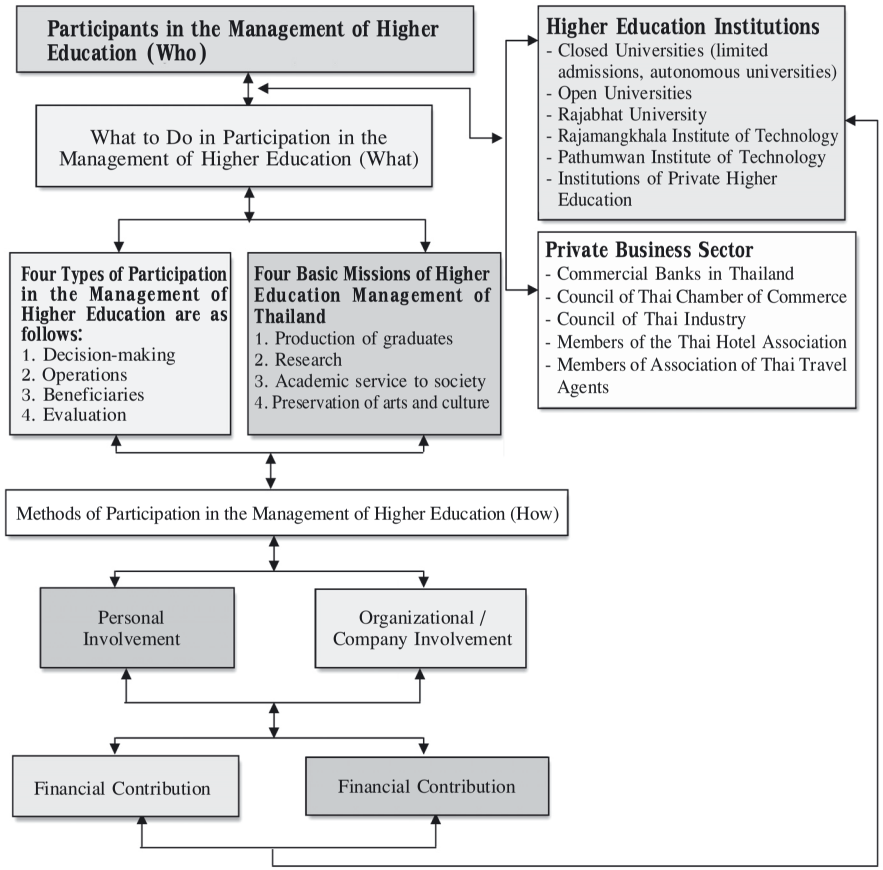
Predictions about Collaboration on the Part of the Private Business Sector in the Management of Higher Education

From a logistic regression analysis it is indicated, based on the participation of the private business sector in the four basic missions of higher education at present, that opportunities for future participation by the private business sector in the management of the four basic missions of higher education can be predicted with a statistical significance at 0.05.

Participation Model of the Private Business Sector in the Management of Higher Education

Based on data analysis of this research, the research team can summarize the participation model of the private business sector in the management of higher education as shown in figure below.

Figure 2: The Participation Model of the Private Business Sector in the Management of Higher Education



Directions in Improving Collaboration between the Private Business Sector and Institutions of Higher Education in the Management of Thai Higher Education

From the focus group of administrators of higher education and the private enterprise, it was learned that in order to improve participation by the private business sector in the management of higher education, institutions of higher education have various options. For example, they could have personnel of the institutions of higher education increasingly engage in conversations and visits to the private business sector; they could invite the private business sector to serve as advisors or members of committees of the institutions of higher education; they could assess the needs of the private business sector before initiating programs of study, for example, assess in what fields there is a need for graduates, and the professional qualifications and competencies they should have. In addition, the institutions of higher education and the companies should collaborate on activities in the community, and provide additional opportunities for students to engage in cooperative study in industry. At the same time, the institutions of higher education should initiate research and development in the areas of production or service which benefit to the private sector.

The private sector should participate in research, by collaborating with the institutions of higher education in designing tools and questionnaires, using simple language with easy-to-answer questions. The private business sector should contribute to the costs of research, scholarships, and funds for educational equipment or equipment for research. The private business sector could participate in joint educational ventures, opening of new curricula or departments that the industrial sector needs, or participate in funding construction of facilities for research or laboratories, or collaborate on research and development of production and service enterprises that would be of value to the private sector or the nation.

Subsequently, the government must improve the incentive in order to enhance and encourage private enterprise, companies, or individuals to financially contribute to higher education through personal income tax and corporate tax incentives for contributions to institutions of higher education.

On the whole, the administrators of institutions of higher education and the administrators of private enterprise agree that there are four types of participation by private enterprise in the management of the four missions of higher education, through operations, decision-making, evaluation and through receiving benefits, and that there are two methods of participation, which are, by individuals, and by companies and organizations. Base on the research findings, the researchers have made specific recommendation for higher education institutions, private enterprises, and government.

In summary, the purposes of the research on the models for participation by private enterprise in the management of higher education are a study of the perceptions of the administrators of institutions of higher education and the administrators of private enterprise about participation, the types of participation by private enterprise in the management of higher education in the present and in the future, and a comparison of the perceptions of administrators of institutions of higher education and administrators of private enterprise about participation and the types of participation by private enterprise in the management of higher education, predictions about participation by private enterprise in the management of higher education, and recommendations about directions for promoting collaboration between private enterprise and institutions of higher education. The researchers created two sets of questionnaires to use as research tools, and tested the reliability of the questionnaires by using Cronbach's Alpha Coefficient reliability test. The sample groups consisted of 30 administrators of institutions of higher education and 213 administrators of private enterprise. The data were collected by mail, by phone, by individual retrieval, and from a focus group. The research revealed that administrators of private enterprise and administrators of institutions of higher education think that private enterprise already participates in management of the four basic educational missions both at present and will continue to do so in the future. Private enterprise participates in four ways, which are, in the operation, decision-making, evaluation, and in receiving benefits. The methods of participation are on the part of individuals, and by companies or organizations. The researchers proposed recommendations and guidelines to promote participation by private enterprise in the management of education, and made policy recommendations to the Thai government that increased tax incentive be enacted for private enterprises which make donations to higher education institutions. This should enable institutions of higher education to produce effective, valuable graduates at the standard and with the competencies needed by public and private enterprises, and it should enable Thailand to be proficient and have a competitive advantage on the world stage.

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Leadership Development in Higher Education

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Organization success is not the work of a single person. Rather, it involves the ability of an individual to influence, motivate, and enable others to contribute toward the effectiveness and success of the organizations which they are members. This ability is defined as leadership. Leadership is an influence process in which leaders and followers work together for the desired organizational change. No matter how one defines leadership, it typically involves an element of a vision which provides direction to the influence process. Leaders can have one or more visions of the future to aid them to move a group successfully towards this goal.

This article is based on the study on Leadership Development in Higher Education in the United States, United Kingdom, Canada, Australia and Thailand sponsored by the Office of the Education Council under the Thailand-US Education Roundtable Discussion project. The purposes of the study are to survey the current practices in selection and appointment of chief academic officers, leadership and managerial skills development models used in those higher education institutions and the strength of those models.

The paper is divided into three parts, namely 1) leadership and managerial skills development models in higher education institutions in the United States, United Kingdom, Canada, Australia,

2) leadership and managerial skills development models in Thai higher education, 3) common practices and recommendations for national policy and strategic plan for quality improvement of higher education, and competitiveness of the country in the globalized world.

By nature, higher education institutions are complex organizations. Each institution has their own missions and visions to accomplish. They are work places for knowledgeable persons and experts in different academic disciplines. Each academic discipline has their own education and training specifics. To fully utilize their expertise, one needs to understand the nature and ability of organizational members. Of course, it is not mechanical, hierarchical and controllable like industrial paradigm. Rather, it is collaboration, power-sharing facilitation and empowerment. Effective leadership in higher education is to be shared among all members of the institutions. Undoubtedly, one of the main functions of the institutional leaders is to seek cooperation from faculty members to accomplish the institutional goals and to strengthen the institutional infrastructure. It is believed that the strength of the university depends on the strength of its members. And the future of the nation depends on the strength of higher education.

From a survey of related literature on higher education in the twenty first century, it was found that change is the name of the game for higher education institutions around the world. And much of the change is driven by market forces, changing societal needs, advanced communication technologies, limited resources and changing state financing system to students and universities, government administrative reform for cost effectiveness and accountability, to name a few. In response to those challenges, it is necessary that higher education institutions must manage themselves efficiently, perhaps to redefine their missions and visions so that they continue to serve the public well and to be competitive in the real world.

In addition, as the world enters the twenty first century and becomes knowledge-intensive society, it is certain that the need for advanced education will be greater in the decades ahead, both for individuals and society at large. Thus, the critical issue for higher education is how university transforms itself to serve the changing world and by whom, and at the same time, to preserve the values, principles so essential to academic learning, i.e. the freedom of inquiry, an openness to new ideas, a commitment to rigorous study, and a love of learning.

Leadership and Managerial Skills Development Models in Higher Education Institutions in the United States, United Kingdom, Canada, Australia

The result of the study showed that quality is the key of higher education management for academic advancement to respond to the need of society and expectation of all stakeholders. Quality of higher education comes from quality of personnel, curriculum, learners, as well as supporting systems and academic environment of each institution.

The study of UNESCO classified university management into two types, i.e. university-company and university-society. Both approaches are used by higher education institutions. Leadership development models in the selected overseas institutions, both university-company and university-society, aimed at internationalization. Recruitment of important senior management positions and professors is open for candidates at institutional, national and international levels. And the government has an important role in supporting higher education quality improvement. Canadian Government, for example, strengthens quality of higher education by offering scholarships to outstanding students from all over the world to study and to be a research team of

university professors, founded Canada Foundation for Innovation in 1997 and Canada Research Chair and Genome Canada in 2000, Canada Graduate Scholarship in 2003. In selecting the president, the University of British Columbia Council, for example, will identify necessary qualifications of university president to ensure continuity of university development and research excellence in all areas.

The University of Pennsylvania in the United States has a clear policy to recruit and maintain the brightest as faculty members. From their experience, a good mentoring system at departmental level is the key success factor of all faculties. The University Strategic Plan 2003 stated that "nothing is more important to maintaining the reputation of the University than selecting and maintaining the excellent professors. The excellence is reflected in quality of the programs at undergraduate and graduate levels, including the career oriented programs that University offers to produce the future instructors, practitioners, and research work of the University. Quality of faculty members, research work, undergraduate and graduate degree programs and career oriented programs are indicators of University reputation, university force, university attractiveness, and competitiveness". Quality improvement must be carried out systematically at an institutional level. Quality is meant to both product and processes, from input to output.

For Australia, the Government has a blueprint for higher education reform package: *Our Universities: Backing Australia's Future.* It proposed increased Commonwealth investment in approximately $ 1.5 billion over four years linked to reforms in areas as diverse as teaching, workplace productivity, governance, student financing, research, cross sectoral collaboration and quality. The aspirations they hold for Australia, i.e. the standard of living enjoyed by the citizens and its values, will be largely driven by research, teaching and scholarship undertaken by Australian universities. To promote

and support strategic change in higher education institutions for enhancement of learning and teaching, including curriculum development and assessment, the Australian Government has approved the establishment of the Carrick Institute for Learning and Teaching in Higher Education. The values of the institute are inclusiveness, long-term change, diversity, and collaboration.

In addition, Commonwealth has developed a set of National Governance Protocols for Public Higher Education Institutions. The protocols will strengthen university governance by increasing the responsibilities of university councils in overseeing commercial activities, requiring councils to discharge these responsibilities in a transparent way and ensuring the protection of public interest. The protocols will require universities to specify the duties of their council members, and have in place a formal program of professional development for council members.

The case of Indiana University in the United States which is a multi-campus, comprehensive university, administrators realized the strategic roles that the faculty play in the future of higher education. Therefore, the university created the Faculty Leadership Institute Model in 1996 and allocated fund to encourage faculty to seek an understanding of national issues and institutional needs and then to lead out on issues beyond their department or school. There are three strands of activities. The first strand of sessions explores avenues for the development of faculty leadership within the faculty ranks as teachers, scholars, and campus "citizen". Leadership has been defined as distributive leadership and participants are encouraged to embrace the model to create change within their institutions. The second strand investigates current issues in higher education. It is the goal of the institute to introduce faculty to a body of literature outside the realm of their academic discipline and encourage them to continue to stay abreast of new development by subscribing to the

professional journal. The third strand is devoted to the development of campus team projects so that the faculty have an opportunity to exercise their leadership when they return to their campus.

University of Sunderland in the United Kingdom which has reputation for enterprise, employment and opportunity, has committed to staff training and development at every level and allocates two to four per cents every year of the revenues for the purpose. University values that reflect the character of the institution are the core university culture that promotes continuous learning. The university has three training programs, i.e. (1) general staff development (2) academic activity (3) management development. All activities are organized by the personnel office and the schools. The university has developed strategic plans for organization development and uses appraisal scheme to evaluate performance of the institution and the employees every year. The appraisal reports are sources of information for personnel development plan. Furthermore, the University of Sunderland has cooperation with other universities in the region, comprising North Thumbria, New Castle, Durham to organize Leadership and Administrative Management Program, and with the Leadership Foundation for Higher education for Senior Management Development Opportunities. The foundation was established as a company limited by a registered charity. It provides a dedicated service of support and advice on leadership, governance and management for all UK's universities and higher education colleges. It is committed to developing and improving the management and leadership skills of existing and future leaders of higher education. In the first three of four years phase, the major program of development is supported by ten million pounds from the four funding bodies.

Leadership and Managerial Skills Development Models in Thai Higher Education

The result of the study revealed that the selection process and appointment of institutional top executives of state universities and private ones are different. State universities follow their own constitution. Their common practice is an appointment of a search committee to select qualified candidates and propose a short list to the university council for consideration and appointment. As to private institutions, the selection process, appointment and term of top executives depend on the type of ownership. Some prefer appointment of qualified persons from within. It is believed that candidates from within know their institutional culture better. The university core values are continuity, teamwork, and distributive leadership. Leadership development models at an institutional level normally comprise skill training and knowledge development organized by personnel department at faculty level or by the human resource development center of the university.

There is cooperation among higher education institutions, both public and private, on a geographical networking to plan, manage and deliver the mission of the network, e.g. research projects to support local area development. These higher education institutions networkings are supported financially by the government budget. This is one model of leadership development in Thai higher education, i.e. to work in teams and share knowledge and skills among researchers, practitioners, local people and to train junior researchers.

At national level, there is a strategic plan called Wisdom Thailand 2015. It is a long term plan for manpower requirement for Thai higher education, in preparation for knowledge based society which needs universities to be a national mechanism for national strategic development. Universities must reform themselves to improve quality and management efficiency and effectiveness to attain

international standard. In addition, there is a training curriculum for development of university administrators organized by the Ministry of Education started in 1999. This training program consists of class lectures, case studies, and field trips to local institutions and overseas. Furthermore, the Ministry of Education in cooperation with the Governments of United Kingdom, Australia, for example, organized administrators' shadowing program. From the project evaluation report, the participants found it very useful. They gained new ideas to develop themselves and the institutions. The Thailand-US Education Roundtable Project is another leadership development model for Thai and US scholars and administrators to work together to create more understanding and share interest in common areas to advance knowledge in selected fields.

Common Practices and Recommendations for National Policy and Strategic Plan

From the study of leadership development models in overseas higher education institutions and in Thailand, it was found that:

1. The acquisition process of top executives in higher education institutions depends very much on the institutional constitutions and practices. It can be one of these measures, i.e. by appointment, by search committee, or by election. Some overseas institutions open for applications from outside candidates, local and international, given their qualifications fit the position. Some Thai universities open the positions for outside candidates as well, but not overseas. This may be due to language and culture barriers. It should be noted that the principle of "fit for purpose" in screening the right candidate means that the successful candidate must be able to carry out the mission of the university according to the strategic plan, or to develop a university strategic plan to achieve the university goal. His or her performance will be assessed periodically.

2. Higher education institutions, both overseas and local, have responsible units to organize personnel development and training programs. The difference is in the development strategies and measures, depending on the institutional management models and philosophy. Some institutions have utilized distributive leadership model by involving faculty members in solving the institutional problems that they indentified important, while others recruit the brightest to be faculty members and created a mentoring system by assigning senior professors to be supervisors of the new instructors at the departmental level.

3. The governments of the selected cases value the importance of higher education and believe that quality of higher education is the future of the nation. Therefore, the governments have policy to increase the potential and efficiency of universities, by reviewing the scholarship programs, internationalization policy, networking, leadership development. At the same time, universities have reviewed their institutional mission and vision to serve the changing society well. It should be noted that research capability in all fields of study and strategic plans have played important roles in university leadership development. For Thailand, the Office of Higher Education Commission has drafted a strategic plan comprising eight strategies. i.e. manpower development, quality of higher education, research and development, faculty development, financial reform in higher education, administrative reform, teachers production and development program, and participation of private sector in educational management.

4. The roles of professional associations in the selected cases overseas are strong. They are more proactive that can lead the government on the public policy issues on higher education, create unity among members and have close relationship with the government on related higher education policy.

5. The relationship between the governments and higher education institutions in terms of budget allocation, it was found that some central governments, eg. the United States would support research projects of the institutions mainly, and some government special policy, while the local ones support part of the annual institutional budgets. For Thailand, direct financial support from the government to the government higher education institutions is presumably on a decreasing trend, like that of overseas. This is a critical issue for university administrators.

6. From the study of the cases, developing the strength of higher education starts from bottom up and top down policy, meaning the institutions and the governments must realize the importance of higher education that it is the future of the nation. Higher education in the twenty first century really needs to reform itself as knowledge will be the key factor in driving economy. How the institutions transform themselves to be able to serve the society well in the twenty first century is a challenge. Some of the characteristics of universities in the twenty first century are:

1) Higher education institutions must be dynamic and all personnel are equipped with skills, knowledge, expertise, and attitude for change. Change from within is desirable as university is a complex organization that needs cooperation from all concerned to accomplish the vision and mission of the university. Organization leaders at all levels, from top to bottom, need to have strong leadership skills that can lead, motivate, set good examples to their members. Like change process in other social institutions, universities have to start reviewing their mission and vision for the twenty first century, taking into consideration outside factors affecting their mission delivery. Certainly, reputation of universities comes from quality of professors and support staff. The truth is universities not only train and produce manpower for the country, but also for themselves.

2) Universities in the twenty first century need to have networkings with local and overseas and to be able to accommodate the different practices among member institutions. Some of the differences are institutional rules and regulations, cultures, thinking paradigm of each discipline, to name a few. This is a challenge task for university leadership development in the twenty first century. It is on the trend that leadership in the new century will be more collaboration rather than competition and conflict.

3) Higher education in the twenty first century is not only for special talented groups but whoever wants to study in higher education can do so. Therefore, universities have to be prepared for new demand of society, new demand of students, while maintaining quality of the educational programs. If academic quality and expectations of the student inputs have changed, then the techniques of teaching of instructors need to change accordingly. Undoubtedly, instructors need teaching techniques training to teach diverse ability groups of students, like the case of Australia project. Universities in the past were more reactive than proactive to changes. More importantly, the majority of higher education institutions are not aware of the impact of knowledge era and learning society to be their future.

4) University Council will play more active role in supporting university strategic development plan and policy decision to strengthen university governance and to protect public interest at the same time. University Council members will have more responsibilities in supervising university main functions on academic as well as operations matters, eg. to be chairpersons of the university development committees, i.e. academic standards, financial plan, strategic plan. University Council should consist of knowledgeable members from outside who have experiences that benefit university development and can help university with networking with the outside world.

5) Higher education institutions must review their missions, the key roles and values that should be preserved during the period of change or transformation. Who are the target groups of students and their areas of excellence. Research work must be oriented more towards possible applications for research and teaching and its contribution to the solution of problems in industry, society and politics.

What Role the Thai Government should Play in Leadership Development in Thai Higher Education

From the study, it is recommended that the Thai Government should consider the following issues.

1. Under the national budget constraint, and the increasing numbers of higher education institutions, the government should have a mechanism to regulate manpower planning for higher education. At present, there are four groups of higher education institutions, namely, the government regulated and autonomous universities, the Rajabhat Universities, the Rajamangala Universities of Technology, and private universities and colleges. It will benefit the higher education institutions if the government states explicitly the roles of each group of institutions to complement each other for country development. What is the role and accountability of government institutions that receive budgets from government and what is the role of private institutions. In the twenty first century, strategic move in strengthening higher education is essential.

2. It is recognized that higher education is the future of the nation. If higher education is weak, it will affect the strength of the country long term. By nature, university is an academic intensive organization that needs brightest manpower that can further the core values of higher education and create innovation and knowledge for society. The government can help strengthen higher education to serve the country well by reviewing and supporting continuous scholarship programs for the brightest young people, and research grants to universities. This is very important for every government to run the country, especially in the knowledge driven society. These scholarship recipients can return to work at institution of their choice.

3. Excellence in higher education is expensive. Higher education institutions need excellent professors, state of the art laboratory equipments, adequate financial support, and good communication information technology. The government should set policy on centers of excellence that correspond to the need of the country development. Higher education is the key to national progress. The government can invite private institutions to propose a project to be a center of excellence if they are ready and the government provides a matching fund. This approach will benefit both parties.

4. To promote change in higher education is to provide management training programs for senior executives as well as professors. In the turn of the century, change is inevitable. One of the alternatives is to establish an organization to be a center of training in order to plan and deliver short courses, certificate programs, exchange or cooperative programs with overseas universities.

Royal Diamond Jubilee's Strategic Knowledge Consortia: A Program for Development of University Faculty for Enhancing Competitiveness of Thai Higher Education

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Introduction

Presently, the overall quality of Thai higher education is significantly lower than the international standard. Several key performance indicators have indicated undesirable figures. These include low ratio of faculty with doctoral degrees and professorship, low number of publications, patents and R&D / innovation, and low efficiency of Ph.D. graduate production. This situation has generally affected the quality of research, teaching and academic services in many universities. As a result, the Thai higher education has been relatively inefficient in responding to the government's strategic plan on the enhancement of the country's competitiveness.

Human resources in higher education, especially those who are faculty members and academic staff, are very important for the production of high level manpower, and discovery of new knowledge. At present, the academic staff with Ph.D. degrees in the Thai higher education institutions accounts for only 25 per cent of the overall academic staff. It is, therefore, an urgent need for Thailand to develop this group of human resources.

The main strategy on the academic staff development has been proposed by the Education Reform Steering Committee, Minister of Education and approved by the Cabinet since 16th September 2003. To translate such strategy into action, the Commission on Higher Education has developed a project entitled "Royal Diamond Jubilee's Strategic Knowledge Consortia : A Program for Development of University Faculty for Enhancing Competitiveness of Thai Higher Education". This paper describes the concept, objectives and scope of activities of the program.

Project Purpose

The main purpose of this project is to speed up Thailand to the knowledge-based society. The project concept is integration of human resource development activities with knowledge creativity. This will be implemented by establishing various "problem-based" consortia which pool experts within country and establishing exchange collaboration relations with world-leading universities to stimulate nurturing highly-qualified human resources.

This program is expected to create environment in which graduate students can exert their efforts mainly on research and study. They will be provided with sufficient stipends and financial support for overseas studies of both "sandwich" and "full time" types.

Each strategic consortium will pursue co-development of curriculums with world-leading universities, distance learning, Faculty/Student exchange programs, and mandatory publication of Ph.D. thesis on international journals. Moreover, relationship with industries/ communities will be strengthened by conducting collaborative research. Infrastructure for graduate school such as laboratories, equipment, e-library will be supported.

Types of Support

Applicants must form a research team with certain number of researchers. It can also be a group/network among universities. For management, a group of scientists, technologists, experts from inside/abroad, entrepreneurs, foreign scholars with form a committee for each consortium. Through open competition, the committee will select 2 or more researcher teams per field or area for ensure competition between the research teams. Simultaneously, the committee will conduct follow-up reviews.

Research groups/universities will be supported financially in establishing relations with world-leading universities for International Exchange Program or Collaborative Research Program. The financial support includes scholarship, stipend for Post-doc., and research facilities. For university-industry relation, both university and industry are encouraged to jointly develop research topics.

Networking

Establishing research networks with world leading research groups/ centers of excellence/universities in each strategic consortium are encouraged to run joint research program with any world leading universities to enhance international competitiveness. Research internships for graduate students will then be introduced using credit exchange program.

Expectations

- Produce/train 9,600 Ph.D.s within 6 years
- Develop 2,800 academic staff
- Publish 12,000 international research articles
- Produce 80 industrial products/patents
- Create 500 international research consortia
- Establish 60 centers of excellence in Thai universities

Scope of Activities

The Commission of Higher Education has targeted what it considers the five most important clusters, with twenty consortia, necessary to enhance national competitiveness in the 21st century. The clusters covering from science & technology to art and social science, and the consortia are grouped by convergence of a wide range of disciplines. These include:

1. New Frontier Research

This group puts emphasis on new sciences and future trend of world. It comprises 4 consortia :

- Alternative Energy
- Nanomaterials and Devices
- Converging Technologies in Health Sciences
- Science and Technology for National Defense and Security

2. National Economy Base

This group puts emphasis on increasing productivity and capacity under government's strategies. It comprises 6 consortia :

- Food, Herb and Fruit Safety
- Enabling Technologies for Advanced Agriculture
- Gems, Ornaments and Fashion
- Software and Digital Technology
- Standardization and Instrumentation in Science Technology

- Logistics, Transportation and Aviation

3. Knowledge and Resource Management for Country Security

This group comprises 6 consortia :

- Emerging Diseases
- Biodiversity Conservation and Utilization
- Innovation in Chemistry
- Environment and Emergency Management Technology
- Innovation in Education and Knowledge Management
- Intellectual Property and Knowledge Commercialization

4. Culture and Society

This group comprises 2 consortia :

- Languages, Culture, Art and Indigenous Knowledge
- Social Sciences

5. Special Group for Strengthening Basic Science of the Country

This group comprises 2 consortia :

- Mathematics
- Physics

Scopes and disciplines in the 20 strategic consortia are summarized in the following Table.

Table 1: 20 Strategic research consortiums with scopes and potential disciplines involved

New Frontier Research

Consortium	Scope	Supporting Discipline/Subject
1. Alternative Energy	Solar Energy, Advanced Battery, Bio-Diesel, Fuel Cells, Gas to Liquid Conversion, Pemonalized Energy, Hybrid Technology, etc.	Electrical Engineering, Materials Science, Biotechnology, Microbiology, Agriculture, Physics, Chemistry, Biology, etc.
2. Converging Technologies in Health Sciences	Artificial Sensing, Man-Machine Interface, Nanobiotechnology, Gene Therapy, Artificial Brain, Sensor Networks, Universal Memmory, Omnipresent Computing, Intelligent Computing, etc.	Nanoscience, Bioinformatics, Biomechatronics,Cybernatics Cognitive Science, Neuroscience, Computer Science, Medicine, Mechanical Engineering, Electrical Engineering, Mathematics, Physics, Chemistry, Biology, Medical Biotechnology etc.
3. Nanomaterials and Devices	Drug Delivery System, Biomedical Sensor and Diagnostics, Anti-Aging, Optical Magnetic, Electronic Materials Nanoelectronics, Quantum Wire	Materials Science, Electrical Engineering, Medical Technology, Pharmaceutical Technology, Physics, Chemistry Biochemistry, Medical Biotechnology, etc.
4. Science and Technology for National Defense and Security	Anti Bio/Chemical Warfare, Chemical and Biochemical Sensor, Advanced Warrior System (Soldier Suits etc), etc.	Military Science, Biochemistry, Materials Science, Microbiology, Engineering, GIS, Remote Sensing, Physics,Chemistry, Mathematics, etc.

National Economic Base

Consortium	Scope	Supporting Discipline/Subject
5. Food, Herb and Fruit Safety	Food, Herb, Fruit Specification, Processing, Packaging, Toxicity, Functional Foods, Quality Evaluation, Nutraceuticals, etc.	Food Science, Food Technology, Toxicology, Botany, Pharmacognosy, Chemistry, Pharmaceutical Botany, Microbiology, Toxicology, Agriculture, etc.
6. Enabling Technologies for Advanced Agriculture	Post-Harvest, Agro-Industry, Precision Farming, Organic Farming, Fishery Agricultural Economics and Marketing, etc.	GIS, Animal Production, Plant Production, Genetic Engineering, Agricultural Engineering, Fishery Science, Veterinary, etc.
7. Gem, Ornaments and Fashion	Design, Color, Patterns, Silk Products, Jewelry, etc.	Geology, Physics,Chemistry, Textile Technology, Design, Architecture, Fine Arts, Textile Engineering, etc.
8. Standardization and Instrumentation in Science & Technology	Analytical Instrumentations, Scientific Equipment, Calibration, Standardization, etc.	Chemistry, Mechanical Engineering, Physics, Mathematics, etc.
9. Software & Digital Technology Software	Multimedia, Digital Entertainment, etc.	Computer Science, Computer Engineering, Information Technology, MIS, etc.
10. Logistics, Transportation, Aviation, Traffic	Logisties, Transportation, Aviation, Traffic, etc.	Transportation Engineering, Management, Administration, etc.

Knowledge and Resource Management

Consortium	Scope	Supporting Discipline/Subject
11. Emerging Diseases and Bio-Warefare	Emerging Diseases (eg. SAR, Bird Flu, etc.)	Molecular Biology, Immunology, Microbiology, Biochemistry, Pharmacology, Pharmacognosy, etc.
12. Bioresource Conservation and Utilization	Biodiversity, Ecotourism, Biodiversity-Based Economy, Bioresource, Eco-Technology, etc.	Taxonomy, Biology, Ecology, Systems Biology, Microbiology, Zoology, Genetics, Botany,Paleontology Education, Molecular Biology
13. Innovation in Chemistry	Lab-on-Chip, Microtatal Analysis Biotransformation, Combinatorial Synthesis, Combinatorial Biochemistry, Molecular Modeling , Natural Products, High-Throughput Screening, etc.	Chemistry, Biochemistry, Pharmacognosy, Bioinformatics, Mathematical Modeling, Natural Product Chemistry, etc.
14. Emergency Management & Technology	Crisis, Disaster, Mob, Forest Fire, Tsunami, Earthquake, Diseases, Atmospheric Science Geo Computing & Modeling, 3-D Full Scale, Earthquake Testing, etc.	Geology, Climate Science, Mathematics, Remote-Sensing, GIS, Forestry, Biomedical Sciences, Geography, Astronomy, Mathematies, etc.
15. Education Innovation and Knowledge Management	Knowledge Management, Research Management, Knowledge Documentation Communication Knowledge, MIS, Publications, Lifelong Education	Management, Communication, Journalism Information Education, MIS, etc.
16. Intellectual Property and Knowledge Commercialization	IP, UBI, Enterprises Entrepreneurs, Technology Liscensing, Technology Transfer, etc.	Business 2 AD Ministration, Law, Technology Economy, Technology Management, Management Science, etc.

Culture and Society

Consortium	Scope	Supporting Discipline/Subject
17. Languages, Culture, Art and Indigenous Knowledge	Diversity of Languages, Cultures, Arts Indigenous Knowledge	History, Cultural Study, Languages, Philosophy, Arts, Indigenous Knowledge, Tourism
18. Social Science	Social Science	Various disciplines in Social Science

Special Group for Strengthening Basic Science of the Country

19. Physics	Development of Physics in education, curriculum, knowledge and human resources	Physics, Physical Education
20. Mathematics	Mathematics	- Mathematics - Math. Education

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Science Education

The Third Thailand–US Education Roundtable

Science and Technology Manpower Development Roadmap of Thailand[1] (2006–2013)

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Manpower Policy in Science and Technology

Science and technology (S&T) manpower is one of the most important factors in building up science and technology capability which is a key driving force for sustainable economic and social development. However, during the recent years Thailand's performance in S&T has been unimpressive. This trend can be observed from its low position in the league tables ranked by the IMD (International Institute for Management Development). There are a number of reasons for such a weak performance. Among those, one major constraint is that of human resource or manpower. Although, indeed, Thailand is experiencing S&T human resource constraint in terms of both quantity and quality, the latter is particularly emphasized in the roadmap. The priority is given to development of high-performance young people who are in the system of formal education as well as knowledge and skill upgrading of those who are already working in both public and private sectors.

[1] Summary of the first version of roadmap by the subcommittee for Science and Technology Manpower Development Subcommittee, under the National Science and Technology Policy Committee (NSTC)

The problem of S&T manpower development in Thailand is partly a result of failure to effectively respond to the future demand. This may be because, by its nature, development in S&T is very much dynamic and fast changing. Accordingly, successful S&T manpower development needs to be a "proactive", rather than a "responsive" planning as Thailand has been practicing hitherto. The proactive planning not only aims at providing short-term solution for current shortage of S&T personnel but also preparing manpower to meet future development demand.

While demand for S&T manpower for the future appears to grow rapidly, capacity of domestic supply seems to be limited both quantitatively and qualitatively. The constraint tends to be more intense at highly skilled levels (Master and Doctorate level). During 1993-2001, domestic higher education institutes can produce on average about 41,000 graduates in S&T annually. However, the production capacity of S&T postgraduates has been very low. Only about 3,600 master's degree graduates and 200 Ph.D. graduates can be produced yearly. The supply problems are also found at the level of technical colleges. While in terms of quantity supply appears to have been exceeding demand, there has been quality problem for quite some time. In 2003, there were 439,000 vocational technicians produced, but there were complaints from employers that most of the newly vocational graduates lack industrial skills and competence to learn new things. They should be taken more training their skills and knowledge to match with their jobs.

In the past, manpower development in Thailand was largely done in a responsive manner to meet needs instantly. Little effort was paid at producing manpower to drive development of new industries or existing industries towards higher value-added ends. Even in such a "responsive" fashion, the current production capacity of S&T manpower is still unable to reasonably satisfy industrial needs in terms of quality. Moreover, as it usually takes considerable time to complete a four-year bachelor's degree, two-year master's degree and three to five-year doctorate degree, development of manpower for future demand needs to start as early as possible. Otherwise, Thailand will keep stuck in the cycle of inability to effectively develop industrial sector toward higher value-added or innovative industry. The ability to shift from low value-added activities towards high value creation is becoming a key competitive determinant for the Thai economy.

Manpower development needs to be done in parallel with development in other areas. Therefore, HRD policy cannot be formulated and executed independently. It needs to be linked particularly with policies to develop production and service sectors. That is, development targets of the production and service sectors have to be taken as key proposition for HRD planning in order that the future demand for S&T manpower in terms of both quantity and quality can be fulfill effectively. On the other hand, without sufficient and capable manpower, it is hard to expect achievement on targets set by industrial sector. On the other hand, policy to guide development of industrial sector, there will be no appropriate market for manpower produced. This will bring about the problem of supply exceeding demand and as a consequence that will be high possibility of the so-called "brain-drain" phenomenal.

The main targets of this roadmap are derived from target setout in the National S&T Strategic Plan (2004-2013). These include an increase in the ratio researchers per 10,000 populations from 6.7 to 10 by 2013. It is also expected that by 2009, industrial sector will demand additional 200,000 science and technology manpower in general.

The roadmap covers development of S&T manpower from primary school level up to postdoctoral level and includes upgrading of

manpower in industries. The targets set out for the eight-year development (2006-2013) are as follows:

1. To have at least 10 research personnel per 10,000 populations (around 65,000 research personnel in total)

2. To have sufficient high quality science and technology manpower to satisfy industry requirement

3. To develop Thailand as the center for scientific and technological education in potential areas such as food technology and biotechnology in Southeast Asia

4. To at least upgrade 75% and 30% of S&T lecturers in 24 main public universities and in Rajabhat universities and Rajamangala universities respectively to Ph.D.s

5. To have high quality and adequate number of S&T teachers

To achieve the targets above the roadmap proposes seven development programs including:

1. Developing S&T gifted and talented young people

2. Expanding S&T education opportunity for all

3. Capability building for S&T teachers

4. Upgrading S&T skills and knowledge for personnel in industries

5. Developing Thailand to become center of education in potential areas in Southeast Asia

6. Constructing a permanent body responsible for S&T manpower development

7. Reinforcing formulation and implementation of policies in relatedareas to support S&T manpower development

The Subcommittee for S&T Manpower Development (STMD) will be responsible for coordinating, overseeing and monitoring execution of Programs 1-6. As for Program 7, STMD will coordinate with relevant subcommittees under NSTC, namely: Subcommittee for S&T Infrastructure and Institutional Development and Subcommittee for S&T Management System Development to reinforce policy formulation and implementation to support development of S&T manpower.

In the first phase (2006-2009) priority will be given to Programs 1 and 4. These two programs are the ones showing promising high impact for economic development. Execution of all programs in the first phase will require total budget of about 46,621 million baht (25,590 million baht for Program 1; 1,463 million baht for Program 2; 11,374 million baht for Program 3; 7,603 million baht for Program 4; 590 million baht for Program 5; and 1 million baht for Program 6). In the second phase (2010-2013), although it is not yet able to set an exact budget for each program, it is estimated that the total budget required for execution of all programs throughout the eight-year period (2006-2013) will reach 92,220 million baht. An expected output of this investment is production of additional 18,300 research personnel and 14,200 Ph.D. graduates.

Thai School Science Education 1999–2005 *

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Science Education in Thailand–An Overview

The Context of Science Education

Education Administration at School Level

Education administration at the school level is mainly the turf of the Ministry of Education; a relatively small number of schools are administered by other ministries. For the purpose of school management, Thailand is divided into 175 education areas. The government primary schools and secondary schools are under the jurisdiction of the Basic Education Commission, while private schools come under that of the Office of Permanent Secretary, Ministry of Education. All government schools are allotted annual budgets from the Ministry of Education. Thus, all primary pupils have free access to what is considered compulsory education. Once in secondary level, students are required to pay tuition fee, however minimally.

* In analysis and synthesis of this paper, the author used the following 3 research studies:

1. "Science Education Reform in Thailand", presented at the First Thailand-US Education Roundtable;

2. "Second International Science Study (SISS) to Third International Mathematics and Science Studies (TIMSS) (Science Education in Thailand: The results from SISS to TIMSS)", presented at the Second Thailand-US Education Roundtable; and,

3. "Development and Promotion of Talents in Science and Technology", presented at the Third Thailand-US Education Roundtable.

School System

The current Thai school system is a 6+3+3 structure. That is, 6 years of primary education, 3 years of lower secondary education and 3 years of upper secondary education. All 7-year-olds are required to enroll in grade 1, the beginning of the compulsory primary education but this rate decreases at higher levels to approximately 50-60% at upper secondary level.

School Science

Schools all over the country have the right to develop their own working curricula based on the national content standards as set by the Ministry of Education. Students begin to study science at the first year of their primary schooling. At the secondary school levels, lower secondary students study general science as a single subject. The upper secondary education branches into academic and vocational streams. In the academic stream, science students follow coursed in physics, chemistry, biology and environmental science. Science curricula for vocational students are however designed to provide students with the appropriate foundation for their chosen professional courses.

Science Curricula

Science Curriculum Development

A number of government agencies are involved in science curriculum development in Thailand. Before the year 1999, the Department of Curriculum and Instruction Development at that time defined the curricular structure and scope, and the Institute for the Promotion of Teaching Science and Technology (IPST) was responsible for the development of curricula and instructional materials including teaching-learning activities corresponding to the prescribed structure

and scope. At present, the Basic Education Commission, in association with the IPST defines the curricular scope, and the schools are responsible for the development of their own implemented curricula.

Curriculum Content

The science curriculum science content aims at enabling students to learn about problem-solving processes, emphasizing the application of scientific process skills for quality of life. Learners' understanding of the basic principles and theories, as well as the nature, scope and limitations of science, are the goals of secondary level science. At the same time, students are expected to acquire research and intellectual skills. They should also become rational and receptive to opinions and comments of others, and able to apply the scientific process in solving problems. Eventually, they should develop a keen interest in science and realize the relationships between science, technology, mankind and the environment. Ultimately, they must be able to apply their knowledge and understanding of science and technology for the benefit of their society and their own living.

Teaching–Learning Process

Different teaching-learning processes have been developed, trialed, and later on introduced to teachers so that they are able to apply scientific processes in their teaching of science. These processes are introduced in textbooks and teacher guides alike. A study on science teaching-learning in Thailand reveals that these processes are already in use, however to a limited extent. The study reports that science teaching-learning in Thailand needs to be further improved in both content and scientific process.

Instructional Materials

Printed school science instructional materials currently in use are consistent with the enquiry method, a learner-centered approach, which enables students to derive knowledge from their own practical experiences. Teachers have the freedom to develop their own teaching materials and choose what they want to use from the numerous available audio-visual aids and laboratory equipment that are mostly made of local materials using the local technology. Still, the actual in-school use of this equipment leaves a lot to be desired. It has been found that in reality most schools do not have adequate teaching-learning aids and equipment. The small number of items that are available in these schools are outmoded and substandard. There is also an apparent lack of appropriate resources. Teachers do not have sufficient experience in producing and using teaching aids. On one hand, there is just no supply of materials in some locations for making any teaching aids. On the other hand, the abundance of teaching-learning tools are neither put to good use nor properly maintained.

Teachers

The Current Situation

Most primary teacher were not science majors and a large number of them do not enjoy teaching science and mathematics.

Only 25% of teachers at the secondary level hold degrees in science and mathematics. Most other teachers do not understand the activities and lack the skills in organizing teaching-learning activities. It may be said that there is a shortage of science and mathematics teachers at all levels. Teachers are overloaded with responsibilities and work, and the profession can attract only a handful of knowledgeable, competent personnel. Under the prevailing circumstances, it is not

possible to replace the large number of competent teachers who are about to retire in the near future.

Teacher Training

Teacher training programs to enable effective implementation of the curricula must accompany each and every major curriculum reform. There are also other teacher training programs. In an attempt to solve the problem of the inability of the teaching profession to attract a sufficient number of high-caliber personnel, scholarships are available to science and mathematics talents, who have suitable attributes for the profession, to enable them to pursue teacher education programs.

General Administrative Problems

At the primary level there is a shortage of instructional materials, equipment and teachers with a sound fundamental knowledge of science. The schools are yet to have the opportunities to assign science teaching graduates to science classes.

At the secondary level it is appeared that of highest interest to administrators is the students' success in university entrance examinations. As a result, it is almost impossible to effect inculcation of positive attitudes towards science in the students and development of their science process skills through practical experience. This is exacerbated by overcrowded classrooms in some schools that make it impossible for teachers to supervise students' experiments.

Testing and Evaluation

Rote learning remains the basis of assessment, which pays little attention to the science process skills. Assessment of the development of scientific attitude is almost non-existent. This promotes rote learning rather than development of initiative and other positive characteristics. This type of assessment results in the students' attention on tutorial classes that prepare them for university entrance examination at the sacrifice of the process- and skills-oriented learning and attitudinal development.

Learning Achievement

Findings of national studies on learning achievement reveal that in general primary and secondary student are keen on science and have science learning skills. The average science score of primary children is 50%, and that for scientific process skills is 45%. Their three best skills are classification, measuring and computation, in that order. Lower secondary students have an average science score of less than 50%.

Lack of sufficient knowledge and conducive environment was cited as the main cause for most students not applying some scientific knowledge to their daily living. At the upper secondary level students' average score in science is also below 50% and needs to be improved.

Home Environment Influencing Students' Science Achievement

Studies on home environment reveal that 73% of parents are primary school graduates and only 9% are university graduates. Most primary school children have fewer than 10 books at home and secondary school students have between 10-26 books. At the secondary school level although about 68% of students have a calculator at home, only 4% of then have computer at home. Most primary school children spend less than one hour watching TV or VDO at home compared to 1-2 hours among most secondary school students.

Out-of-School Science

Science information and knowledge available through the media is limited in both quantity and quality. Positive scientific attitudes reflected in the mass media also leave much to be desired. This is one reason that communication for the purpose of developing scientific attitudes among the populace, and building a scientific society in Thailand, is moving at a snail's pace.

Thai Students' Science Achievement by International Standard

The Results from SISS to TIMSS

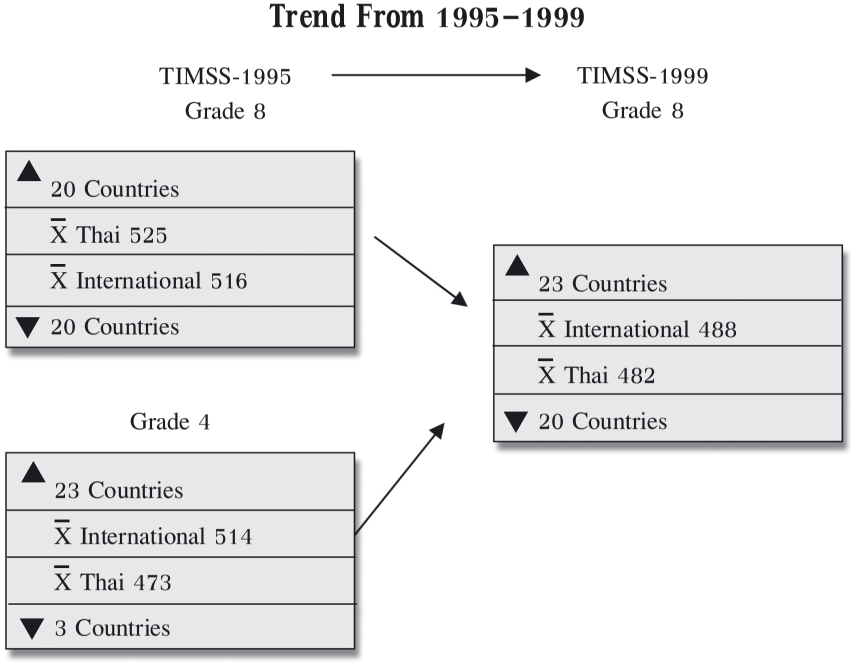
The secondary science achievement as obtained from participation to the IEA-Second International Science Study (SISS) showed that Thailand scored below the international mean; and belonged in the same group with USA, England, Singapore, and Hong Kong. The lower scores of Thai students, compared with those of the other countries in this group had put Thailand in the lower-than-average group. A decade later, the improvement was found in the results of TIMSS-1995. Students performed above the international mean, but were in the average group. Thailand still remained in the same group with USA and Hong Kong, but not with Singapore and England. Singapore ranked first, and England belonged to the above average group.

Trend from TIMSS-1995 to TIMSS-1999

TIMSS-1995 results reveal that at the primary school level Thailand was far below the international average for science overall and every content area. There were only three countries that scored below Thailand at that time. In TIMSS-1999, however, there were 17 countries that scored below Thailand. This time Thailand ranked 21st among 38 countries, and belonged to the average group.

The Thai trend of change from TIMSS-1995 to TIMSS-1999, from primary school to lower secondary school, can be schematically summarized in the chart below.

Figure 1: Trend in science achievement of Thai student from TIMSS-1995 to TIMSS-1999



Factors Effecting Students' Science Achievement

A number of reasons can account for the relatively low achievement of Thai students. The data collected from TIMSS, concerning inputs for science education, revealed various shortcomings of Thai students. They are, for example, instruction time, education resources, and equipment and materials for science learning, and investment in education.

Instruction Time

Among participating countries, Thailand has the lowest percentage of instruction time for science. Thai students have 6% at primary schooling (up to grade 6), and 9% at lower secondary schooling (grade 7-9). Taking lower secondary level for comparison, Singapore has 15%; Chinese Taipei, Korea and Hong Kong have 12-14%. The high performing countries in Eastern Europe have 25-27% of instruction time allocated for science class.

Teachers

The quality of teacher is one of the most important factors that affect students' learning. Science teaching requires well educated and skilled teachers. The data on percentage of teachers with their major areas show that Thailand is next to Malaysia that has very small number of teachers with major areas in science content, especially physics, compared to other countries.

Resource for Science Instruction

According to the index of availability of school resources for science Instruction created by TIMSS. Internationally, on average, only 18% of the students were in the high category and 63% were in the medium category. Only very few countries including Thailand were the majority of students in the low category.

Educational Expenditure

The outcomes of science education of Thailand follow the expected trend.

Gender Issues

The results from TIMSS-1995 indicated the pattern that in almost every participating country boys outperformed girls in all content areas. In only two countries, Thailand and Cyprus, girls actually outperformed boys though not by any significant margin. Again in TIMSS-1999, the results show no significant difference between boys and girls.

Programs for Science Talents

National scale projects implemented by governmental bodies in this connection are:

Development and Promotion of Science and Technology Talent Project (DPST)

The project aimed to provide continued support and encouragement to the talents so as to enable them to develop their potential capacities for the future benefit of the country. Under this project, science and technology talents are encouraged to undertake researches and explore new frontiers of science and technology beneficial to the national development. A steering committee chaired by the Deputy Prime Minister in charge of the Ministry of Education was responsible for policy-making.

Implementations of the project are as follows:

1. Selection of school, college and university students talented in science and technology for upper secondary level and undergraduate scholarships. Each scholarship was intended to support the awardee at least up to Master's degree level.

2. Provision of continued support for awardees' development through the completion of their studies to employment.

3. Provision of research and development facilities in science and mathematics relevant to the national development plan.

At the secondary school level, the project is implemented in the form of special class (school in school), where special learning programs are designed and offered to students as additional activities to be undertaken. At the higher level of education students take regular programs of study at a faculty of science of a university.

It can be said that the Thailand DPST project has progressed effectively and fruitfully. Up to the present time, the number of students currently undertaking their programs of study under the DPST scholarship scheme is over 1,150. The project has already produced more than 300 Ph.D. graduates in basic science and mathematics who are playing important roles as a part of high potential groups of young scientists - the valuable asset of many scientific research centers and academic institutions all over the country

Science School

Following the government policy of providing education for the full development of exceptionally gifted and talented students in science and mathematics as mandated by the National Education Act, the Ministry of Education assigned the Institute for the Promotion of Teaching Science and Technology (IPST) the task of establishing a special science school. Consequently, a Royal Decree establishing Mahidol Wittayanusorn School as the country's first specialized science school, with the status of a public organization under the supervision of the Minister of Education, was promulgated on August 25, 2000.

Vision

The school has a lofty ideal of providing world class education at upper secondary level for exceptionally gifted and talented students in science, mathematics and technology, so that they will have the requisites of avid lifelong learners, researchers, and innovators.

Missions

- Searching for an annual enrollment of 240 exceptionally gifted students in science and mathematics.
- Providing an education at the upper secondary level to its students for development to their highest potentiality.
- Encouraging the agencies concerned and the private sectors to contribute to enhancing the development of school's programs and activities.
- Providing special services for science and mathematics education.

The Present Situation

To date the school is now in its full operation. Two hundred and forty students are thoroughly recruited annually and that brings the total number of school students up to 720. Programs and activities are carefully designed and offered to this group of students under the supervision of the school personal including approximately 80 academic and 60 support staff. Moreover, a number of specialists from various agencies are also regularly invited to provide contributions to the school programs/activities.

The Achievement

For a new school with its only 5 years of operation extreme care must be taken in making any interpretation on the achievement. Although 100% of the first two batches of the school graduates have been able to get seats in university faculties, it is too soon to make conclusions in accordance with its long term goals and objectives.

However, series of evidences are appearing. For example, a number of the school's students have been selected to be national representatives for international mathematics and science Olympiads. They have been able to obtain a certain number of awards, including some gold medals, recently.

Enrichment Program

An outstanding enrichment program for science talents currently carried out in Thailand nowadays is the Junior Science Talent Project (JSTP) undertaken by the National Science and Technology Development Agency (NSTDA). Each year, the project searches for approximately 100 talented young students at the secondary school level and offer them an enrichment program for one year. The focal points are on learning and knowledge management, not teaching oriented. The program emphasizes the development or empowerment of the student's thinking system using various potential stimuli. Students have to design and conduct an open-ended experiment and/or carry out a process-based project work, supervised by a group of mentors. After the completion of a one year program, the top 10 students of each cohort will be granted scholarships for approximately 10 years to pursue their study in science / technology areas with an academic supporting system via a mentoring process.

It is believed that the achievement of the program may not be able to indicate by the students' success at high school or even university level, but a long the way from their participations in JSTP through long term development processes up to the stage of their mature careers.

Development of Science and Mathematics Excellence Project (Primary Level)

This project is operated by the Institute for the Promotion of Teaching Science and Technology (IPST), in cooperation with concerned government agencies involved in research and development in science, mathematics and technology education.

The objectives of the project may be summarized as follows:

- To develop indicators of exceptional science and mathematics competency.
- To select and search for science and mathematics talents for development to their full potential.
- To seek ways and means to encourage students who excel in science and mathematics.
- To encourage government agencies to organize activities supporting science and mathematics talents at both primary and secondary levels.

Activities currently going on mainly focus on the selection and identification of science and mathematics talents at the primary level of education i.e. students at grade 3 and grade 6. Among several thousands candidates per year, the top 500 in science (or mathematics) at each level are identified, Learning materials in science and mathematics are specially developed for student, as well as manuals for their teachers are provided as resources for these selected groups. Although it is started recently, the project has proven to be very popular on the perception of school personnel, parents and students.

Development and Promotion of Science and Mathematics Excellence at the Lower Secondary School Level

This project is initiated and carried out by Mahidol Wittayanusorn School in cooperation with concerned governmental agencies and the faculty of science of various universities all over the country. The project aims to identify and nurture primary school graduates who are excellent in science and mathematics. Top grade 6 graduates with a proven record on science and mathematics excellence are invited to apply to participate in the project. Thorough procedures are applied for the screening. Approximately 500 students are annually selected to participate in the project in the academic year 2005-2006. The selected candidates are to be nurtured by 15 centers all over the country. Special programs including science camps and distance learning packages are designed for this target group to maximize their potential during the 3 year period of the lower secondary school level.

Learning Revolution: Synergy of Tacit and Explicit Knowledge

Vicharn Panich
Director, Knowledge Management for Society,
The Knowledge Management Society

The Knowledge Management Institute

From the past up to the present time, the focus of education has been on classroom learning, with emphasis on teaching and training; in other words, with teachers and trainers serving as the centre or the focal point. The advantage of this type of learning lies in the rapid quantitative expansion of education. Its main disadvantage, however, is evident in the low level of learning achievement, nor is it conducive to stimulating the desire for learning among learners and teachers alike.

Advancement in the application of neuroscience and ITs has led to the present theory of human learning. It is apparent that action learning or learning from real life is more natural, yields higher achievement, and inculcates the culture of learning among learners and teachers. Such tacit learning has been prevalent long before adoption of the present system of education. Through application of diversified modern technologies, tacit learning can also enjoy quantitative expansion of scale, not through classroom increase but through expansion of **learning networks.** Since this type of learning is quite complex and comprises several dimensions, a "teacher" is no longer an "instructor" imbued with "knowledge", but has been

transformed to become a "facilitator", an "inspirer" and a "stimulator" of avidity for learning.

From Explicit Knowledge to Tacit Knowledge

Apart from the change in the paradigm of education i.e. the shift of emphasis from **teaching** to **learning,** the paradigm of knowledge has also been changed; in other words, the shift from **Theoretical Knowledge** or **Explicit Knowledge** to **Knowledge for Action** or **Tacit Knowledge.**

The modern learning model is an integration of explicit learning from textbooks and tacit learning in the proportion of approximately 10-20% : 80-90%. Most important to be found lies in the synergy between these two types of learning.

Lifelong Learning

The third aspect of learning evolution is the shift from learning in school only or formal to lifelong learning. From the past up to the present time, those regarding themselves as "educators" have given greater emphasis to learning in school or formal learning, resulting in limitation on education in both space and time, which does not serve the people's real needs throughout their lives. A paradigm shift to lifelong learning is therefore called for i.e. creation of new paradigms, theories and skills at different levels and various dimensions of education for all; in other words for all segments of society from birth (in fact right from inception) to death. One ought to learn even to prepare oneself for the end of life.

The main features of lifelong learning for all include the following:

- Learning by doing;
- Group learning: Interactive learning through action;
- Assistance from "facilitator/coach";
- Capturing tacit knowledge and explicit knowledge from outside;
- Creating knowledge for and from action; and
- Application of the principles and methods of "Knowledge Management".

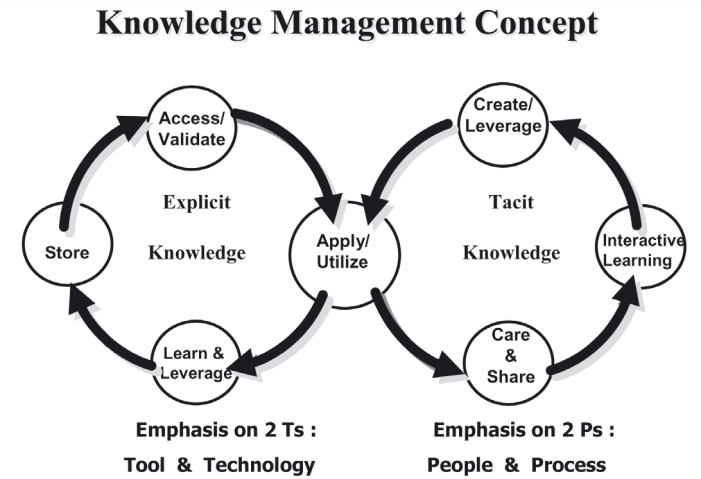
Emphasis on Learning How to Learn

The most important knowledge or skill is not the content or skill required for an undertaking. The essential skill for lifelong learning is knowing how to learn. The ultimate aims of education are to inculcate a learning habit; to know how to learn; to ask oneself questions conducive to self-learning in order to sustain curiosity, confidence and enjoyment in learning.

A teacher should therefore change his role-from an "instructor" to an "organizer" of learning in group or team learning through different dimensions at the same time. The most important dimension is learning how to learn through tacit and explicit knowledge.

Concept of Knowledge Management

Knowledge management logically begins with tacit knowledge (see figure on the next page). This cycle recognizes that all learners are knowledgeable; the ambience is conducive to mutual recognition of the knowledge of members of the group, leading to inspiration and thus resulting in Care and Share. The knowledge gained will be duly applied. Learning experiences will consequently be exchanged in a positive and encouraging ambience, resulting in an unending cycle of leverage. This cycle is illustrated through the figure on the right with which not many are familiar.



The cycle on the left is familiar to most of us. This is the cycle of knowledge from textbooks or theoretical knowledge, beginning with access to knowledge which is subsequently validated in accord with individual contexts. The knowledge gained is then utilized, leading to learning and leverage. The next step in the process is storage of such knowledge for easy retrieval. The explicit knowledge also follows a similar unending cycle of knowledge management.

A desirable knowledge management requires a harmonious fusion of the two cycles into one. Each step will not be taken separately, but harmoniously integrated, without the "Knowledge Practitioners" (as called by the Knowledge Management Institute) realizing that they are in fact managing the knowledge.

Desirable knowledge management needs an emphasis on **People** and **Process** harmoniously balanced with the application of **Tool** and **Technology** with the view to facilitating exchanges of learnings.

Undesirable or ineffective cycle of knowledge management is that with main emphasis or sole emphasis on explicit knowledge shown in the left figure.

Relevant Case Studies

Examples of interactive learning through action will be presented through two case studies. Such learning requires supporting energy or necessary process management, so as to generate synergy among learners and between tacit and explicit knowledge. The two case studies are:

- Farmer School under the aegis of the Holy Rice Foundation, Suphan Buri; and
- Jirasartvidhya School, Ayudhya.

Farmer School

The school is run by the Holy Rice Foundation, which invites a number of farmers for interactive group learning with the three main aims as follows:

1. To reduce production cost for rice farming;
2. To reduce health and environmental hazards resulting from use of chemicals in rice farming; and
3. To produce organic rice.

Learning at a farmer school is organized at three levels:

1) Elementary level, with emphasis on pest management without using chemicals, especially insecticide;

2) Secondary level, with emphasis on soil management without using chemicals or chemical fertilizer; and

3) Tertiary level, with emphasis on seeds management, so as to enable the farmers to have their own rice seeds without having to depend on outside sources.

Although the learning is divided into three levels, a farmer school encourages integrated learning among its students; in other words, those at elementary level are also allowed to learn about soil fertilization and seeds management at the same time.

There are at present four farmer schools under the aegis of the Holy Rice Foundation, with a school located in each of the four participating districts.

Students

The students are in fact practicing farmers without any age limit. Some students of the Holy Rice Foundation are more than 70 years old, while others are aged only just over 10 years. They must have their own rice fields or do the farming themselves for the season. They agree to spend half a day each week at the 16-18 week regular meetings for knowledge sharing.

The students of a farmer school wear two hats, serving as both students and teachers; in other words, they rotate the role of teachers among themselves. The meeting venue is also rotated, either at a temple pavillion or at a student's home.

Students with regular attendance will be provided with farmer school uniforms of which they are extremely proud, and which will be worn on occasions of important meetings or visits from outside visitors.

Learning Process

The "curriculum" of a farmer school is highly flexible, since it is jointly designed by the students themselves with assistance provided by the knowledge facilitators.

The learning venue also rotates, depending on the demands of suitability and convenience.

Theoretical knowledge is gained from lectures given by resource persons of the Holy Rice Foundation or those of government agencies invited by the students or their facilitators. Learning experiences are also provided through study visits to universities or technical centres of the Ministry of Agriculture and Co-operatives.

At the heart of learning is self-study in the students' own farms. This is in fact learning by doing, based on observation and note-taking (conditions of the rice stalks, insects, water, soil, living organisms in the field etc.). The information thus gained will be used for knowledge sharing or for raising pertinent questions for collective identification of correct solutions and answers.

The learning process of the students in a farmer school is not at all boring, since it includes exciting activities and depends on regular mutual assistance e.g. study visits, trips to the forest for collecting microbic specimens for soil fertilization etc.

The students from a farmer school have recently designed their own learning process, based on the principle of peer assistance. "Peer assist rotating visits" have been organized by the students, with study visits from those in another district for sharing knowledge. The student groups take turn in serving as a "Home Team" and a "Visiting Team" for reciprocating the visits. Such activity serves useful purposes for stimulating conceptualization or synthesis of the knowledge garnered through action and sharing of information among members of the group.

Since learning takes place through action, it is intrinsically an integrated one.

What Students Share and Learn

At the elementary level, students in a farmer school learn about the hazards of insecticide and "good" and "bad" insects found in the

fields. They practise catching these insects for separating the "good" from "bad" ones; identify them; draw their pictures and take notes for further review; learn about the habits and life cycle of each kind of insects; and learn about the method of checking and managing their rice fields to achieve an insect balance without having to use insecticide.

These students learn about herbs and preparations for insect repellent from textbooks and local knowledge and wisdom. They experiment for knowledge building or prepare ferment for insect repellent for their own use. With confidence in their experiment and with encouragement through their team learning, the students have prepared more than one hundred formulas for insect repellent, compost, organic ferment and hormone by trial and error. Most impressive is their success in identifying methods of collecting and cultivating micro-organisms for soil improvement at low cost, but at the same time yielding quite spectacular results.

Theoretical Knowledge Confirms Knowledge through Action

On February 14, 2005, Assoc. Prof. Dr.Karn Chanpromma visited the Wat Dao Farmer School in Bang Pla Ma district from where he took specimens of bamboo leaves for cultivating micro-organisms. He has found that the micro-organisms for soil improvement collected by the students from Sai Ber waterfall in Uthai Thani, which do wonder for soil fertilization, comprise many kinds of microbes. These are: bacteria (Bacillus); fungi (Trichoderma, Rhizopus and Aspergillus), and yeast (Saccharomysis). Besides, there are a number of unidentifiable micro-organisms.

These pieces of information are quite simple for scientists, but in fact extremely valuable to the farmer school students. Having received from Dr.Karn the pictures of the colonies of the micro-organisms on the culture plates, together with descriptions of their kinds and properties, the school community was quite excited. The information confirms the "knowledge" they have built (i.e. micro-organisms for soil improvement). Previously they have witnessed only the spectacular yields in their rice fields, not knowing what has happened to the soil, nor what organisms have fertilized it. The farmer school students can now see the concrete results of the knowledge they have accumulated.

Micro-organisms found through cultivation

- 5 plates of fungi: Trichoderma supp.2, Rhizopus supp.2, Aspergillus supp.1
- 5 plates of bacteria: Bacillus supp.4, unidentifiable 1
- 6 plates of yeast: Saccharomysis 4, unidentifiable 2

Knowledge from Microbiologists

These fungi help to digest the bamboo leaves, as they grow rapidly; are highly resilient to the environment; and are capable of producing a large number of enzymes. Apart from efficiently digesting the bamboo leaves, the Trichoderma spp. can also release plant growth promoting regulators e.g. Pentyl pyrone Harzianic acid and Harzianic acid isomer. Besides, the Trichoderma spp., the Bacillus spp. and the Saccharomysis spp. culled out can also produce substances which prevent plant disease-inducing fungi and bacteria. Utilization of these bamboo leaves in plant beds is therefore most beneficial to farmers, as they reduce plant diseases and at the same time promote the growth of their crops.

This case study illustrates how academics/ scientists could extend the villagers' local wisdom. Such confirmation is highly beneficial to the society, even though scientists would view the outcomes as something quite simple, nothing new to them, and without significant academic achievement for publication. On the contrary, academics are strongly recommended to extend thousands of similar cases, thus bringing untold benefits to the building of knowledge society.

Knowledge Facilitators

Team learning among villagers will never be possible or difficult to realize without the service of "Knowledge Facilitators", endowed with the skills in encouraging, persuading, enticing and stimulating how to learn in a group. What is crucial is not "teaching" or providing the villagers with "instant knowledge". Acting as an "almighty" must be avoided at all costs.

Lessons Learned from Learning by Doing

Conclusion has been reached among farmer school students completing elementary level that there have been six significant changes in their lives, namely:

1. Change from the use of insecticide to insect repellent herbs, and the latter only when necessary;

2. Previously, the investment in rice farming was quite high due to the costly insecticide; at present, the investment has been reduced to only half or even one third of the requirement in the past;

3. Previously, frequent illnesses due to toxic chemicals; at present they enjoy much better health with the previous health hazards reduced by 10-20 times;

4. Previously, the villagers were kept extremely busy with spraying the insecticide, fertilizing the soil etc., leaving them with no spare time. At present, however, they have more time for leisure, chatting with their neighbours and joining the communal merit-making ceremonies which have been absent for many years;

5. Hoarding of knowledge and methods of rice farming due to lack of self-confidence and appreciation of knowledge sharing; at present, they find pleasure and pride in exchange of learnings, resulting in close-knit community and happier lives; and

6. The previously contaminated rice fields have now become chemical-free.

Conclusion

The most effective learning realized by the farmer school students themselves is the grouping for team learning from action. The learnings thus accessed are then debated and exchanged for information and further leverage. Through direct observation, the students take notes of the data in the fields for further reflection, review and mutual exchanges. They learn how to capture external knowledge, both tacit and explicit; and learn how to interpret and try out in their own context, and not avail of "instant knowledge" from others or from textbooks.

This learning model is called **Learning Through Knowledge Management** which has been extended to many areas in Phichit, Nakhon Sawan and other provinces. The Knowledge Management Institute is committed to creating such learning networks nationwide, and is therefore mobilizing partners for moving forward this desirable learning model.

Jirasartvidhya School

Jirasartvidhya School attaches great importance to learning from action together with classroom learning at all levels of the school community-students, teachers and administrators. Achievements from the innovative approach of Jirasartvidhya School have made it quite

well known. Those interested can find further information from visits to web site www.jirasart.com and web blog http://gotokhow.org/jirasart.

At this juncture, only conclusions on the integrated learning by doing at the school botanical garden will be presented. For further details, please visit the web blog mentioned above.

The students are divided into groups of 5-6 members, who are rotated for learning at all the four bases. These are:

- Base 1: Science-based
- Base 2: Arts ad Occupation-based
- Base 3: Mathematics-based
- Base 4: English-based

Having completed their learning and assigned tasks, all groups will present the knowledge gained and pertinent inventions to the fellow students in their class.

For this learning model, a team of teachers will prepare in advance an assignment for each session (which is never the same). A broad theme will be set for learning in each base, allowing the students freedom to jointly identify the issues of their interest and construct their own knowledge. Each theme set must be commensurate with the level of the students' capacity.

For instance, for this session (for Grade 6 students),

Base 1: Discovery, requiring the students to:

- Acquire skill training in exploring and studying the plants of their interest in a designated area;
- Draw pictures of what they have observed, showing structures of the plants and their environment, together with living things around these plants; and

- The drawings will show physical conditions of the plants as well as living and non-living things in the area explored, with relevant titles given.

Base 2: Fantasy Model, the students are required to:

- Design creative inventions and utensils of their interest, using the materials available at hand (in this case, stems of banana leaves); and
- Work on their creative inventions for which appropriate titles will be given, together with instruction for use in daily life.

Base 3: Food and Health, the students are required to:

- Explore the herbs around the natural learning source;
- Jointly prepare a menu for health food by specifying:

  Name of each dish

  Ingredients

  Steps for cooking

  Benefits; and

- Present the menu to members of other groups for knowledge sharing.

Base 4: The Trees Can Talk, the students are required to:

- Identify for discussion a list of plants and trees which they know, together with their characteristics;
- Jointly prepare a script for a short play, with living things in the area explored as players together with the sequence of the script; in this connection, a campaign should be launched to mobilize the villagers' collective efforts in preserving and taking care of plants and trees as well as conserving energy and the environment; and

- Role play together.

How the Students Learn

- The students learn with their peers in groups and share between groups;
- Theoretical/explicit knowledge from textbooks/manuals provided by schools/teachers (at the level suitable to the students' capacity);
- The students learn by doing through direct observation, counting, measuring, taking notes and discussing or sharing knowledge within the group; in other words, tacit learning;
- The students synthesize and construct their knowledge expressed through drawings, short plays and group reports;
- The reports and drawings are kept for students in other groups and those in succeeding years for access to and leverage of such knowledge.

What the Students Learn

- Content providing explicit knowledge ;
- Team work/team learning leading to socialization;
- The skills of observing, counting, measuring, integrating knowledge, creating and presentation through various forms;
- Through these actions, the students learn and absorb tacit knowledge; and
- Most important of all, they learn **how to learn.**

How the Teachers Learn

- They learn from knowledge sharing through team work to determine the overall learning objectives and to develop directions for each base;
- The teachers learn the methods of "facilitating" or "coaching" for children in each key stage and for those with different characteristics;
- They acquire knowledge and skills in serving as "facilitators" for succeeding generations of teachers;
- They learn from observation of individual and group behaviour during the students' activities; and
- They learn from the **After Action Review** of their team at the completion of each activity.

Conclusion

The two case studies presented comprise two different categories: one for the benefit of adults, while the other is for children. Both cases are engaged in team learning with assistance from their facilitators. They learn both content and learning skills at the same time i.e. both theoretical knowledge and practice, resulting in synergy between explicit and tacit knowledge.

Learning with emphasis on action will undoubtedly result in inculcation of learning culture, learning skills, avidity for learning and self-confidence to learn from activities, which will ultimately lead to **lifelong learning.**

The Thailand–US Higher Education

President and Dean Summits 2005

Report of President Summit in the United States of America

April 10–21, 2005

Prasert Chitapong
Chairman, Council of University Presidents of Thailand

The President Summit was held under an agreement between University of Pennsylvania (Penn) and the Thailand-US Education Roundtable Steering committee coordinated by the Office of the Education Council, Ministry of Education. Dr. Cheng Davis, Vice Dean of Graduate School of Education (GSE) of University of Pennsylvania proposed an invitation to a Thai president delegation of both state and private universities, including 8 state university and 2 private university presidents, and 3 representatives from Education Council with a total of 13 members, to attend the summit with top executives of leading American universities and agencies as well as a study visit to their institutions from April 10-21, 2005.

The venues of the summit and study visit included 5 private universities, namely, University of Pennsylvania, Georgetown University (Georgetown), American University (AU), Columbia University (Columbia), Standford University (Standford) and 2 state universities which are New Jersey Institute of Technology (NJIT) and University of California, Berkeley (UCBerkeley) as well as a study visit to Office of Higher Education of New York State Education Department (OHE/NYED) and an exchange discussion with

members of The Association of Thai Professionals in America and Canada (ATPAC) and also to Sun Microsystems. The Thai delegation was led by Associate Professor Dr. Presert Chitapong, President of Prince of Songkla University and Chairman of the Council of University Presidents of Thailand, Associate Professor Dr. Varakorn Samakoses, President of Dhurakij Pundit University and Dr. Siriporn Boonyananta, Deputy Secretary-General, Office of the Education Council as deputy group leaders with details as provided in the meeting programs and the participant list of the summit in the appendix.

The summit and study visits have contributed prominent benefits for the management of Thai higher education as follows:

1. All U.S. universities, both state and private, hold high independence of management. Board of Trustees, which freely executes financial management, has been found. In addition to tuition fees, private universities have raised funds from many sources, for example, research, interest from patents, donation from generous contributors and alumni, academic services, joint ventures with private sectors, retailing university-trademark merchandises, equipment and souvenirs, etc. The budget of state universities, however, is allocated from the state government, approximately 30-40% and some from the federal government on the basis of exceptional plans.

2. Research universities in America. The case studies of this type of universities are Penn, Standford and UCBerkeley, all of which obviously indicate their principle policy that to be a research university requires a doctorate program education, in which students and faculties are collaborating to conduct research and research fund could be organized to run education at this level. The research management is also very crucial to such university. The case of Penn shows that competency and research production owned by academic

personnel is regarded as essential for recruitment, retention and promotion in this institution. Besides, the capability of finding and administrating research funds are crucial to recruitment, retention and promotion as well.

3. Self adjustment from a teaching–oriented to a research–oriented university. The case of New Jersey Institute of Technology (NJIT), a state university, is obvious to illustrate that it is extremely required to establish strategies in every level, both at the state level where policy and support are provided, and the university level which is an operational unit to adjust itself pursuant to the set strategy, with a focus on executives' adjustment, physical enhancement, prioritized operation of academic staff for research production and a graduate education management. However, since NJIT is a technology and management-focused university with an academic collaboration with private sectors to have an application of research results in the industrial development in form of an incubator. The university has regarded this scheme as its chief issue, especially during the shifting period to be a research-oriented university. This shift of NJIT becomes a good model for several Thai universities which are shifting themselves to a research-oriented one, especially technology and management-focused universities. Moreover, the development of its incubator, being operated by NJIT, become a good example for Thai universities which are establishing Business Incubator.

4. The universities with focus on international relation education. The case studies of this type are Georgetown University and American University. From the visit to these universities, it is found that both universities have prioritized international relations tremendously. Georgetown University focuses on Political Sciences in diplomacy while AU has its emphasis on international economics. The strength of both universities lies in their location in Washington D.C., which is the authority center of America. Any education in respect to international relations provided by a university located in

Washington D.C. is deemed appropriate. Both universities are leading private universities. Their budget is mostly from endowment fund, alumni contributions, tuition fees and research project.

5. Development of research in special areas. From the case study of the research development in Biomedical Engineering (BME) in Columbia University, it has been found from the meeting with the BME research team in Columbia that the university has launched this project by assigning senior professors with related gained academic disciplines to coordinate a research team. Then this was done by coordinating many academic scholars in different disciplines in Columbia, i.e. medical science, biological science, physical science and engineering. New researchers with BME or BME related education were recruited to join the research team along with to offer graduate programs to recruit graduate students to join research in this discipline. The strength of the BME research at Columbia University lies in that in addition to having highly competence researchers, it has been fully supported by university executives as well as its close connection with academic institutions, state and private organizations, both in America and at the international level, all of which are interested in this discipline.

6. Aesthetics at tertiary institutions. Stanford University houses Rodin Sculpture Standford Museum of Arts, an open-air museum. It becomes an important learning resource of world-class artwork, available to general people. This is an example of academic services which a university can provide as well as promoting aesthetics atmosphere in educational institutions.

7. A multi-campus university. University of California is organized under the multi-campus system in which each campus is independent in its management, however, with a link of policy and information exchange among campuses. Each campus has Chancellor who is in charge of management while President monitors the general policy of University of California Systems (UC Systems). One of the main campuses in UC Systems is UCBerkeley with the so-called comprehensive system with multi-disciplines at its campus. UC Systems might be a role model for Thai universities to implement a multi-campus system.

8. Governmental role in monitoring educational standard at higher education. The case study is Office of Higher Education of New York State Education Department (OHE/NYED). In New York State, there are more than 240 institutions at tertiary level, both state and private, which offer education programs, ranging from Associate to Doctorate. The associate education is organized by Junior College and Community College. The bachelor-doctorate degree education is run by colleges and universities. OHE/NYED itself is in charge of monitoring educational standard and quality in these institutions strictly. Any state or private university which plans to offer a doctorate program is required to be a research university (RU) or a research-oriented university (ROU) only. Teaching-oriented universities, however, is monitored by OHE/NYED to offer only bachelor degree programs or may offer some master degree programs in some disciplines. Most universities which offer master degree programs are required to have research publications in a target discipline. Some disciplines are allowed to offer doctorate programs with their own doctorate degree or a joined degree with others in RU or ROU group. OHE/NYED has mechanisms for monitoring education quality and standard by implementing a peer reviewer system which requires qualified scholars in New York State or other states as well as academic organizations at a national or international level. Accreditation Standards used by OHE/NYED for tertiary level institution include : (1) institutional mission, (2) assessment of student achievement, (3) curricular, (4) faculty, (5) resources, e.g. facility and library&information resources, (6) fiscal capacity,

(7) administration, (8) support services, (9) admission, (10) consumer information, (11) students complaint, (12) HEA Title IV program responsibilities, (13) teach-out agreements, and (14) public disclosure of accreditation status.

9. Sun Microsystems. The company presents new advanced technology of a smart card which could store huge information and it can be plugged into any computer in the world by using its main server as a controlling center with different security entrances to get access to each personal data. Any organization has sufficient networks and could organize its main server, then it would be more convenient and cost saving. In the near future, this technology will play its more significant role in general organizations.

10. A courtesy visit and discussions with the Thai Ambassador in the United States of America at the Royal Thai Embassy in Washington D.C. The main discussions include:

1) Enhancement and expansion of ATPAC operation and later ATPAC shall be under the Royal Thai Embassy.

2) Opportunities to corporate with US universities in personnel development urgently at Rajabhat Universities and Rajamangala University of Technology in particular. Cooperation in research is also a high priority for most established Thai Universities.

3) Establishment of relationship between the Thai Embassy and US universities in which the Thai ambassador have paid a visit and provided a presentation of educational collaborations with Thai universities.

4) Opportunities to establish collaborations between Thai and US universities and Chulabhorn Research Institute in cancer and environment research.

5) A development of Thailand as a center of communication and transportation.

6) Due to the Tsunami disaster, the United States of America is willing to provide educational support and trainings in respect to prevention and mitigation of disaster, public health and environment.

7) Thai universities and Ministry of Foreign Affairs will organize a summer program in relation to current world events to Thai students with speakers from the ministry who also provides assistance in case a travel abroad is included.

8) Free Trade Area (FTA) in relation to education and also foreign educational institutions in Thailand. Thai universities need to be well prepared in terms of active and passive strategies.

9) Revision and data collection of MOU under which Thai universities have signed an agreement with American universities. A follow-up program to see to what extent academic activities has been carried out and extended.

10) Thai universities need to develop their academic potentials and Center of Excellence in different disciplines. The Thai Embassy is pleased to support and coordinate with research institutes and universities in America.

Suggestions from the Summit

During the summit, Thai delegates have proposed key issues for development in higher education as follows:

1. **Universities need to hold philosophy and strong determination to serve as organizations to produce quality human resources and to develop knowledge through research production beneficial to Mankind and also to serve as a social intellect.** These can develop

leading universities. To set the prime conceptual goal in constructing benefits and values is a key factor to push universities to a leading status.

2. **Leading and developed universities need "a transition" across extended periods.** This is under the strong determination of sustainability in the long future through the basis of "the excellence tradition" and "a transition" might be based upon Board of Trustees and/or alumni and/or communities.

3. **Stable financial status.** Universities have to be administered cautiously under the conditions in item 1 as a key path to the future.

4. **Beautiful sites and constructions as a university landmark chiefly help develop a distinctive university identity and a sense of pride among alumni.** This represents a symbol to confirm its determination within a long run through an esteemed university philosophy.

5. **Effective management** has been implemented through qualified and competent academic supporting staff as a key factor of achievement.

6. **Ongoing management of a university executive group** which causes the university policy to be undertaken without interruption.

7. **Every development matter needs determination, dedication and selflessness from operators** and it is time-consuming at all time.

8. **Interruption in university affairs by private sectors** is inevitable under the current world circumstances. To produce a proper balance between academic independence and private influence in university affairs is a delicate matter which needs attention from university policy makers.

9. **Leading universities give their most attention to students' experiences** including proper learning atmosphere, learning process, academic quality, welfare and living conditions in universities.

10. **America is a country with educational development of world-class leading and standing tertiary level.** The special attention given by the Thai Ambassador in the United States of America to academic progress and collaborations between American and Thai universities is a key mechanism to foster Thai universities to gain benefits from the academic agreement with American universities and to develop higher education in Thailand to go forward substantively and effectively.

Appendix 1

List of Participants Thailand–US Higher Education Summit 2005

April 10–21, 2005

Nam	Title	Institution	
1. Dr. Prasert Chitapong	President	Prince of Songkhla University	Head of the delegation
	Chairman	Council of University Presidents of Thailand (CUPT)	
2. Dr. Varakorn Samakoses	President	Dhurakij Pundit University	Deputy head of the delegation
3. Dr. Siriporn Boonyananta	Deputy Secretary-General	The Education Council, Ministry of Education	Deputy head of the delegation
4. Dr. Pongsak Angkasith	President	Chiengmai University	
5. Dr. Teravuti Boonyasopon	President	King Mongkut's Institute of Technology	
6. Dr. Viroch Impithuksa	President	Kasetsart Univerisity	
7. Dr. Wiroon Tungcharoen	President	Srinakarinwirot University	
8. Dr. Vallop Suwandee	President	Kasembandit University	
	Deputy Governor	Bangkok Metropolitan in charging of Educational and Community Development	
9. Mrs. Aree Vachiravarakarn	President	Thonburi Rajabhat University	
10. Dr. Preang Kitratporn	President	Phranakhon Rajabhat University	
11. Dr. Suawanit Saunananda	President	Nakhon Ratchasima Rajabhat University	
12. Mrs. Ruangrat Wongpramote	Head	The Section of Educational Policy Development on Enhancing Human Potentiality for Competitiveness of the Country, Bureau of Education Policy & Planning, The Education Council, Ministry of Education.	Secretary
13. Ms. Woramon Chulacharit	Head	International Education Strategy, The Education Council, Ministry of Education.	Assistance Secretary

Appendix 2

Thailand–US Higher Education Summit

April 10–21, 2005

Monday, April 11st

9:15 am - 9:30 am — Welcome remarks by Vice Dean Cheng Davis

9:30 am - 10:15 am — **Session I: Higher Education Finance**

Chair: Cheng Davis, Vice Dean for International Programs, PennGSE

Presenter: **Craig Carnaroli**, Executive Vice President for Finance and Treasurer, University of Pennsylvania

Topic: Review of Penn Finance

10:15 am - 11:00 am

Presenter: **Janet Plantan**, Chief Financial Officer, Executive Director of Finance and Administration, Graduate School of Education, University of Pennsylvania.

Topic: Case Study: PennGSE

11:45 am - 12:15 pm

Presenter: **Frank Claus**, Associate Vice President of Finance, University of Pennsylvania

Topic: Student Finance

12:15 pm - 1:30 pm — **Session II: Higher Education Leadership and Organization**

Presenter: **Leslie Kruhly**, the Secretary of the University, University of Pennsylvania

Topic: Penn Trustee System

2:00 pm - 4:00 pm **Session III: Faculty Recruitment, Retention, and Promotion**
Presenter: **Perry Molinoff**, Vice Provost for Research, University of Pennsylvania
Topic: Research and the Administration of Research at the University of Pennsylvania

4:00 pm - 5:00 pm **Lab tour at the School of Engineering and Applied Sciences (SEAS)**

Tuesday, April 12nd

10:00 am - 11:30 pm **Georgetown University**
Chair: **Samuel S. Robfogel**, Associate Director for International Initiatives
Participants: **Dennis Quinn**, Associate Provost of International Development
David Steinberg, Director of Asian Studies, Walsh School of Foreign Service
Dennis McNamara, Professor of Sociology & Korean Studies, Department of Sociology & Anthropology
Ronica Sanders Smucker, Director, Regional & International Advancement, Office of Alumni and University Relations

11:30 am - 12:00 pm Campus Tour

4:00 pm - 6:00 pm **American University**
Chair: **Robert A. Pastor**, Vice President of International Affairs

Wednesday, April 13rd

9:15 am **Columbia University**
Chair: **Van C. Mow**, Professor of Biomedical Engineering

2:00 pm - 3:00 pm **Office of Higher Education New York State Education Department**
Presenter: **Byron Connell**, Office of College and University Evaluation

6:30 pm - 11:00 pm Meeting with Thai Community of New York and New Jersey

Thursday April 14th

1:00 pm - 1:15 pm **New Jersey Institute of Technology**
Welcoming Remarks and Program Briefing
Chair: **Methi Wecharatana**, Professor of Civil Engineering
Presenters: **Urs P. Gauchat**, Interim Provost
Donald H. Sebastian, Sr. VP for Research & Development
Dana Knox, Assistant Provost

1:15 pm - 2:15 pm Tour the Center for Environmental Engineering & Science
Presenter: **Daniel Watts**, Executive Director

2:15 pm - 3:15 pm Visit NJIT's Incubator for Small Business Enterprises

3:30 pm - 5:00 pm Welcoming Addresss by President Altenkirch
Presentation of NJIT's University Profile, Direction, and Strategy
Question and Answer Session
Open Discussion on Potential Collaboration Between Thai Universities and NJIT

Friday, April 15th

11:30 am — Depart JFK - NYC for San Francisco

Saturday, April 16th

9.00 am -11.30 am — Study visit at Asian Art Museum

1.00 pm - 4.30 pm — Meeting with the President and members of Association of Thai Professionals in America and Canada

Sunday, April 17th

All Day — Study visit at San Francisco

Monday, April 18th

9:30 am — **Stanford University**
Presenter: **Pauline Larmaraud**, Coordinator for the Office of International Visitors, Bechtel International Center

10:00 am - 10: 45 am — Presenter: **Kathleen Quinn**, Senior Director of Major Gifts Office of Development

10:45 am - 11:30 am — Presenter: **Steve Suda**, Director of Office of Asian Relations Office of Development

11:30 am - 12:00 pm — Presenter: **Jeff Wachtel**, Sr. Assistant to President & Provost Office of the President and Provost

2.00 pm - 2.30 pm — **Stanford University Information Technology Systems& Services**
Presenter : **Tom Prussing**, Faculty Manager
Topic: Tour of Forsy the Hall Data CenterComputer Room

2.30 pm - 3.00 pm — Presenter: **John Pllat**, Infrastructure Project Manager
Topic: Stanford E-mail System

3.00 pm - 3.30 pm — Presenter: **Tom Goodrich**, Technical Support Manager
Topic: Help Desk Services

Tuesday, April 19th

8.45 am — **University of California at Berkeley**

9:00 am -10.30 am — Presenter: **William Webster**, Vice Chancellor for Budget & Finance

10:30 am - 12.00 am — Tour of Campus

1:30 pm — Visit to Sun Microsystems

1:45 pm - 2:45 pm — Presenter: **Emil Sarpa**, Director, External Research, Global Education and Research
Topic: SUN in Global Education and Research

2:45 pm - 3:30 pm — Tour the iForce Solution Center
By Pepi Edlinger, Manager, iForce Solution Center

Wednesday, April 20th

8:40 am — Depart from San francisso

Thailand–US Science and Education Dean Summit

Pruet Siribanpitak
Dean, Faculty of Education,
Chulalongkorn University

The Thailand-US Science and Education Dean Summit was held under an agreement between the University of Pennsylvania and the Thailand-US Education Roundtable Steering Committee which was coordinated by the Office of the Education Council, Ministry of Education.

Five Deans of the Faculty of Science, three Deans of the Faculty of Education and two education officials had joined the summit for two weeks during May 1-14, 2005. The group visited three high schools, five colleges, and four other supporting and learning resources as follows:

1. High Schools
   1) Radnor High School, Philadelphia, PA
   2) Hopkins High School, Minnesota
   3) Upper St. Clair High School, Pittsburgh, PA
2. Science Colleges
   1) University of Pennsylvania, PA
   2) University of Minnesota, MN
   3) University of Pittsburgh, PA

4) Duquesne University, PA

5) Carnegie Mellon University, PA

3. Supporting and Learning Resources

1) National Science Foundation

2) Smithsonian National Museum

3) Carnegie Science Center

4) National Air and Space Museum

Lessons Learned

The group has learned two important lessons as follows:

1. To improve science education requires a joint effort between professionals in education or pedagogy and science-content or innovative involvement of scientists in science education.

2. The conventional ways of science education is not effective as a result of ill-prepared teachers and too much emphasis on pedagogy or how to teach.

Interesting Advancement of Science Education and Science Teacher Education in the US

Science Colleges

1. Joint/Dual degree program in medical engineering, biomedical science, computer-cognitive science

2. Lab based courses

3. Cooperative education program to enhance working experiences

4. Cognitive apprenticeship (learning in the environment of experts)

5. The course as system (use strengths of components acting together-lectures, recitation sections, laboratories, coach problem solving)

6. Interdisciplinary program ie. Forensic Science and Law

7. Undergraduate research, scholarship and creative activities in science and mathematics

8. Small is beautiful "small enough so that every students' talents can be enhanced and used to make a difference"

9. Teaching a large introductory Physics through problem solving (UM)

10. The Pennsylvania Governor's School for the sciences (summer courses)

11. Integration of research & education at undergraduate level

(A technological approach "cutting-edge research" at CMU)

High Schools

1. Teachers and high school students do the research together

2. Teaching introductory geology class with 3 dimensions maps (to be a better informed citizen not a young geologist)

3. Teacher leadership in teaching development

4. Curriculum review every 7 years

5. Science standards

6. Students' choice driven school

7. The teachers' fellows and support team from university to public high school with the support of NSF

8. AP and IB programs for high achievers

9. Online science education resources

Teacher Education

1. Earth Links Project for teacher training

2. Integrate science and math content with pedagogy

3. Grant to college and school district to develop material for science and mathematics education (NSF)

4. Initial licensure teacher program designed to prepare inquiring, analytical and reflective teachers who can teach in the classroom and lead in the schools. According to the standard of effective practice for teacher (SEPT)

5. Induction program and supports for beginning science teachers, ie:

- Advisory team
- Mentor teachers
- Weekly communication
- Monthly meeting
- Classroom visits
- A huge-online monitoring program
- Materials

6. ASSET Program : Achieving Student Success through Excellence in Teaching providing:

- Standard supply of curriculum materials (rental basis) in life science, earth science, physical science, and technological science.
- "Teachers teaching teachers" Professional development (The more the teacher involve in professional development, the more the student's achievement increase.)
- Corporate-education partnership (ie. Westing House High School for Math&Science)
- Hands on/minds on learning (Focus, explore, reflect, apply)
- Teaching materials support (National Science Resource Center)

7. Different science-content at different teacher education programs:

- Master of Integrated Science Education for middle school science teachers
- Master of Chemistry (or Physics, or earth sci.) Education for high school science teachers

Recommendations for the Improvement of Science Education in Thailand

1. Strengthen the cooperation of university-school-corporate partners to upgrade either schools or colleges science education

2. Promote the teachers leadership in science education

3. Support student research and creative activities in science and mathematics curriculum

4. Provide scholarship to attract talent students and teachers in science and mathematics

5. Promote university honor's programs for high achievers in science and mathematics

6. More science and mathematics in school and college curriculum

7. Induction and inservice education for science and mathematics teachers

8. Continuous support of teaching materials and resources for science and mathematics teachers

Recommendations for the Improvement of Science Teacher Education in Thailand

1. Strengthen the cooperation of the faculty of science and the faculty of education in science teacher education

2. Emphasize on both pedagogy and science content (What to teach is as important as how to teach)

3. Attract more talent in science and mathematics to science teacher education program

4. Provide faculty instructional development lab. for continuous professional development

5. Continuous support of teaching materials and resources for science teacher education

List of Thai Participants

1. Assoc. Prof. Dr. Pruet Siribanpitak	Chulalongkorn University (Dean, Faculty of Education)
2. Assoc. Prof. Dr.Suladda Loipha	Kon Kaen University (Dean, Faculty of Education)
3. Prof. Dr. Piamsak Menasveta	Chulalongkorn University (Dean, Faculty of Science)
4. Assoc. Prof.Dr. Dech Budcharoentong	King Mongkut's University of Technology Thonburi (Dean, Faculty of Science)
5. Asst. Prof. Songsak Nitipreecha	Nakornrachasima Rajabhat University (Dean, Faculty of Science)
6. Prof. Dr. Chaivat Toskulkao	Mahidol University (Associate Dean, Faculty of Science)
7. Assoc. Prof. Dr. Ravewan Shinatrakool	King Mongkut's Institution of Technology Ladkrabang (Dean, Faculty of Industrial Education)
8. Assoc.Dr. Yuvadee Nakapadungrat	Srinakarinwirot University (Dean, Faculty of Science)
9. Assist. Dr. Chawalert Lertchalolarn	The Office of the Education Council, Ministry of Education
10.Ms. Woramon Chulacharit	The Section of International Education Strategy, The Office of the Education Council, Ministry of Education

Appendix

List of Speakers

(In alphabetical order)

Adulya Viriyavejakul

Current Position

President, Mahasarakham University

Academic Position

Professor of Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand

Education Background

1. M.D. Mahidol University (Faculty of Medicine, Siriraj Hospital), Thailand
2. LL.B. Thammasat University (Faculty of Law), Thailand
3. F.R.C.P. (London) Fellow of the Royal College of Physicians of London, U.K.
4. F.R.C.P. (Glasgow) Fellow qua Physicians, the Royal College of Physicians and Surgeons of Glasgow, U.K.
5. Diplomate, The Thai Board of Internal Medicine (The Thai Medical Council)
6. Diplomate, The Thai Board of Neurology (The Thai Medical Council)

Working Experience (selective)

- Member, National Committee on Standards and Assessment in Higher Education, Office of the National Standards and Assessment of Education (Public Organisation)
- President, Council of University Presidents of Thailand
- Secretary General, The Thai Medical Council
- Secretary General, The Medical Association of Thailand under the Royal Patronage
- Deputy Dean, Faculty of Medicine Siriraj Hospital, Mahidol University
- Vice President, Mahidol University

Amornwich Nakornthap

Current Position

- Director, Ramajitti Institute, a research institute focused on education and youth development (under joint support of the Thailand Research Fund and the Thailand Health Promotion Fund)
- Faculty member, Department of Educational Policy, Management, and Leadership, Faculty of Education, Chulalongkorn University

Education Background

- B. Ed. (Honor) Chulalongkorn University, Thailand 1981
- M.S. (Higher Education) Florida State University, U.S.A. 1984
- M.A. (Education Research and Evaluation) Ohio State University, U.S.A. 1986
- Ph.D. (Education Research and Evaluation) Ohio State University, U.S.A. 1988
- Certificate in Policy Studies, Cambridge University, U.K. 1991
- Fellow, Eisenhower Exchange Fellowship, U.S.A. 2002

Working Experience (selective)

- Advisor to the Deputy Minister of Education 2007
- Chairman, Task Force on Teacher Development Strategies, under Special Commission on Education Reform chaired by Deputy Prime Minister, 2002
- Member, House Commission to Study the Impact of Civil Service Reform on the Organization and Structure of the Ministry of Education, 2001
- Member, House Commission on Underprivileged Children, 2000-2001
- Vice-Chairman, Committee for the Drafting of Ministerial Regulations Regarding Homeschooling Practices, Ministry of Education, 2000
- Chairman, Task Force on Developing Quality Assurance Framework, Ministry of University Affairs (Commission on Higher Education at present), 1999

Boonserm Weesakul

Current Position

- President Emeritus, Dhurakij Pundit University
- Professor Emeritus, National Institute of Development Administration

Education Background

- Ph.D. (Statistics), University of Western Australia
- M.A. (Statistics), Columbia University, U.S.A.
- B.Sc. (Honors), M.Sc. (Physics), Liverpool University, U.K.

Working Experience (selective)

- Vice President for Administration, National Institute of Development Administration (NIDA)
- President, Dhurakij Pundit University
- Governor of Provincial Water Authority
- Director of Mass Communication Organization of Thailand

Chinnapat Bhumirat

Current Position

- Permanent Secretary for Education, Ministry of Education

Education Background

- Bachelor's degree in Education, Khon Kaen University, Thailand
- Master's degree in Curriculum and Instruction, University of Kansas, U.S.A.
- Doctoral degree in Science Education, University of Kansas, U.S.A.

Working Experience (selective)

- Deputy Permanent Secretary for Education, Ministry of Education
- Deputy Secretary-General, Office of Basic Education Commission, Ministry of Education
- Director, Bureau of Educational Policy Development and Strategic Planning, Office of the National Education Commission

Janjira Wongkhomthong

Current Position

President , the Association of Christian Universities and Colleges in Asia (ACUCA)

Education Background

1987 Ph.D. (Community Health). Texas Woman's University, U.S.A.
1979 M.S. (Nursing). Texas Women's University, U.S.A. Intensive Care Nursing, Methodist Hospital, Dallas, Texas, U.S.A.
1975 B.S. (Nursing). ChiangMai University, Thailand

Working Experience (selective)

- Dean, College of Nursing, Christian College
- Vice-President, Christian College
- Assistant to the Dean, College of Nursing, Rangsit University
- Assistant Researcher, National Medical Enterprise Co.,Ltd., Carrolton, Texas, U.S.A.
- Clinical Manager of Intensive Care Unit, Trinity Medical Center, Carrolton, Texas, U.S.A.
- Clinical Nurse Specialist, Flow Memorial Hospital, Denton, Texas, U.S.A.
- Part-Time Nursing Instructor, Cooke County College, Gainesville, Texas, U.S.A.
- Nursing Supervisor, Flow Memorial Hospital, Denton, Texas, U.S.A.
- Evening-In-Charge of Coronary Care Unit, Flow Memorial Hospital, Denton, Texas, U.S.A.

Khunying Sumonta Promboon

Current Position

- Chair, National Sub-Committee on Manpower Policy in Science and Technology
- Chair, Jombung Rajabhat University Council
- President, Education Society of Thailand
- President, Science Society of Thailand under the Patronage of H.M. the King

Education Background

- Bachelor's degree in Zoology, University of Wisconsin, U.S.A.
- Master's degree in Genetics, University of Wisconsin, U.S.A.
- Doctoral degree in Genetics, University of Hawaii, U.S.A.

Working Experience (selective)

- President, Srinakharinwirot University
- Vice President, Srinakharinwirot University
- Dean, Faculty of Science, Srinakharinwirot University
- Chair, Council of University Presidents of Thailand
- Chair, Recruitment and Human Resource Development Committee, Higher Education Commission

Krissanapong Kirtikara

Current Position

Advisor, King Mongkut's University of Technology Thonburi

Education and Training

1965-1973	B.Sc. in Engineering (1st Class Hons.), Electrical Eng., University of Glasgow, U.K.
	Ph.D. in Electrical Eng., University of Glasgow, U.K.
1980	Training and research in Alternative Energy, University of Florida, Gainesville, U.S.A.

Working Experience (selective)

- Secretary-General, Commission on Higher Education
- President, King Mongkut's University of Technology Thonburi
- Chairman, National Institute for Brain Based Learning
- Chairman: Council of Presidents of Autonomous Universities and Board of the Mahidol National Science School for the Gifted
- Vice Chairman, Council of University Presidents of Thailand
- University Councils: Taksin University, Chombueng Rajabhat University, Mahamakhut Rajavidyalaya University, Maejo University
- Leader, Junior Science Talent Program for gifted students (Lower Secondary) of the National Science and Technology Development Agency (NSTDA)
- President: Hill Area and Development Foundation and Bhumi-Panya Foundation
- Secretary-General, Chumbot-Pantip Foundation

Medhi Krongkaew

Current Position

Member, the National Counter Corruption Commission

Education Background

- 1967, B.A.(Econ. & Pol. Sci.), Victoria University of Wellington, N.Z.
- 1968, M.A.(Econ.), University of Canterbury, N.Z.
- 1976, Ph.D.(Econ.), Michigan State University, U.S.A.

Working Experience (selective)

- Professor, School of Development Economics, National Institute of Development Administration (NIDA)
- Director, Centre for Poverty Studies, NIDA
- Coordinator, Community Building Forum, the Pacific Economic Cooperation Council (PECC)
- Member, Thailand's Board of the National Statistical Office
- Professor of Economics, Faculty of Economics, Thammasat University
- Chair, APEC SOM Subcommittee on Economic and Technical Cooperation (ESC)
- Member, Thailand's National Budgetary Reform Committee
- Director, Institute of East Asian Studies, Thammasat University

Pichet Durongkaveroj

Current Position

- Executive Director, Knowledge Network Institute of Thailand

Education Background

- Ph.D., (Public Policy and Management), the Wharton School, University of Pennsylvania, U.S.A.
- M.Eng.Sc., Applied Solar Engineering, Trinity University, U.S.A.
- B.E., Electrical Engineering, University of New South Wales, Australia

Pisarn Soydhurum

Current Position

Specialist, Mahidolwittayanusorn School

Education Background

Ph.D. (Science Education), U. of Texas at Austin, U.S.A.,1977

M.Ed. (Teacher & Higher Education), Srinakharinwirot University (Prasarnmitr), Bangkok, Thailand, 1972

B.Ed. (Biology), Srinakharinwirot University (Prasarnmitr), 1970

Dip. Ed. Bangkok, Thailand, 1966

Working Experience (selective)

- Director, the Institute for the Promotion of Teaching Science and Technology (IPST)
- Asst. Vice President for Academic Affairs, Siam University, Bangkok, Thailand
- Acting Head, Biology Curriculum Development Team, IPST
- Vice Rector of Planning, Academic and Foreign Affairs, Dusit Thani College
- External Evaluator, Ph.D.Dissertation, Graduate School, Deakin University, Geelong Victoria Australia

Prasert Chitapong

Current Position

Senator from Election of the Senate on 2 March 2008

Education Background

Ph.D.(Agroecology), Rutgers University,New Jersey, U.S.A.,1983

M.S.(Resources Studies), Alabama A&M University, Alabama, U.S.A.,1976

M.S.(Agr.) in Plant Science, Kasetsart University, Thailand, 1973

B.S.(Agr.) in Plant Science, Kasetsart University, Thailand, 1970

Professional Experience (at Prince of Songkhla University)

1988 -2006	Associate Professor (Agroecology and Weed Science)
1980 - 1987	Assistant Professor
1976 - 1979	Lecturer
1974 - 1976	Research Associate, Alabama A&M University
1970 - 1973	Research Assistant, Kasetsart University

Administrative Experience (at Prince of Songkhla University)

2000 - 2006	President
1997- 2000	Vice President for Research and International Relations
1994 - 1997	Vice President for Research and Outreach
1987 - 1995	Dean, Faculty of Natural Resources
1984 - 1986, 1977 - 1979	Chairman, Department of Plant Science

Prayoon Sriprasart

Current Position

- Dean of Graduate School, Chalermkarnchana College, Srisaket

Education Background

- B.A. , Faculty of Arts, Chulalongkorn University, Thailand
- M.P.A., National Institute of Development Administration (NIDA), Thailand
- M.S. in Education, Northern Illinois University, U.S.A.
- Ph.D. in Education, Srinakharinwirot University, Thailand

Working Experience (selective)

- Associate Professor in Educational Administration, Sukhothai Thammathirat Open University
- Educational Planning Officer, Office of the National Education Commission

Pruet Siribanpitak

Current Position

Dean, Faculty of Education, Chulalongkorn University, Bangkok, Thailand

Education Background

Ph.D. in International and Development Education, Economics of Education, University of Pittsburgh, Pennsylvania, U.S.A. 1984

M.Ed. in Educational Administration, Chulalongkorn University, Bangkok, Thailand, 1979

B.Ed. in Primary Education, Chulalongkorn University, Bangkok, Thailand, 1974

Working Experience (selective)

- President, Thai Council of Deans of Education
- Associate Dean for Planning and Development, Faculty of Education, Chulalongkorn Head, Department of Foundations of Education, Faculty of Education, Chulalongkorn
- Member of the Task Force on Teacher's Reform, Office of Education Reform
- Member of the Task Force on Research and Development Project on the Rating System for Higher Education Institutions, Office of National Education Commission
- Advisor, Education Committee of the House of Representatives, and Senates

Vicharn Panich

Current Position

Director, Knowledge Management Institute (KMI)
Special Advisor, Thailand Research Fund (TRF)

Education Background

1960-1962 Faculty of Science, Chulalongkorn University, Thailand
1962-1966 Faculty of Medicine Siriraj Hospital, University of Medical Science (M.D.), Thailand
1966-1967 Rotating intern, Siriraj Hospital, Thailand
1967-1968 Department of Human Genetics, University of Michigan Medical School, Ann Arbor, Michigan, U.S.A
M.S. (Human Genetics)

Working Experience (selective)

- Member of the Executive Board of The National Center for Genetic Engineering and Biotechnology (BIOTEC)
- Member of the Policy Board of Sirindhorn Anthropology Centre
- Advisory Committee on the Center of Excellence, Faculty of Science, Mahidol University
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- Chairman of the Steering Board (SB) on Thailand-Tropical Diseases Research Programme (T2) which is a collaborative programme supported by The Thailand Research Fund (TRF), The National Center for Genetic Engineering and Biotechnology/ National Science and Technology Development Agency (BIOTEC/ NSTDA), and WHO/TDR
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Glossary of Organization Acronyms

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AIT	Asian Institution of Technology
DTEC	Department of Technical and Economic Cooperation
HEFRC	Higher Education Financing Reform Committee
HEFRO	Higher Education Financing Reform Office
IPST	Institute for the Promotion of Teaching Science and Technology
KMIT	King Mongkut's Institute of Technology
KMUT	King Mongkut's University of Technology
KMUTT	King Mongkut's University of Technology Thonburi
MERC	Ministry of Education, Religion, and Culture (now MOE)
MOE	Ministry of Education
MUA	Ministry of University Affairs (now OHEC)
NERO	National Education Reform Office
NIDA	National Institute of Development Administration
NRCT	National Research Council of Thailand
NSTDA	National Science and Technology Development Agency
OEC	Office of the Education Council
OERC	Office of Education, Religion, and Culture (now OEC)
OHEC	Office of the Higher Education Commission
ONEC	Office of the National Education Commission (now OEC)
ONESQA	Office for National Education Standards and Quality Assessment (Public Organization)
SUT	Suranaree University of Technology
TAST	Thailand Academy of Science and Technology
TRF	Thailand Research Fund

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