Princess Maha Chakri Sirindhorn's Vision and Action in Science, Technology and ICT for Development

The Information Technology Project under the Initiative of
H.R.H. Princess Maha Chakri Sirindhorn

National Science and Technology Development Agency

ISBN : 978-616-12-0367-2
First Edition : April, 2016
Number of copies printed : 1,200

Princess Maha Chakri Sirindhorn's Vision and Action in Science, Technology and ICT for Development/by The Infomation Technology Project under the Initiative of H.R.H Princess Maha Chakri Sirindhorn. Pathum Thani : National Science and Technology Development Agency, 2016.
262 p. : ill.
ISBN : 978-616-12-0440-2
1. Information technology2. Information technology – Thailand
3. Information technology -- Study and teaching
I. Maha Chakri Sirindhorn, H.R.H. Princess, 1955-
II. National Science and Technology Development Agency
III. The Infomation Technology Project under the Initiative of H.R.H Princess Maha Chakri Sirindhorn IIII. Title

T65 607

Published by

The Information Technology Project under the Initiative of
H.R.H. Princess Maha Chakri Sirindhorn
Secretariat : National Science and Technology Development Agency
Ministry of Science and Technology

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Introduction

If you ask Thai people to name qualities they associate with Her Royal Highness Princess Maha Chakri Sirindhorn, words that are always high on the list include compassion, intelligence, curiosity and, above all, service to the people of the Kingdom. Not content to live her life behind palace walls, Her Royal Highness is a prime example of the virtues of lifelong learning. She has always had a keen interest in science and technology both as an intellectual pursuit and as a means of enhancing the quality of life for Thai people. She has been called a 'determined developer', whose efforts are based on the principle that any development model must be suitable for the geography of the land and the nature of the people who reside there. This encompasses consideration of the local population's cultural and religious beliefs as well as their economic and social backgrounds. High technology should go hand in hand with local wisdom, and to be truly effective the developers must have love and a sense of responsibility for the people and the land.

This book is intended to present the works related to science and technology undertaken by Her Royal Highness. The projects listed are primarily those co-ordinated by the National Science and Technology Development Agency (NSTDA) on her capacity as the secretariat of Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn. The projects have shown concrete results because of the wisdom and dedication of Her Royal Highness

and the collaborative efforts of great many partners in the public, private and educational sectors whose names appear in the apppendix.

The science and technology projects under the initiative of Her Royal Highness Princess Maha Chakri Sirindhorn can be grouped into three broad categories:

Development of Science and Technology

H.R.H. Princess Maha Chakri Sirindhorn supports the development of human resources at every level through programs designed to make the country's educational system more competitive. There has been a special focus at the highest educational levels to develop the nation's brightest minds through advanced training. Students, teachers, lecturers and professional scientists have been given the opportunity to travel to foreign countries to gain knowledge at state-of-the-art facilities through informative visits, training sessions, research grants and scholarships. The individuals involved greatly enhance their professional capabilities and bring back the knowledge they've gained for the country's development.

H.R.H. Princess Maha Chakri Sirindhorn supports collaborations with institutions and organizations on the very cutting edge of human achievement. For example, Thai students, teachers and working scientists have been sent to study at CERN (Conseil Européen pour la Recherche Nucléaire), DESY (Deutsches Elektronen-Synchrotron), and the Chinese Academy of Sciences. H.R.H. Princess Maha Chakri Sirindhorn strongly supports the strengthening of international networks as she realizes

the creation and utilization of knowledge requires the cooperation of many parties.

Science and Technology for Education

H.R.H. Princess Maha Chakri Sirindhorn is well aware of the need to give better educational opportunities to younger students to allow them to realize their full potential and stimulate the country's development. Priority is placed on teaching basic science and math courses because these supply the foundation for a career in applied sciences and technology. Her Royal Highness has supported many basic education projects geared toward providing students with an early understanding of the scientific process, and she believes it's never too early to start.

Projects include the Little Scientist's House for Preschoolers, Children's University for primary and high school students, IT for education in Islamic Private Schools, and General Buddhist Scripture Schools. Her Royal Highness also works to improve the quality and quantity of teachers in small rural schools through the Electronic Distance Learning Television Project (eDLTV) and the training of teachers in the use of ICT.

Science and Technology for the Development of the Underprivileged

Her Royal Highness Princess Maha Chakri Sirindhorn has always had a high degree of compassion for the least fortunate members of society. That is why Her Royal Highness has established projects to benefit the disabled, prison inmates and chronically-illed children.

Wherever possible these projects attempt to use science and technology to ease suffering. At the same time, Her Royal Highness realizes that strong people-to-people support networks for these groups and a better understanding of their special needs are crucial if they are to have a chance to live productive and meaningful lives.

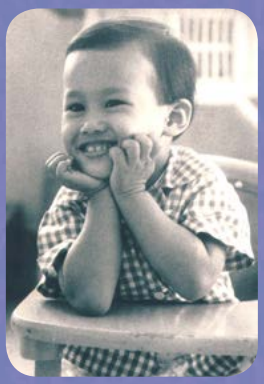
H.R.H. Princess Maha Chakri Sirindhorn supports educational programs that teach skills and self-reliance to people with disabilities. Through Her Royal Highness Initiative Projects, inmates receive moral training along with occupational training to increase their chances of a successful reintegration into society once they are released. Her Royal Highness pays special attention to autistic children and children with cerebral palsy, and has proposed science-based initiatives to enable these young ones to have an opportunity to develop life skills and capabilities.

It is the hope of the production team that this book will inspire readers to follow the example of Her Royal Highness Princess Maha Chakri Sirindhorn and strive continually to use innovation and technology to create good things for the benefit of people, communities and society. The production team would like to thank all the organizations and individuals involved who have given such wonderful cooperation in terms of suggestions, information and referenced documents in the course of putting this book together.

The Production Team

Content

Science and Technology For the Development of the Underprivileged



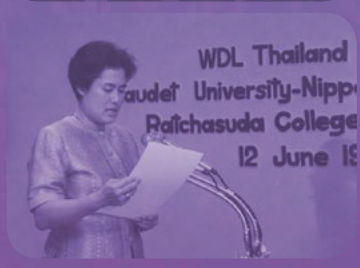








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Biography of

Her Royal Highness
Princess Maha Chakri Sirindhorn

Her Royal Highness Princess Maha Chakri Sirindhorn was born on April 2, 1955, the third child of Their Majesties King Bhumibol Adulyadej and Queen Sirikit of Thailand. Her Royal Highness completed her primary education at Chitralada School and was ranked number one in her class in the 1968 national academic examination and again in 1973, when she enrolled in the Faculty of Arts, Chulalongkorn University. Her Royal Highness majored in History and minored in Bali-Sansakrit language. She earned a Bachelor of Arts Degree with first class honors and a gold medal in History.

Her Royal Highness Princess Maha Chakri Sirindhorn was awarded a Master of Arts in Oriental Epigraphy from Silpakorn University in 1979 and a Master of Arts in Pali and Sanskrit from Chulalongkorn University in 1981. She continued her studies in a doctorate program in Development Education at Srinakarinwirot University and graduated in 1986.

Her Royal Highness Princess Maha Chakri Sirindhorn is an eager learner who has always been interested in new fields of science. Her determination in helping people inspires her to always look for new approaches.

A passion for native art and culture led her to study Thai music and dance, and almost all kinds of Thai arts and crafts. She excelled in the study of Thai and foreign literature and is a gifted composer in both poetry and prose. She has studied many foreign languages, including English, French, German, Chinese, Cambodian, Pali, Sanskrit and Latin. She has visited many countries at the invitation of scientific institutes. In addition, she has created works of traditional and contemporary fine arts. She has also encouraged talented individuals to pursue careers in arts and crafts through projects and grants.

Her Royal Highness Princess Maha Chakri Sirindhorn has worked hard to improve nutrition in the country. In her childhood, Her Royal Highness often accompanied Their Majesties the King and Queen on royal visits to remote areas, so she understands the needs and wants of the people.She realized at a young age that to enhance standards of living it is necessary to draw on a broad-based and integrated knowledge. For example, a blueprint for agricultural development requires knowledge of geography, botany, plant improvement, water management, mapping and other skills. Her Royal Highness is keen to promote technological advances alongside the proper utilization of natural resources for sustainable development. She has focused especially on sanitation and nutrition as they are of utmost importance to developing a high standard of living.

Her Royal Highness Princess Maha Chakri Sirindhorn is aware of the importance of science and technology in the development of the country and has therefore studied numerous disciplines and worked to apply them to benefit the people. Her royal initiatives include development projects in rural areas which focus on education and nutrition for children, projects to utilize plant genetics in agriculture and the plant bank. Her Royal Highness has also initiated information and communications technology programs designed to develop learning skills and enhance self-reliance in people with disabilities.

The list of charitable organizations and foundations to which Her Royal Highness has unselfishly given her time and energies is a long one. To name a few, she has been a vice president of the Thai Red Cross since 1979 and is a chairperson of a number of foundations. These include the Chaipattana Foundation, which has involvement in development projects and environment conservation projects; the Anandamahidol Foundation to promote university education; the King Rama II Phraboromrachanusorn Foundation, under royal patronage to promote and conserve Thai arts and culture; the Sai Jai Thai Foundation for soldiers injured or disabled in their mission to protect the country; and the Prince Mahidol Award Foundation, which presents international awards for excellence in medicine and public health. Her Royal Highness is alsoan honorary chairperson of the Princess Maha Chakri Awards to honor teachers of any nationality who are excellent role models. She is an adviser for His Mahesty the King's Committee of Thai Encyclopedia for Youths.

On the international stage, Her Royal Highness is Special Health Advisor of the World Health Organization to the border people in the South East Asia Region; an honorary committee member of the Bloomberg School of Public Health, Johns Hopkins University; a counselor for Refugees Education Trust headquartered in Geneva; and special ambassador to schools for the World Food Program of the United Nations.

Her Royal Highness has been lecturing on various subjects since 1979, when she began teaching formal classes at Chulalongkorn University. In 1980 she joined the Department of Law and Social Sciences in the Academic Division of Chulachomklao Royal Military Academy (CRMA) and became the Director of the Department of History. She is very active with the Thai Music Club of the academy as well. Her Royal Highness has been invited as a guest lecturer and joined in numerous seminars at academic institutes in Thailand and abroad.

Her Royal Highness Princess Maha Chakri Sirindhorn is well versed in Thai and foreign literature and is a gifted writer of poetry and prose. She has published works in poetry, literature, archeology, religion, nutrition, rural development and other areas. Her treatises on royal visits abroad have been very popular; revenue from the books goes to the H.R.H. Princess Maha Chakri Sirindhorn Foundation for support of poor students.

Those who follow the life and works of Her Royal Highness are continually impressed with the passion for learning and boundless compassion that drive her longstanding efforts to create a better life for Thais in every socio-economic group.

Vision on Science and Technology

"In the present global society moving towards 'knowledge-based society and economy', we need education with a focus on thinking process, lifelong learning, knowledge creation and innovation, as a foundation of social and economic development. Science and technology is not only the key to such development, but also a tool to build up students' scientific behavior, namely, logical thinking, problem-solving and idea-proving by a systematic scientific method. The academic promotion of science and technology therefore paves the way for a new era of social and economic development."

A perspective on science and technology in the modern world
offered by H.R.H. Princess Maha Chakri Sirindhorn
in an address at the opening ceremony of
the 30th Congress on Science and Technology of Thailand
on October 19, 2004.

Her Royal Highness Princess Maha Chakri Sirindhorn has a keen interest in science and through training programs and workshops she has developed a broad knowledge of the practical applications of technology. Early on, Her Royal Highness realized that in order to bear good fruit, advancements in science and technology must be linked to applications that are in harmony with nature and that enhance the quality of people's lives

Her Royal Highness is a firm believer in the maxim that scientific research should begin with the raising of many questions and proceed through activities and experiments designed to test existing assumptions and explore new possibilities. Curiosity is a vital ingredient, as is attention to detail in making observations and systemically collecting and recording information. Assumptions must be cross-checked and proven experimentally before an integrated conclusion can be reached.

As she was growing up Her Royal Highness was taught concepts of sustainable agriculture, biological diversity and soil, water and forest conservation. She is therefore well prepared to continue the work of Their Majesties the King and Queen in the fields of agriculture, natural resources and the environment. She initiated a plant genetic conservation project and has been working on the plants database to improve management of rice and other chief economic crops, vetiver grass, dairy cattle, and to develop more productive and insect resistant seed strains for farmers. In her work she explores the use of technological advances, but at the same time she is aware of the constraints they may impose in certain circumstances.

An area of particular interest to Her Royal Highness is proper nutrition for the young. In the past, many children in remote areas of Thailand showed signs of malnourishment. To address this problem Her Royal Highness initiated school lunch programs in provinces which are home to large numbers of hill tribe learning centres, Border Patrol Police schools, General Buddhist Scripture Schools at Nan and Tak provinces, as well as the Islamic Private Schools in three south most provinces.

Her Royal Highness avidly monitors advances in the pure sciences in areas such as astronomy, particle physics, nanotechnology, biotechnology, biomedical engineering and information and communication technology. She strongly promotes science education for young Thais and aspires for the nation to take its place among the global leaders in science and technology.

Whenever she visits abroad Her Royal Highness' schedule is always packed with meetings with academics and innovators. Her Royal Highness especially enjoys talking and listening to respected scientists to gain information on new technologies. Her Royal Highness then integrates her knowledge and experiences to work out ideas for development projects to benefit the Thai people and move the country forward.

The significance of Her Royal Highness' initiatives and development projects has been recognized worldwide through the presentation of numerous important international awards, including:

- Ramon Magsaysay Award experiences, The Foundation of Ramon Magsaysay, presented at the Philippines Cultural Centre, the Phillippines on August 31, 1991.
- ASEAN Achievement Award in Community Development, The ASEAN Institute, presented in 1995.

- Franklin D Roosevelt International Disability Award 2001, which His Majesty the King assigned Her Royal Highness Princess Maha Chakri Sirindhorn to accept on behalf of Thailand, presented in New York, U.S.A, July 2, 2001.
- The National Researcher Award 2002 in Multidisciplinary, The National Research Council of Thailand, presented on September 11, 2002 at Dusitdalai, Chitralada Royal Villa.
- The GSE International Award of Merit, Graduate School of Education, Pennsylvania University, presented in 2004 for leadership in education.
- The Trophy of Excellent Leadership, dedicated to the project of sustainably ridding of iodine deficiency disorders, presented by the International Council for Control of Iodine Deficiency Disorders in Bangkok, August 19, 2003.
- The World Food Program Honorary School Lunch Ambassador, presented by The World Food Program of the United Nations, Rome, Italy on October 11, 2003.

- UNESCO Goodwill Ambassador for the Empowerment of Minority Children and the Preservation of their Intangible Cultural Heritage, the United Nations Educational, Scientific and Cultural Organization, presented by Mr. Koishiro Matsuura, Director-General of UNESCO, March 2005, in Bangkok.
- The Indira Gandhi Prize 2004, November 19, 2005, India.
- Honorary Patron of Connect the World, presented by International Telecommunication Union (ITU), December 8, 2006.
- Special Award of International Union of Nutritional Sciences, for Her Royal Highness excellent works in promoting nutrition for the underprivileged, presented on October 2, 2009.

- Commemorative Badge and the Certificate of the "Top Ten International Friends of China", presented by Jia Qinglin, Chairman of the National Committee of the Chinese People's Political Consultative Conference, December 8, 2009, Beijing, The People Republic of China.
- Honorary Senator of The Lindau Nobel Laureates Foundation, presented at the opening of 60th Lindau Nobel Laureate Meeting, June 27, 2010.
- Leader of Technology Management, presented at the Portland International Conference on Management of Engineering and Technology (PICMET), July 6, 2010 at Chaipattana Building, Chitralada Royal Villa, Bangkok.
- Memorial Medal Award, presented by the International Federation of Inventors' Association (IFIA) on February 3, 2011 at Chaipattana Building, Chitralada Garden, Bangkok.
- Hilal-i-Pakistan Insignia, presented by Asif Ali Zardari, the president of Pakistan, March 20, 2012 at Aiwan-e-Sadr, the President's House, in Salamabad, Pakistan
- Honorary Doctorate in Public Services, presented by The Sage Colleges of the United States of America, May 12, 2012 at The Sage Colleges, New York, U.S.A.

- CESA Honorary Membership Plaque, Comparative Education Society of Asia (CESA), presented at the 8th International Academic Conference of the CESA, July 9, 2012 at Chulalongkorn University, Bangkok, Thailand.
- Royal Scholar of the Scholar Science Council of Lisbon, presented on July 17, 2012 at Portuguese Embassy in Bangkok.
- Honorary Membership of the Institute of South East Asian Studies, presented on July 25, 2012 at the Institute of South East Asian Studies, Singapore.

The outstanding vision of H.R.H. Princess Maha Chakri Sirindhorn in formulating her development initiatives is to integrate science and technology with human resources and society. In this model science and technology are in harmony with the humanities and social sciences. Moreover, because science and technology are integral parts of culture and society, Her Royal Highness believes it is vitally important to teach basic scientific concepts and the scientific method to all children and youths not just certain groups. This will not only result in a more complete education, it will also help them to develop the intellectual tools needed to recognize the value and the dangers associated with technology. A proper understanding of science and technology should lead to respect for the laws of nature and the environment, particularly to conservation, sustainable development and the wise use of natural resources.

"Scientific discovery leads to better living for humanity. Scientific knowledge advances innovation. It is a significant driver of public health and medicine, helping people to live longer and happier lives. However, we have to try to push science to be more beneficial to the entire world population and help upgrade the quality of life for the underprivileged in the society, without concern for differences in economic or social status, race or religion".

Her Royal Highness Princess Maha ChakriSirindhorn remarks on the occasion of her being presented the title of the Honorary Senate by the Foundation of Lindau Nobel Prize Winners, June 27, 2010.

Development of Science and Technology

Her Royal Highness Princess Maha Chakri Sirindhorn
with CERN executives
on March 16, 2009

Thai Scientists Move Forward to CERN

"I hope that this collaboration can lead to better and conflict-free international cooperation based on the scientific principle. For the Thai scientists, researchers and students involved, to be accepted for participation in a scientific endeavor like this is a very positive sign on our standards of education and quality of the people."

Remarks of Her Royal Highness Princess Maha Chakri Sirindhorn on the occasion of the presentation of an Honorary Doctorate in Physics from Suranaree University of Technology to Professor Rolf-Dieter Heuer, the Director of CERN at Srapathum Palace in Bangkok on October 10, 2013

Establish Cooperation

Perhaps the most ambitious royal initiative of H.R.H. Princess Maha Chakri Sirindhorn to date is sponsorship of the collaboration of Thai students and scientists with CERN, the organization which is trying to unravel the very nature of matter. From the CERN website: "At CERN, the European Organization for Nuclear Research, physicists and engineers are probing the fundamental structure of the universe. They use the world's largest and most complex scientific instruments to study the basic constituents of matter – the fundamental particles. The particles are made to collide together at close to the speed of light. The process gives the physicists clues about how the particles interact, and provides insights into the fundamental laws of nature."

What is CERN?

CERN is the European Organization for Nuclear Research, based in Geneva. The name CERN is derived from the acronym for the French "Conseil Européen pour la Recherche Nucléaire", or European Council for Nuclear Research, a provisional body with the mandate of establishing a world-class fundamental physics research lab proposed by Louis Victor de Broglie, a French physicist. Officially established in 1954, CERN was founded by 12 member countries in Europe.

Louis Victor de Broglie (1892-1987)

Source: http://en.wikipedia.org/wiki/CERN

Her Royal Highness Princess Maha Chakri Sirindhorn has long taken an active interest in the CERN project and first visited the facility in 2000. Her Royal Highness wanted Thai scientists to be involved in this fantastic intellectual exercise and approached Prof. Dr. Pairash Thajchayapong, o explore hoe Thai scientists could take part in this project. Her Royal Highness mentioned to Prof. Dr. Pairash that if Thai scientists had the opportunity to do a joint-research with CERN it would be very beneficial to the development of science and technology in Thailand.

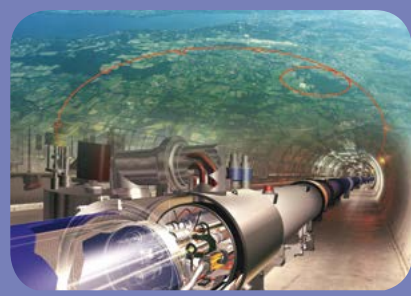
Prof. Dr. Pairash therefore co-ordinated and consulted with executives at CERN and Synchrotron Light Research Institute (public organization) operating projects aimed at promoting basic and applied scientific research in Thailand) about the possibility to develop a scientific or academic collaboration. This led to the signing of an expression of interest in the participation of physicists from universities and research institutes from Thailand in the CMS (Compact Muon Solenoid) Experiment at the CERN LHC Accelerator.

The collaboration opened an opportunity for Thai physics students and teachers to participate in a CERN summer program and join in experiments in high-power particle physics. Her Royal Highness presided as chairwoman and witness to the signing ceremony while she was on her third visit to CERN, in March 2009.

In 2009, the Sub-committee on Academics and Research with CERN was set up in order to oversee the co-operation between Thai organizations and CERN. Synchrotron Light Research Institute (Public Organisation) and the National Science and Technology Development Agency (NSTDA) are co-secretariats of the sub-committee. Collaboration are working activities that have been implemented are CERN School Thailand and CERN's WLCG Grid Computing. Later, the name of the sub-committee has been changed to the Committee on CERN-DESY Academic and Research Collaboration to make collaboration with CERN and DESY under the purview of the same committee for better synergy.

H.R.H. Princess Maha Chakri Sirindhorn athe MoU signing ceremony between Chulalongkorn University and CERN's CMS research program at Srapathum Palace on July 14, 2012.

What is CERN doing?



Large Hadron Collider

The primary research at CERN is involved with particle physics. The CERN facility on the Franco-Swiss border near Geneva houses the Large Hadron Collider (LHC), the world's largest and most powerful particle accelerator.

The LHC consists of a 27-kilometre ring of superconducting magnets with a number of accelerating structures to boost the energy of the particles along the way. When particles collide, they fragment into smaller particles which are detected by the supersensitive instruments at CERN.

The scientists at CERN wrestle with questions about the very nature of matter and energy. For example, the 'Big Bang' bang should have created equal amounts of matter and antimatter, or dark matter. So why is there far more matter than antimatter in the universe?

Scientists at CERN are also trying to pin down a very elusive particle / the Higgs boson. It is thought that elementary particles may have gained their mass from the Higgs boson.

Source: http://home.web.cern.ch/about/accelerators

Collaborative Activities of Thai Institutes and CERN:

- Program for distribution of knowledge of particle physics, operated through various programs such as CERN School Thailand (Master and Doctor) and Thailand Experimental Particle Physics Novice Workshop (Graduate level). The program sponsors speakers, some of them from CERN, to come to Thailand to give lecture on particle physics theory and experimentation.

- Scholarships for students and physics teachers operated through the CERN Summer Student Program and CERN Physics High School Teacher Program. The programs started in 2010 and are open to students in Computer Engineering and Computer Science who have knowledge in Parallel and Distributed Computing, and Cloud Computing.

- A joint research between Thai researchers researchers working with CERN and CERN scientists, open to Master's and PhD students and researchers. In 2012, Chulalongkorn University students worked with CMS Research Station, and Suranaree Technology University students worked with ALICE (A Large on Collider Experiment) on advanced research. For example, Dr. Norraphat Srimanobhas from Chulalongkorn University did research at Compact Muon Solecoid (CMS) experiment at CERN's LHC on gravitons, dark matter and HIGGS particles.

- The National e-Science Infrastructure Consortium, a program initiated by Her Royal Highness after she visited CERN for the third time and was introduced to the Worldwide LHC Computing Grid (WLCG). This global initiative was launched in 2002 to provide computing resources to store, distribute and analyze data generated by the Large Hadron Collider. Thailand joined with more than 30 other countries to connect with the LHC grid. The science infrastructure covers data management the system, network computers and databases which have supported

Dr. Norraphat Srimanobhas

research in many areas, including high energy particle physics, climate change, water resource management, energy and environment, computer science, and computer engineering.

- CERN has provided the opportunity for Thai high school students to visit CERN for about 5-6 days each year, starting from 2013. Students were selected based on their test scores in physics and their written application document. Ten and twelve students were selected to join the program in 2013 and 2014 respectively.

Thai Physic students and teachers participating in a training program at CERN

Thai students doing research at CERN

Many Modern Wonders were Created at CERN

The cutting edge research at CERN has led to new technologies that people today would find it difficult to live without. In 1989, the World Wide Web was given birth at CERN because computer scientist Tim Berners-Lee and his team wanted to be able to link scientists working across the globe on CERN-related experiments.

The touch-screen display, introduced in 1973, was developed by engineers at CERN.

CERN scientists were responsible for significant improvements in Positron Emission Tomography (PET) in 1977.

The world's first web server

Source: http://en.wikipedia/wiki/World_Wide_Web

From 2010 to 2014, a total of 13 organizations in Thailand were involved in the collaboration with CERN initiated by Her Royal Highness. These are: Synchrotron Light Research Institute (Public Organization), Thailand Center of Excellence in Physics, The Thailand Research Fund, Chulalongkorn University, Suranaree University of Technology, Mahidol University, King Mongkut's University of Technology Thonburi, Thailand Institute of Nuclear Technology (Public Organization), Hydro and Agro Informatics Institute (Public Organization), The Institute for the Promotion of Teaching Science and Technology, Agricultural Research Development Agency (Public Organization), National Science and Technology Development Agency.

At present Thailand lacks the technological resources, funding and capability to create a facility like CERN. Through the efforts of H.R.H. Princess Maha Chakri Sirindhorn, however, Thai students and researchers have been given the opportunity to learn, work and train with top notch academics and science professionals at this world's eminent international institute. The experience enhances the quality of Thai personnel and also establishes a productive relationship with a great many talented and highly skilled scientists. Thus the vision of Her Royal Highness has paved the way for a more technologically capable and prosperous society.

Prof. Dr. Helmut Dosch, Director of DESY had an audience with H.R.H. Princess Maha Chakri Sirindhorn on August 9, 2012 at the Imperial Queen's Park Hotel, Bangkok on the occasion of her presiding as chairwoman of the opening ceremony of The 6th Asia-Oceania Forum for Synchrotron Radiation Research (AOFSRR 2012) and The 4th SLRI Annual User Meeting (SLRI AUM 2012).

Thai Youths Gain Experience at DESY

"When young people have the opportunity to join an activity abroad, they should be very open to learn from the whole experience, not just the work or activities in the institute. They should also learn about the society and culture of other nations."

Remarks of Her Royal Highness Princess Maha Chakri Sirindhorn to executives and students at the National Science and Technology Development Agency (NSTDA) Annual Conference (NAC) on March 24, 2008 at Thailand Science Park.

Deutsches Elektronen-Synchrotron (DESY) is a state-of-the-art high energy physics research institute. It is one of the world's leading accelerator centres, operating at sites in Hamburg and Zeuthen in Germany. Every year the institute welcome international students who excel in physics and natural sciences to join the activities the DESY labs through the Summer Student programme.

Her Royal Highness Princess Maha Chakri Sirindhorn has visited DESY in Hamburg twice; on August 21, 2002, and June 30, 2011. On her first visit, Her Royal Highness was informed that two scholarships would be granted to Thai students in natural sciences to participate in the DESY Summer Student Programme. One scholarship was provided by DESY

H.R.H. Princess Maha Chakri Sirindhorn visited DESY on June 30, 2010, and was welcomed by Prof. Dr. Helmut Dosch, Director of DESY.

and the other provided by Wolfgang Krohn, Honorary Consul-General of Germany in Thailand. Her Royal Highness had asked the National Science and Technology Development Agency and Synchrotron Light Research Institute (Public zation) to be responsible for the selection of Thai youths to join the Summer programme. After the signing of an MoU in August 2012, the number of scholarships was increased to four per year. As of the summer of 2014, there have been 27 students who had participated in the programme.

The European X-Ray Laser Project (XFEL) at DESY is a 3.4-km. long facility which runs essentially underground, at about 6-38 metres, with three sites above ground. It was completed in 2015 and opened for experimentation in 2016.

The activities at the DESY Summer Student Programme which Thai students can choose to join according to their interests include:

1. Experiments in Elementary Particle Physics, including Physical Characterisation, Experimental Equipment Development and Data Processing.
2. Experiments with Synchrotron Radiation. Students have a chance to experience basic and applied research in Physics, Chemistry, Biology, Medical, Material Sciences and Geology.

3. Research on Accelerators. Students have a chance to join research with a group of accelerators called TESLA, or research on superconducting magnets.
4. Theory of Elementary Particles. Students will join the theory research by reading the research document and discussion.
5. Computing in High Energy Physics at the operating lab at Zeuthen.

Examples od students who have joined the CERN Summer Programme are:

- Nirawat Thammajak, who is now a scientist at BL8-XAS research station, Synchrotron Light Research Institute (Public Organisation). He studied the structure of a new crystal magnet substance using X-ray crystallography and neutron crystallography.
- Pongladda Panyajirawut who is now a lecturer in Physics at the Faculty of Science, Silpakorn University. She studied the structure of zinc oxide by using X-ray diffraction. Zinc oxide semiconductors and can be made super thin and have applications in solar cells.

Technological Collaboration with DESY

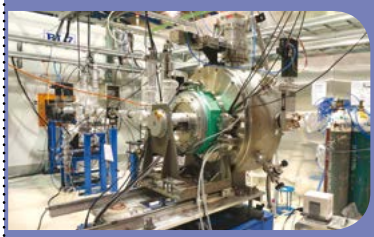
When DESY Institute replaced the DORIS III light synchrotron generator with the PETRA III light synchrotron generator, they donated some equipment (four-system focus mirror) of the DORIS III to Thailand's Light Synchrotron Institute on August 28, 2013. The equipment has made it possible to increase the light intensity at the testing station.

- Atchara Thammajak is a lecturer in Physics and Materials Science at the Faculty of Science, Chiang Mai University. She studied the crystal structure of new semiconductors used in optoelectronics (the study and application of electronic devices that source, detect and control light) and solar cells to aid in developing designs to make them less costly and more efficient and environmentally friendly.

Spreading the Benefits of Synchrotron Light

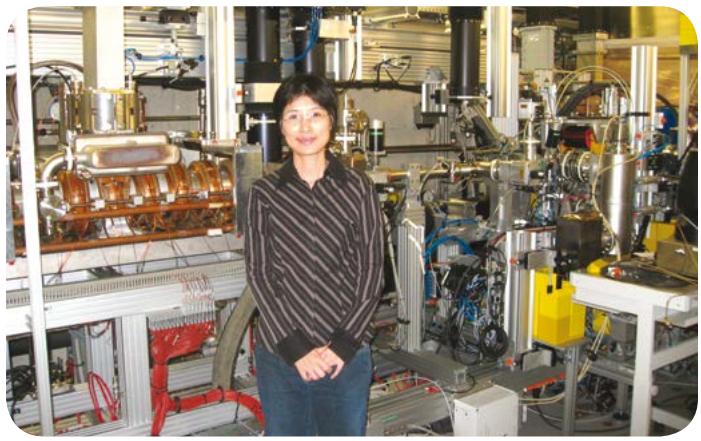
Synchrotron light is electromagnetic radiation that is emitted when charged particles moving at close to the speed of light are forced to change direction by a magnetic field. Synchrotron radiation spans a wide frequency range, from microwave up to the highest-energy X-rays, so it can be used in a variety of applications. In practice, synchrotron light is shot to the sample object to be studied, and the emitted signals are then detected by sophisticated sensors. For example, infrared inspection reveals data on the chemical bonds of the sample objectdata; X-ray inspectio gives the composite substance data; and electron inspection provides surface qualification data.

Thai researchers have exploited the Siam Photon Source (SPS) in a wide range of applications. These include using techniques of X-ray crystallography to study the three-dimensional structure of enzymes that accelerate carbohydrate metabolism; employing an X-ray absorption technique to study the chemical composition of stained glass samples more than 150 years old, providing crucial information on how to restore ancient art objects; and infrared inspection to study chemical changes in biomolecules of cloned bovine embryos.



Source: press release of Synchrotron Light Research Institute.

Thailand Center of Excellence in Physics sent five researchers and doctorate students from the Femtosecond Electron and Proton Pulses Research Laboratory, Chiang Mai University to join the Photo Injector Test Facility at DESY's research at Zuethen (PITZ). It was the chance of a lifetime for Dr. Jitlada Thongbai (project leader), Dr. Sakorn Rimjaem, Dr. Jatuporn Saisut, Mr. Keerati Kusoljariyakul and Mr. Prach Boonpornprasert to work with leaders in global scientific organizations and make friends from many countries.



Dr. Jitlada Thongbai joins the PITZ on June 21-25, 2009, and August 29-September 2, 2010

Her Royal Highness Princess Maha Chakri Sirindhorn has repeatedly shown her vision for the country by providing opportunities for Thailand's best and brightest. The knowledge gained by the participants in such state-of-the-art scientific ventures benefits them professionally, and at the same time advances the entire nation on the road to self-reliance and technological excellence.

Her Royal Highness Princess Maha Chakri Sirindhorn gave a speech at the opening ceremony of Nobel Laureates Meeting in the year that the 'Foundation Lindau Nobel Prize winners Meeting at Lake Constance' confirmed upon Her Royal Highness with the title of the Honorary Senate of the council on June 27, 2010

Lindau Nobel Laureates Meetings

I have read an article about the Nobel Laureates meetings at Lindau and found that there were a lot of international youths participating in the meetings, including representatives from our neighboring countries such as Malaysia, Singapore, India, China, but not one young Thai science student is represented. So I would like to contact the organizers to discuss having Thai representatives to join this conference."

Remarks of Her Royal Highness Princess Maha Chakri Sirindhorn
to the NSTDA executives at the Lindau Nobel Laureate Meetings
on July 17, 2006

The objectives of the Lindau Nobel Laureates Meetings are to foster the exchange between young scientists and the Nobel laureates who will inspire them in the pursuit of knowledge of science and technology, and also to create a network of international scientists. Every year, dozens of Nobel Laureates convene at Lindau to meet the next generation of leading scientists: undergraduates, PhD students, and post-doc researchers from all over the world. The Lindau Nobel Laureate Meetings foster intellectual and social exchanges among scientists of different generations, cultures and disciplines. The Lindau Meetings take place every year from late June to early July at Lake Constance, which borders the countries of Germany, Austria and Switzerland.

Prof. Dr. Pairash Thajchayapong, representing Thailand (NSTDA), signs the third MoU with Countess Bettina Bernadotte, the president of the Council for the Lindau Nobel Laureate Meetings, and Prof. Dr. Wolfgang Schurer, the chairman of the Foundation, on June 30, 2013.

Through Her Royal Highness' efforts, during 2008-2014 there were 33 Thai representatives at the Lindau Meetings: three physics students in 2008; six chemistry students in 2009; five physics, chemistry, physiology or medicine students in 2010; three physiology or medicine students in 2011; six physics students in 2012; five chemistry students in 2013; and five physiology or medicine students in 2014.

Following their participation at the Lindau Meetings, the students have a responsibility to share their experiences and knowledge with other young Thais. They embark on a mission to inspire more potential scientists through speaking engagements at schools and other venues.

Thai representatives at the 63rd Meeting of Nobel Laureates, June 30-July 5, 2013.

Global Young Scientists Summit

Another annual international eventthat Her Royal Highness wish Thai students to participate is the Global Young Scientist Summit (GYSS), held by the National Research Foundation of Singapore. The objective of the GYSS is similar to that of theLindau Nobel Laureate Meetings, that is, to create a network of senior and next-generation scientists by inviting internationally acclaimed researchers, including Nobel Prize, Fields Medal, Millennium Technology Prize and IEEE Medal of Honor awardees, to give lectures and share their experiences to young scientists from around the world.

Panel discussion of Nobel laureates and the Fields Medal mathematician Prof. Stephen Smale.

A Mathematician's Perspective

Prof. Stephen Smale, an American mathematician who was awarded the Fields Medal, was invited to speak at the 2nd Global Young Scientist Summit, held during January 19-24, 2014 at Nanyang Technological University. He remarked that for scientific knowledge to progress it is necessary to have universities join in the discussion. He joked that Google is a good college that we can consult as well, but libraries and traditional knowledge sources are necessary for doing research. In order for the crystallization of ideas to come about, scientists need independence and privacy, said Prof. Smale, adding that responsibility, discipline and morality are important qualities for life and for scientific endeavors.

Source: the article of Experience of participation at Global Young Scientists Summit 2014, the final part in Materials Technology Journal, issue 75,

October-December, 2014 by Dr. Somboon Otarawanna, Dr. Namrin Thaitrong, Dr. NirawatThammajak, Dr. Somphong Jitman, and Dr. Pornthep Tanpowpong.

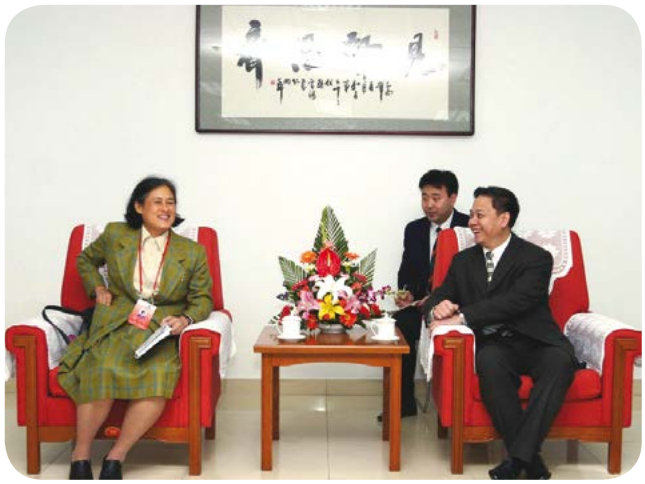
Thai representatives at Global Young Scientists Summit are in the audience with Her Royal Highness Princess Maha Chakri Sirindhorn.
On January, 2013

The GYSS is a multidisciplinary meeting that invites participants from the fields of chemistry, physics, medicine, mathematics, engineering and computer sciences. The first two summits were held in Singapore in 2013 and 2014, at National University of Singapore and Nanyang Technological University, respectively. Her Royal Highness had asked NSTDA to select five Thai representatives each year to participate in the meetings meetings. Her Royal Highness has remarked that the Lindau Nobel Laureates Meetings and the Global Young Scientists Summits are starting points for creating friendships and partnerships for researchers in science and technology, and they will produce a positive impact in the future for all parties involved.

Her Royal Highness Princess Maha Chakri Sirindhorn
at the the MoU signing ceremony between Office of the Civil Service Commission
and the University of Chinese Academy of Sciences
on April 6, 2011.

Reaching Out to the Chinese Academy of Sciences

Her Royal Highness Princess Maha Chakri Sindhorn looks to the East as well as the West to build bridges which could help to enhance science competency for Thai youth. Her Royal Highness mentioned Prof. Pairash that Thailand has had a long-lasting relationship with China in terms of language and culture, but not much in terms of science and technology. As China today is very advanced in these areas, Thai scientists and researchers can learn and exchange experiences through greater contact with their colleagues to the north, and at the same time strengthen the relationship between the two countries. The Her Royal Highness' initiatives have led to various human resources development programs in collaboration with the Chinese Academy of Sciences (CAS) and its associated university, the University of the Chinese Academy of Sciences (UCAS).



Prof. Deng Yong, the Chairman of the University Council of UCAS, welcomed Her Royal Highness during her first visit to UCAS on November 30, 2005.

Human Resource Development through Collaboration with CAS's Associated University

From 2005 to 2014, Her Royal Highness visited UCAS* four times, on November 30, 2005, April 3, 2008, November 6, 2010, and November 10, 2014. UCAS and Thailand's Office of the Civil Service Commission (OCSC) signed the Memorandum of Understanding (MoU) on the second, third and fourth royal visits. The MoU helps to establish a study and research exchange program. Thai students enroll in post-grad programs in science and technology at UCAS, and UCAS supports half for half of the tuition fee. The study programs that are open for Thai students under this collaborative program are Remote Sensing, Space Technology, Accelerator Physics and Synchrotron Technology, Natural Language Processing & Machine Translation, Robot Automation, Astronomy, Astrophysics, and Hydrological Models for Climate Change.

* Before 2009, UCAS was named GUCAS (The Graduate University of the Chinese Academy of Sciences)

Her Royal Highness Princess Maha Chakri Sirindhorn with Thai and Chinese representatives after the first MoU signing ceremony with UCAS (at that time named GUCAS) on April 3, 2008.

From 2009 to 2013, OCSC allocated 16 scholarships to Thai students. In 2014, five students finished their studies. These were Mr. Warawut Supamitmongkol, in Science and Engineering Management; Mr. Thanawat Niyamosoth, in Applied Mathematics; Ms. Titima Songkroh, in Biochemistry; Mr. Peera Yomwan, in Remote Sensing; and Mr. Thee Chaowanonthapunya, in Engineering and Material Science.

Academic Activities and Research with CAS

The collaboration with the Chinese Academy of Sciences has opened an opportunity for the Thai research institutes to take part in the following activities:

The ICCES-HAII Workshop in Rainfall Forecasting, held by the Hydro and Agro Informatics Institute (HAII), in conjunction with the Institute of Atmospheric Physics (IAP) and the International Centre for Climate and Environmental Sciences (ICCES), in Bangkok on December 2, 2013.

Co-research on Nuclear Physics and Particles between Suranaree University of Technology (SUT) and China's Institute of High Energy Physics (IHEP). Doctorate students from SUT performed research at IHEP and both institutes signed an agreement on September 18, 2014 in preparation for an academic conference in 2015.

Co-research on Astronomy, on the topic of Observations and Studies of Low Mass Ratio, Deep Overcontact Binary Stars, between the National Astronomical Research Institute of Thailand (Public Organization) and Yunnan Astronomical Observatory, Chinese Academy of Sciences, during 2013-2014.

R&D on Chinese-Thai language Machine Translation, by Thailand's National Electronics and Computer Technology Center (NECTEC) and the Institute of Computing Technology, Chinese Academy of Sciences,, during 2013-2014.

Application of Data from Chinese and Thai Satellites in Flood Management in Repetitively Submerged Areas, by Thailand's Geo-Information and Space Technology Development Agency (GISTDA) and The Institute of Remote Sensing and Digital Earth (RADI), Chinese Academy of Sciences, during 2013-2014, objectives of the project are to develop simulated models to handle flooding through satellite image processing, collecting information on hydrology and meteorology. The researchers created a database for Thailand's Yom River Basin and China's Yangtze River Basin to compare the geography and surrounding factors that result in the inundation of certain areas.

Her Royal Highness Princess Maha Chakri Sirindhorn with Thai and Chinese representatives following the MoU signing ceremony between Shanghai Institute of Applied Physics and the Synchrotron Light Research Institute, on July 23, 2010.

Following the collaboration with UCAS, there has been, three other collaboration with universities in East Asia, naming ; Xi'An Jiaotong University (started in 2011) Nanyang Technological University (NTU) (started in 2013) and Sungkyunkwan University (SKKU) (started in 2015). Xi'An Jiaotong University offered 3 scholarships a year to study for a Master's degree in Engineering and Management Sciences, NTU offered five scholarships a year to study for a Ph.D. degree in Engineering and SKKU offered up to five scholarships per year to study for a Ph.D. degree in Nanotechnology and up to five post-doctoral fellowships in Nanotechnology. Since 2011 Xi' An Jiaotong University of China has offered three scholarships a year to Thai master's degree students. Universities in Singapore and South Korea also offer grants to Thai students. Nanyang Technological University of Singapore has offered post-master scholarships in engineering Science since 2013, and Sungkyunkwan University in South Korea provides scholarships for post-master and post-doctorate students of nanotechnology.

Her Royal Highness Princess Maha Chakri Sirindhorn on the Icebreaker "Xue Long" on April, 2013.

Polar Research

Her Royal Highness Princess Maha Chakri Sirindhorn is the first Thai to visit the Antarctica. On a visit in November 2013, Her Royal Highness stayed at Scott Base, the research station operated by the government of New Zealand. Her Royal Highness also and also visited the USA's McMurdo Station. She learned a great deal about the research at both stations, particularly pertaining to biology, ecology, meteorology and the environment. Following the visit, Her Royal Highness wrote the book "*Antarctica: Coll Summer*", which is a record of her visit to New Zealand and Antarctica.Her Royal Highness wrote that "*it was my great adventure*".

In 2004, NSTDA had discussed with the National Institute of Polar Research of Japan, requesting support for support for Associate Prof. Dr. Voranop Viyakarn, Department of Marine Science, Faculty of Science, Chulalongkorn University to travel to Japan's Syowa Station in Antarctica Continent, together with the Japanese research team called JARE-46 (The 46th Japanese Antarctic Research Expedition). In 2009, Associate Prof. Dr. Suchana Chawanich, also from Chulalongkorn University worked

with the JARE-51 team and later wrote the book "*Antarctic...the Land of Ice*". When Her Royal Highness read this book, she thought polar research is beneficial for the country and there should be a project which supports Thai researchers to continuously conduct polar research. Her Royal Highness suggested that we pursue collaboration with China in this area through Shanghai's Polar Research Institute.

Why would polar research be beneficial to Thailand?

As Associate Prof. Dr. Suchana Chawanich has pointed out, "Global warming or climate change is a problem that needs international collaboration. Based on data from ice excavation and other polar research activities, we can tell a lot about global weather patterns in the past and present. Polar warming also contributes to climate change because it releases methane, a major greenhouse gas, and reduces the 'mirror effect' of the ice that reflects the sun's rays back to space. Taking the opportunity to join in polar studies shows that Thailand pays attention to this big global problem and it also enables Thailand to gather information to deal with the changing climate.''

On a visit to China in April 2013, Her Royal Highness visited the State Oceanic Administration in Beijing and the Polar Research Institute of China in Shanghai, and received honorary certificates from each of them. Her Royal Highness had communicated, via video conferencing, with Chinese researchers who were working at China's Great Wall Station, located on King George Island, Antarctica. She also observed the Icebreaker "Xue Long" (雪龍-snow dragon) which had just travelled back from the South Pole to Shanghai. The visit was a starting point of the cooperation in polar research between Thailand and China.

An agreement was signed with the Chinese Arctic and Antarctic Administration on July 30, 2013. NSTDA then co-ordinated with Thai universities to select Thai researchers whose research are related to polar science and submittedthe list to Her Royal Highness for final selection T. C. Pharmaceutical Industrial Co., Ltd. generously offered to provided financial support for Thailand's polar research for five years. Associate Prof. Dr. Suchana Chawanich and Assistant Prof. Dr. Onruthai Pinyakhong of the Faculty of Science, Chulalongkorn University were selected to the first of the collaboration the first research collaboration. They travelled with the survey team of the 30th Chinese Antarctic Research Expedition (CHINARE-30) during January 1 to February 10, 2014, doing research at the Great Wall Station. The expedition was joined by 50 researchers from seven countries.

The Thai researchers would collect samples in the area of the research station to bring back for further study. They also joined Chinese researchers on trips to study populations of penguins and seals on King George Island and surrounding islands, and participated in a meeting at the Escudero Station, operated by the Republic of Chile, which is also located on King George Island. The Thai researchers later wrote a project report titled "Thailand Antarctic Research Activities with CHINARE 30".

China's Great Wall Station, located on King George Island, Antarctic.

In March 2013 Her Royal Highness Princess Maha Chakri Sirindhorn ventured to the North Pole. While there, she initiated a cooperative project with the government of Norway for Thai scientists to participate in activities at the Norwegian research station in the Svalbard archipelago. During her stay on Svalbard, Her Royal Hight visited several research facilities, including the Svalbard Global Seed Vault, Svalbard Museum and Svalbard Science Centre in Longyearbyen, where she listened to presentations on the research conducted on Svalbard, including research on climate change and biodiversity. She also went on a snowmobile tour of the area. More than half of Svalbard's 61,000 square kilometers is permanently covered by ice and snow. The sun doesn't rise at all for four months in winter and it doesn't set in summer.

Upon her return Her Royal Highness asked the Ministry of Foreign Affairs and NSTDA to explore the possibility to develop collaboration with the University Centrein Svalbard (UNIS) and Norwegian Polar Institute (NPI). Other Thai institutes that have potential to join in this Arctic research collaboration are Geo-Informatics and Space Technology Development Agency (GISTDA), National Institute of Development Administration, Chulachomklao Royal Military Academy, Faculty of Science Chulalongkorn University, and National Astronomical Research Institute of Thailand.

Research by
Associate Prof. Dr. Suchana Chawanich

The research paper by Associate Prof. Dr. Suchana Chawanich titled "The climate change impact to sea animals on the coast of the Antarctic continent'' details the findings resulting from her continuous observation of marine animals and sampling of marine sediments in 2004/2005 and 2009/2010. To obtain the samples the researcher had to wear a dry suit and dive into the frigid waters which were never above 4 degree Celcius. Diving in polar waters requires a high level of skill and physical fitness.

Research by
Assistant Prof. Dr. Onruthai Pinyakhong

Assistant Prof. Dr. Onruthai Pinyakhong has been studying samples of sediment around Syowa Station, a Japanese research station on East Ongul Island in Antarctica, since 2011. She has found many interesting microorganisms. Her focus is the function of microorganisms involved in the biological decomposition of pollutants. The research provides important information that promotes a natural and environmentally friendly approach to removing contaminants in low temperatureareas. It also sheds light on the function and adaptation of microorganisms that are resistant to low temperatures. The knowledge gained may have industrial and environmental applications.

Her Royal Highness Princess Maha Chakri Sirindhorn together with
His Imperial Highness Prince Akishino Nomiya Fumihito presided over
the opening conference of the Human-Chicken Multi-relationships Research
at Thailand Science Park, Pathumthani,
on March 16, 2007.

Human-Chicken Multi-Relationships Research Project

"The researches on pets and poultry so far mostly focus on the study on biology. However, these animals are different from wildlife in general. They can be called "cultural living things" because they have been created by human beings. The study of poultry, especially their relationship with human, thus should not survey and research only in the biological sciences. We must consider how human are involved. The basic concept of the human-chicken multi-relationships research is that it should involve the participation, exchange of ideas and research of scientists from many disciplines. The result is that now there are human resources in the fields of humanities, biology, economics, geography and others, both Thai and Japanese, joining the project."

H.I.H. Prince Akishinonomiya Fumihito had this to say about the project at the second conference of the Human-Chicken Multi-Relationship in Tokyo on June 19, 2006

H.I.H. Prince Akishino Nomiya Fumihito visited Ban Na To, Mae Fah Luang district, to interview villagers who raise chicken on August 21, 2005.

Like Her Royal Highness Princess Maha Chakri Sirindhorn, His Imperial Highness Prince Akishinonomiya Fumihito is a member of royal family with an interest in science, particularly the relationship between human beliefs and scientific principles. His Imperial Highness earned a PhD in ornithology and has conducted field research in Indonesia and China's Yunnan Province. His mission is to elucidate the evolutionary and socio-cultural processes that transformed the jungle fowl into the domesticated chicken of modern times.

During August 7-21, 2003, H.I.H. Princes Akishinonomiya Fumihito travelled to Thailand to visit Her Majesty Queen Sirikit on the occasion of her 72nd birthday anniversary. H.I.H. Princes Akishinonomiya Fumihito asked for a permission to do a Thai – Japanese collaborative project on Human-Chicken Multi-Relationships Research (HCMR).

H.I.H.Prince Akishino Nomiya Fumihito visited Ban Na To, Mae Fah Luang district, to interview villagers who raised chicken on August 21, 2005.

Her Majesty the Queen graciously agreed and Her Royal Highness Princess Maha Chakri Sirindhorn became the patron of the operation. Her Royal Highness asked Prof. Dr. Pairash Thajchayapong to recruit Thai experts and academics from different fields to participate in the project.

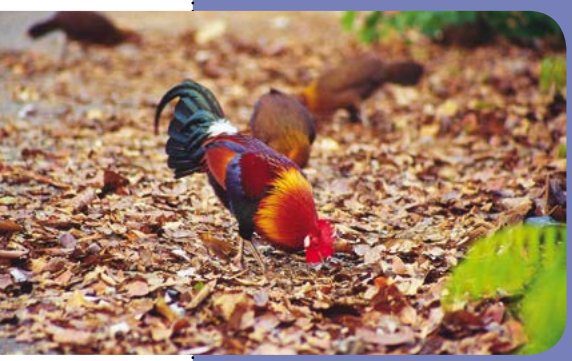
Why study the Human-Chicken Relationship?

Assistant Prof. Doctor of Veterinary Medicine Chanin Tirawattanawanich, Faculty of Veterinary Medicine, Kasetsart University explained that the study answers the two key questions:

1) Where is the original source of the present-day domesticated chicken?

2) What impact did the domestication of chickens by human due to several objectives (for food, sport, or pets) have on the evolution of chickens? And vice versa, what impact has the domestication of chickens had on the human species?

Dr Chanin said that researchers are working on the assumption that the original domesticated chicken is the red junglefowl (Gallus gallus), which is native to Thailand. If the research results confirms this assumption, it may well be that Thailand is the original source of the globally domesticated chicken species.



Red junglefowl (Gallus gallus)

Dr. Chanin added that understanding human influences on the evolution of chickens may enable us to prevent and amend the negative impacts of human influence, like selection based on popular trends that leads to the loss of breeds or specific qualities and characteristics of chickens.

The question addressed in the first phase of HCMR (2004-2007) was "Why and how has the jungle fowl evolved into the domestic fowl?" The multidisciplinary team attempting to answer the question was recruited from several organizations including the Department of Livestock Development, Kasetsart University, Chulalongkorn University, GISTDA and NSTDA.

The achievement of a working hypotheses to answer the first phase question led to the second phase of the HCMR Project.. Now the focus is on the relationship between human and chicken at the point of domestication. The study covers aspects of biological science, humanities and social science. The three-year project (November 2012 to March 2016) will be concluded in 2017.

The HCMR Project also focuses on history, anthropology and folklore. Assistant Prof. Dr. Chomnard Setisarn of the Faculty of Arts at Chulalongkorn University remarked that "The study helps us to understand how ethnic groups in Thailand made value judgments on the relative worth of chickens and other animals and why we like and dislike certain animals, especially in terms of economics. Above all, an awareness of our ancestors' cultural views of different animals provides insight into the foundations of local wisdom in Thai society and enables the new generations to have a better understanding of the lifestyles of their forebears and be proud of their knowledge."

Dr. Virachai Virameteekul, former Minister of
The Ministry of Science and Technology, together with
Dr. Thaweesak Koanantakool, director of NSTDA, presented 1,000 kilograms of
"Thanyasirin" burnt-resilient sticky rice at Chiang Klang Prachapatana School,
Chiang Klang district,
Nan province, February 24, 2011.

Innovations in Thai Rice through Genome Technology

Since ancient times rice has played a fundamental role in Thai society in just about every dimension – agricultural, nutritional, traditional, cultural, economic and even political. In modern times genetic research is being used to improve the quality and viability of Thai rice, to make it more flavorful and produce better yields, as well as more resistant to disease and insects. Her Royal Highness Princess Maha Chakri Sirindhorn has long been a strong supporter and initiator of these efforts as she realizes that genome technology, which encompasses genetic engineering, is a potent tool to improve the lives of rice farmers and rice consumers alike.

In 1999, Thailand joined the International Rice Genome Sequencing Project (IRGSP). In collaboration with colleagues from the United States, Great Britain, Canada, France, China, Taiwan, Korea, Brazil, and India, Thai researchers worked to decode the DNA sequence of rice. There are a number of rice varieties, but worldwide more than 90% of the genome is identical. The IRGSP project was successful and Thai researchers were responsible for sequencing the 9th chromosome, which contains genes involved in flood resistance. Japanese researchers decoded the 8th chromosome, which has involve in producing aroma aroma.

Her Royal Highness generously provided funding of two million baht to support Thailand in the IRGSP project, and NSTDA provided a budget of approximately 50 million baht. In a related project, NSTDA's National Center for Genetic Engineering and Biotechnology (BIOTEC) and Kasetsart University, jointly set up the Rice Gene Discovery Unit (RGD) at Kasetsart University, Kampangsaen Campus, in Nakhon Pathom. The

project focuses on technology development and the study of genes and molecules responsible for fragrance in rice.

The RGD produced excellent results in the discovery of a gene from Jasmine rice that controls aromatic fragrance in rice. The gene is highly conserved throughout the plant kingdom and has been described as the universal aromatic gene. The technology developed by the RGD was granted a US patent in 2008. This important discovery has significant implications for the country's rice breeding programs and genetic conservation.

His Majesty King Bhumibol Adulyadej granted an audience and presented a Royal Citation to Khunying Kalaya Sophonpanich, former Minister of Science and Technology, and the team of researchers responsible for isolating the gene. The researchers presented their report, "Transgenic rice plants with reduced expression of Os2AP and elevated levels of 2-acetyl-1-pyroline", to His Majesty the King on June 24, 2009 at Phra Tamnak Piamsuk, Klai Kangwon Palace in Hua Hin, Prachuap Kirikhan province.

Rice Gene Discovery Unit and Its Role in Thai Rice Innovation

The Rice Gene Discovery Unit is a collaborative effort of Kasetsart University, Kamphaengsaen Campus, and BIOTEC-NSTDA. The unit aims to utilize biotechnology, especially genomic technology, as a tool for making improvements in Thai rice.

The NSTDA gives financial and technical support to researchers in the unit, which include instructors and students of the university. Kasetsart University provides the building and a large experimental plot of land, as well as important links to farming communities in the region.

Breakthroughs at the Rice Gene Discovery Unit

An RGD working group presents seeds of flood-resistant "Hawm Chonlasit" to Her Royal Highness Princess Maha Chakri Sirindhorn on May 7, 2014 at Chaipattana Building, Chitralada Royal Villa.

- Flood-resistant Hawm Chonlasit rice can be underwater for 2-3 weeks and recover well. It has a strong trunk and is insensitive to light duration, so it can be grown more than once a year, with a yield of 800-900 kg. per rai. The cooked rice is soft and aromatic. The rice variety was developed in 2008 and today is widely grown in the North and Central regions. Farmers in Patalung province began growing the rice after Her Royal Highness provided plants for them in 2013.

- RD51 is a rice variety that is resistant to sudden flooding during the seeding stage for 12 days. It recovers well after flooding and has a better yield than Khao Dawk Mali 105 rice, on average yield 550 kg. per rai (in general conditions). Other qualities such as time until harvest, physical and chemical seed quality, cooking and aroma are close to Khao Dawk Mali 105 rice. RD51 was approved on March 12, 2013, and in 2014 the Department of Rice made seeds available to farmers in flood-risk areas.

- Thanyasirin sticky rice is resistant to the highly damaging blast fungus. It has a strong trunk and was derived from the popular sticky rice RD6, which is particularly susceptible to the blast fungus. The new variety was named for the Princess on December 1, 2010. ''Than" means rice and "sirin" was taken from Sirindhorn. The Group of General Budhist Scripture School at Nan received plants in February 2010, and since 2008 Thanyasirin rice has been promoted through technology transfer seed programs to famers in many Northern and Northeast provinces. The primary research for the development of Thanyasarin sticky rice was conducted at Rajamangala University of Technology Lanna, in cooperation with relevant organizations.

  The director of the RGD, Associate Prof. Dr. Apichart Wannavijit, noted that the success of the research unit is in large measure due to the royal kindness and vision of Her Royal Highness. She has promoted education and research into genome technology since it was introduced in Thailand. She has not only provided financial support, but has continuously monitored projects and helped to remove any obstacles to the research.

After the completion of the rice genome sequencing project, Thai researchers with RGD, BIOTEC, Kasetsart University and Rajamangala University of Technology Lanna developed RiceGeneThresher, a database for the discovery of rice genes using bioinformatics software. It is intended to aid researchers in locating genes responsible for traits such as submergence tolerance, salt tolerance and disease resistance.

In a somewhat related project, H.R.H. Princess Maha Chakri Sirindhorn assigned the Department of Livestock to develop a breed of chickens that lays its eggs on the ground. The department successfully developed the laying hens and Her Highness' Royal Project then introduced the chickens to be raised in rural and border areas with the objective of helping to provide sufficient protein to children. At present, more than 50 Border Patrol schools have received the laying hens.

Her Royal Highness Princess Maha Chakri Sirindhorn
visited the Southern Medical Rehabilitation Center, Faculty of Medicine,
Prince of Songkla University,
on October 3, 2010.

Thailand Biomedical Engineering Consortium

One cutting edge research organization that owes its existence to Her Royal Highness Princess Maha Chakri Sirindhorn efforts and vision is Thailand Biomedical Engineering Consortium (TBME). This network of doctors, researchers, and academics in many fields related to biomedical engineering is supported by Her Royal Highness because she realizes its potential to upgrade the quality of life and overall health of the Thai people. The origins of the TBME goes back to the US-Thai Symposium on Biomedical Engineering which was held at Chulalongkorn University during December 11-15, 2005, and was organized as part of the official commemoration of Her Royal Highness' 50th birthday anniversary that year.

Her Royal Highness Princess Maha Chakri Sirindhorn greets researchers at the US-Thai Symposium on Biomedical Engineering held at Chulalongkorn University on December 2005.

At present, the consortium is comprised of 13 organisations including Chulalongkorn University, Chiang Mai University, King Mongkut's University of Technology Thonburi, Thammasat University, Mahidol Univeristy, Srinakharinwirot University, Prince of Songkla University, King Mongkut's Institute of Technology Ladkrabang, Thailand Centre of Excellence for Life Sciences (Public Organization), Mae Fah Luang University, Thailand Research Fund, Health System Research Institute, by which National Science and Technology Development Agency is a member and coordinator.

TMBE R&D milestone: Digital hearing aid

INTIMA is a digital hearing aid that is suitable for those who are hearing impaired at the levels of medium to severe. The settings are done by a computer program. The device uses a lithium-ion polymer battery, so the cost of charging it is minimal.

The INTIMA digital hearing aid has passed clinical tests by the Department of Otolaryngology, Faculty of Medicine, Khon Kaen University, and has the CE mark certifying it meets the European Union health, safety, and environmental requirements.

INTIMA was developed by researchers from the Rehabilitation and Assistive Technology Laboratory of the National Electronics and Computer Technology Center (NECTEC), NSTDA and is a collaborative project of the National Health Security Office (NHSO), the Health Systems Research Institute (HSRI) and NSTDA. The price is around 7,000 baht, making it competitive with imported products.

Members of the TMBE work together to strengthen the application of biomedical engineering in Thailand in many areas, including:

Human resources development: TMBE supports curriculums of biomedical engineering at nine universities including Prince of Songkla University, King Mongkut's University of Technology Thonburi and Mahidol University, Chulalongkorn University, Chiang Mai University, Srinakharinwirot University, King Mongkut's Institute of Technology Ladkrabang, Thammasat University and Mae Fah Luang University. In conjunction with the Ministry of Science and Technology and Office of the Civil Service Commission, the consortium allocates scholarships to study abroad at the post- grad and post-master's levels. During 2007-2013, 47 scholarships were awarded, and 80 scholarships were awarded during 2014-2018. Many scientists who have completed their educational programs currently work in Thailand's biomedical biomedical-related institute.

Research network creation: The exchange between research and academic institutions (see box) helps reduce investment overlap in human resources, equipment and materials.

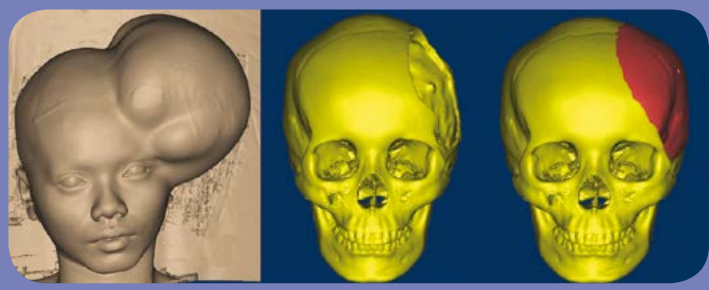
Academic activities: Training, seminars, and conferences, both national and international, such as The 5th National Conference on Biomedical Engineering (NCBME 2007), Biomedical Engineering International Conference (BMEiCON) and International Convention on Rehabilitation Engineering and Assistive Technology (i-CREATe).

More importantly, the consortium members work together on a biomedical engineering blueprint to push research in a direction coinciding with the requirements of the country.

"Assit.Prof.Dr. Jackrit Suthakorn, Dean of the Faculty of Engineering, Mahidol University and a member of the Biomedical Engineering Committee, said: "We previously faced a problem meeting the need for biomedical engineers and doctors, as human resources in this field were limited and the job requires a lot of effort and responsibility. So, the goals for biomedical engineering could not be fully realized. But since we put the research network in place, the field has become more popular

and medical professionals are also paying more attention. This has resulted in a rapid growth in scientific competence and human resources in biomedical engineering. Both policy promotion and research are going strong."

Among other groundbreaking new technologies, NSTDA's Biomedical Engineering Research Unit is employing the medical rapid prototyping technique to restore health to patients that not long ago would have had little hope. Nungruethai Pholkeedkin, 18, was an outstanding student at Sawaijeek Phitthayakom in Burirum province when she had a serious motorcycle accident. The doctor who operated on Ms Nungruethai removed damaged skull parts, but could not close the skull. The brain tissue produced too much water and the



The patient was left with severe cerebral swelling after an accident that shattered her cranium.

(A) Instrument used in operation as a scaffold for the artificial skull.
(B) Artificial skull made of polymethyl methacrylate (PMMA)

Her Royal Highness Princess Maha Chakri Sirindhorn visited MS. Nungruethai Polkeedkhin the team of doctors that performed the operation and researchers from NSTDA who constructed the artificial skull. at Thammasat Chalermprakiat Hospital on January 25, 2013.

pressure caused her brain to swell. She was bedridden for over a year in critical condition.

Thammasat Chalermprakiat Hospital accepted her as a patient and scheduled an operation to replace her damaged skull and do facial reconstruction in April 2011. Dr. Pree Nimmannitya, medical lecturer of Surgery Department, Faculty of Medicine, Thammasat Chalermprakiat University, was the leader of the medical team that performed the surgery. NSTDA's National Metal and Materials Technology Center (MTEC), led by Dr. Kriskrai Sitthiseripratip, Head of the Medical Devices Laboratory, designed the artificial skull using the medical rapid prototyping technique. Rapid prototyping is a group of techniques used to quickly fabricate a model or part using a three-dimensional computer aided design. In biomedical engineering the technique is used to make artificial body parts including replacement hips, ears and skulls.

The entire operation, a collaborative effort of Thammasat Chalermprakiat Hospital and NSTDA, was free of charge. Her Royal Highness Princess Maha Chakri Sirindhorn visited Ms Nungruethai, and the dedicated doctors and biomedical engineering researchers who gave her new hope, at the hospital as she was recovering.

Science and Technology for Education

Her Royal Highness Princess Maha Chakri Sirindhorn
visited the Mae Fa Luang Hill Tribe Community Learning Centre,
at Ban Pitukhi, Omkoi district, Chiang Mai province,
on January 22, 2010.

Science Advancing in Rural Schools

" Science and technology is an important development tool to improve people's quality of life in urban, rural and remote areas. Whether science and technology will progress and be appropriately applied or not depends mainly on human factor. Consequently, to promote the teaching and learning of science and technology to rural youths and children is crucial to sustainable rural development."

Excerpted from Her Royal Highness Princess Maha Chakri Sirindhorn's lecture on "Promoting children's potential in science and technology: Building foundation for sustainable rural development", delivered at a seminar on Thai-Chinese Relations, February 21, 2013.

Despite ongoing development in various aspects in Thailand, there is still a need for support to upgrade the people's quality of life in several remote rural areas. Her Royal Highness Princess Maha Chakri Sirindhorn had witnessed rural people's way of life while accompanying Their Majesties the King and Queen on royal visits to their rural subjects across the kingdom. She realized that science and technology can be deployed as a rural development tool, in particular, in developing human capital. If children are exposed to science and technology at an early age, they will grow up to become a major force in the development of their own communities.

In improving the quality of life of children and youths, it is important not to neglect basic necessities; for example, every child must have adequate and nutritious food. Once they are well fed, they must learn how to think critically and to work effectively so that they can lead a peaceful co-existence with others and live a way of life that is sustainable for nature and the environment.

Project on Teaching / Learning Science and Technology in Rural Schools

In 1997, the National Centre for Genetic Engineering and Biotechnology (BIOTEC) of the National Science and Technology Development Agency (NSTDA) translated the royal wish into action by launching a project on teaching/learning science and technology in rural schools, known as the *Science in Rural Schools Project or SiRS Project*. The project aimed to improve the quality of science teachers and promote a strong science process skills in children and youths. In particular, they should think logically and be able to apply what they learn to improving their own quality of life and that of their communities. The new-generation researchers who volunteered to join the project should gain an understanding and enhanced volunteerism in helping rural communities.

The *SiRS Project* first covered the provinces of Mae Hong Son, Chiang Mai, Nan, Sakon Nakhon, Phangnga and Narathiwat. Up to 2014, it had organized activities to develop and enhance science and technology capabilities for more than 4,500 teachers and schoolchildren, in 139 schools and over 100 hill tribe community learning centres.

To achieve each of the project's major objectives, project implementation was divided into several small projects that comprised diverse activities; for example,

The *Science-based Local Schools Project* improved teachers's quality in the whole school by focusing on logical thinking, exercises on the use of senses, classification, relation of cause and effect, analysis and synthesis, through prioritization, planning, strategic and innovative thinking.

The *Integrating Science Learning with Agriculture for School Lunch Project* developed schoolchildren's science process skills by training them to raise ducks, chickens, catfish, grow mushrooms, water-cress and pumpkin. Having learned the methods, the children were able to transfer their knowledge to their parents.

The *Science Project* trained both students and teachers in scientific knowledge and skills. Children were advised to create projects that have connection with the community context and teachers were trained to coach them. Efforts were made to ensure a wide exchange of knowledge among teachers, students, communities and agencies concerned. This was done through science project contests, held on the provincial, regional and national levels, including, Mae Hong Son province's *Science and Technology with Mueang Sam Mok Ways of Life Fair; Sakon Nakhon province's Kusuman Science Fair; Narathiwat province's Science Developing Wisdom and Life Skills Fair; Phangnga province's Science Students' Insight with IT; and the National Science and Technology Fair*.

Students enjoy conducting a science experiment.

The *Science Camps for Local Communities Project* made use of the local environment as a learning source to develop children's science process skills. It focused on enabling the children to apply the knowledge and skills thus learned to their daily life. More importantly, the children became more aware of their love for their community. They should be later motivated to generate activities that develop their own community in the future.

Thai Children Knew How to Think, How to Do Things, and Appreciated the Worth of Their Surroundings.

Patiwat Nongchai, a secondary grade 3 student (in 2007), of Ban Phae Witthaya School in Mae Hong Son province, cross bred a foreign-breed duck with an indigenous egg-laying breed, thereby creating a hybrid that was disease resistant and a prolific layer. The eggs thus produced could be consumed at home or sold in the market if there were enough of them.

Jiraporn Panphimon, a secondary grade 5 student (in 2007), of Mae Sariang Boripatsuksa School, Mae Hong Son province, said effective learning came about when children got to experiment on an actual problem while solution was being sought under the guidance of a teacher. Her science project was on how to develop dental floss from a natural fibre. She was using a material that could be sourced locally and her dental floss was both practical and low cost.

Apart from these small projects that focused on science process, Thai language was taught in certain areas where the locals had problem using the language so that villagers could catch up with news and information and communicate with outsiders; for instance, a *Project to Teach Thai language through the Spelling Method for Hill Tribe Learners of Omkoi*, Chiang Mai province. The project focused on developing an understanding of the Thai language in hill tribe pre-school children, school children, and adults. Ajarn Suradet Phaholyothin, the field

Her Royal Highness on a visit to Samritbun School,
Wang Chin district, Phrae province on October 2, 2012.

coordinator of the spelling method for Thai teaching, believed that the ability of the hill tribesmen to efficiently communicate in Thai was an important foundation for the *SiRS Project to build on other projects, including, Project on the Little Scientist's House and the Integrating Science Learning with Agriculture for School Lunch Project*.

Project on Quality Development of General Buddhist Scripture Schools

In several remote and underserved areas, there are a number of male children and youths who are deprived of educational opportunities owing to their families' poverty. Their parents make their offspring enter the novice hood so that they may have access to general Buddhist scripture schools. Nevertheless, this group of children and youths still face other problems, particularly in health, for lack of adequate nutrition.

Her Royal Highness Princess Maha Chakri Sirindhorn became aware of the problem during her visit to the people of Ban Bo Luang, Bo Kluea district, Nan province, on 30 December 2003 when she briefly called at Wat Bo Luang Witthayatham, a general Buddhist scripture school. As a result of that

visit, she launched the *Project on Quality Development of General Buddhist Scripture Schools* to address the problem.

The project has three objectives for the target group: "*to be well fed*", "*to have learning options*" and "*to be groomed as the next generation of Buddhist teachers*".

"To be well fed" is to promote good health and nutrition in the novice students. Her Royal Highness donated funds for school lunch on every school day, totaling 200 days, at 10 baht per novice. She also provided supplementary feeding in the form of milk powder for the novices to be taken twice a day, every day.

"To have learning options" involves promoting educational opportunities and options for boys and youths in novice hood so that they may have access to general education stream, Pali theology, and advanced vocational education at the secondary level onward. Her Royal Highness requested BIOTEC - NSTDA to implement a project called, *Project on Science and Technology Learning in General Buddhist Scripture Schools, under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn*" It aimed to upgrade the quality of educational provision in these schools to the same level as other basic education organizations in the country.

"To be groomed as the next generation of Buddhist teachers" is to foster personnel who will maintain and propagate Buddhism in the future. In the academic year 2005, Her Royal Highness donated private funds to be used at 30 scholarships every year for the novice students who completed the highest class of Nan General Buddhist Scripture School to further their studies at the tertiary level at Mahachulalongkornrajavidhalaya University, Phayao campus, Nan class. In addition, she donated scholarships to seven monk teachers and administrators of the school who were studying for a master's degree in educational

administration at Ramkhamhaeng University (special Nan class) until they completed their studies.

Her Royal Highness also provided 70 scholarships in the academic year 2011 and 32 scholarships in the academic year 2014 for teachers at the general Buddhist scripture schools to acquire teaching qualification under a Graduate Diploma Programme in Teaching at Chiang Rai Rajabhat University.

Apart from Her Royal Highness's private funds, the Princess Maha Chakri Sirindhorn Foundation presented 36 scholarships under the Project to Repatriate Graduates to novice students who wished to teach at the general Buddhist scripture schools from academic years 2013-2016. The foundation also provided scholarships to three cohorts of 19 monk teachers to pursue their studies in the master of science programme at the Department of Environmental Science, Faculty of Science and Technology, Thammasat University, during academic years 2009-2013.

During the early stage in 2004, Her Royal Highness included a group of 12 general Buddhist scripture schools of Nan province in the project under the royal initiative. Later, she admitted all schools in group 6 of general Buddhist scripture schools (namely, those from the provinces of Nan, Phrae, Chiang Rai, Phayao, and Lampang) to the project, making a current total of 60 schools (as of 2014).

The activities organized by the *Science in Rural Schools Project* and *Project on Quality Development of General Buddhist Scripture Schools* have provided children and youth in underserved areas with educational opportunities while developing their knowledge and other necessary life skills on a par with children and youth in other areas of the country.

Her Royal Highness watches children experimenting on a science project as part of the Little Scientist's House Project while visiting an exhibition in tribute to Her Royal Highness's contribution to science and technology of the country, held at Thailand Science Park, March 30, 2013.

Little Scientist's House for Preschoolers

Quality early childhood education is highly significant to preschoolers (aged 3-6). Experience gained during this period of life will play a key role in determining the child's attitude and basic skills throughout its life.

There is a foundation in Germany, called "*Haus der kleinen Forcher*" or the *Little Scientist's House* Foundation. It runs projects to promote science learning for kindergarten pupils. There are activities that engage parents through interesting publications and television programmes. The projects in Germany were launched as a collaboration between the public and private sectors. It was hugely successful and its coverage quickly expanded, from 50 pilot schools in the first year to 15,000 schools three years later. The expansion was carried out in accordance with the quality standards set forth in the project objectives.

In July 2009, on her return from attending the Lindau Nobel Laureate Meeting on sciences and a study visit at Lindau, the Federal Republic of Germany, Her Royal Highness decided that the German *Little Scientist's House* was a good project worth adapting to the Thai context.

The Princess Maha Chakri Sirindhorn Foundation and Nanmeebooks Co.Ltd subsequently took up her initiative. They contacted the *Haus der kleinen Forcher* for further information and advice in order to set up a model project, called "*Little Scientist's House, Thailand.*" It was first introduced to 221 schools across the country on a pilot basis. Its implementation was managed collaboratively by seven public and

private organizations, and seven local networks in accordance with the German practices. The committee in charge of the project is chaired by Associate Professor, Dr Khunying Sumonta Promboon. The project is well supported by an advisory committee, and several public agencies, private businesses and organizations.

In 2014, many more public and private agencies joined hands to support the project which expanded to include 217 local networks and 12,000 schools.

Collaborative Agencies for the Implementation of Little Scientist's House, Thailand Project

The *Little Scientist's House Project* is a joint public-private collaboration. Its core agencies include the Princess Maha Chakri Sirindhorn Foundation, Nanmeebooks, Co.Ltd, Institute for the Promotion of Teaching Science and Technology, Office of the Basic Education Commission, National Science and Technology Development Agency, National Science Museum and B.Grimm Group.

Other organizations that have contributed to the project include, Srinakharinwirot University, Thai Public Broadcasting Service, Government Savings Bank, Krungthai Bank, Nai Hang Rong Poon Phunueng Foundation the Embassy of the Federal Republic of Germany, Bangkok, Siemens Co.Ltd, Merck Co.Ltd, Leschaco (Thailand) Co.Ltd, DKSH (Thailand) Co.Ltd, and the Goethe- Institut Thailand.

How are kindergarten projects conceptualized?

One of the important activities of the *Little Scientist's House Project* is for children to work on projects themselves. It is therefore necessary to come to grips with the concept and methodology of this activity.

A kindergarten project is a long-term study on a topic that a child has chosen, based on his/her preferences, and agreed on by the teacher in charge. Both pupil and teacher contribute to the planning and implementation of the project.

Project implementation does not necessarily focus only on content. It is up to the teacher to motivate the pupils to revise and reflect on their own thought on different aspects of the project. The teacher also exchanges opinion with the pupils so that they are fully aware of their own learning process and have an in-depth understanding of the topic, enabling them to connect what they learn with real life experience.

For example, the teacher can kick off a project on solubility by making the pupils observe how sugar dissolves in water. Then the teacher can ask them what else can dissolve in water and what cannot. If water is replaced by other liquids, can sugar still dissolve in them? Conversely, the experiment on sugar dissolution can be a component of other projects, for example, how to eat hygienically. The teacher can ask the pupils these questions: Where does sugar come from? How much should they eat sugar? Why should they brush their teeth after a meal?

The programme Little Scientist's House was aired on ThaiPBS channel every Sunday in 2013. Lasting about 10 minutes, it is divided into two parts: the first part presents a short animation with content inspired by the publication, Little Scientist's House; the second part presents children's project implementation that answers the animation's quiz.

Her Royal Highness Princess Maha Chakri Sirindhorn presides over the opening of the Children's University Thailand Project and visits its exhibition on the theme, Imparting Scientific Concept in Youth, held at Sirindhorn Science Home, Thailand Science Park, Pathum Thani province, on October 30, 2012.

Children's University
For Thai Children with A Heart for Science

"There are several children's universities being organized in Europe but they all form into a network. Children can have their queries answered and explained correctly by experts. Thailand has adopted this approach of organizing children's universities from the Federal Republic of Germany, but we concentrate on science only...Children who join the Children's University Project will be given knowledge and an understanding of science and technology by experts. The project offers several experimental activities. It will inspire children to be creative, while learning to appreciate the attitude and ideology of scientists. The knowledge and understanding thus gained, integrated with good attitude and ideology will contribute towards nurturing the children to become good scientists in the future."

Her Royal Highness Princess Maha Chakri Sirindhorn remarks
at the opening of the Children's University Thailand Project,
at the auditorium of Sirindhorn Science Home, Thailand Science Park,
October 30, 2012

Students are in the middle of a science experiment.

Professor Dr Katharina Kohse-Höinghaus of the chemical education project, *teutolab*, Bielefeld University, Federal Republic of Germany, founded the *Children's University Germany Project* in 2004 with the objective of promoting science education with diversity and depth for primary and lower secondary schoolchildren. The students are mentored and advised in their science and technology activities by researchers, experts and university students.

The *Children University Project* in Germany has been hugely successful in providing inspirations to children and youth. They are able to join various activities and have great fun together. They acquire good attitudes, become observant, know how to ask questions and search for the answers themselves more. This project has later been expanded to other countries, such as the Arab Republic of Egypt, and the People's Republic of China.

In July 2010, Her Royal Highness visited the *Children's University Project* at Shanghai Institutes for Biological Sciences, the People's Republic of China. She witnessed its great success and enthusiastic response from students. Consequently, Her Royal Highness thought that Thailand would do well to have a children's university project that operates in a similar fashion.

A number of academic institutions and those responsible for science teaching in Thailand, namely, Institute for the Promotion of Teaching Science and Technology (IPST), National Science and Technology Development Agency (NSTDA), and their network of universities, responded to Her Royal Highness's wish. They collaborated with an agency for technical cooperation and exchange of the Federal Republic of Germany, the Deutscher Akademischer Austausch Dienst (DAAD), to launch a pilot *Thailand Children's University Project* in 2011.

Her Royal Highness graciously presided over the opening of the *Thailand Children's University Project* on 30 October 2012 at Sirindhorn Science Home, Thailand Science Park, Pathum Thani province.

During 2012-2014, NSTDA was running a trial adaptation of science activities and experiments from the *Children's University Project* in Germany at 16 science camps, attended by a total of 1,240 upper primary, lower secondary and upper secondary students. The experiments that were chosen for the camps include those on Citric Fruits, Nanotechnology Milk, and Paper and Ink.

When the Citric Fruits and Nanotechnology Milk experiments were used in two training courses for 88 deaf students and their teachers, they attracted a good deal of interest from students and teachers. Teachers of the deaf later adapted the experiments to work sheets for deaf students.

Mrs Duangsamorn Klongsara, Vice President of IPST, explained that the *Children's University Project*'s goal is to make students like to learn about sciences. It has helped students to realize the importance of science and more of them are choosing to study science subjects. This goal is consistent with IPST's mandate.

IPST adapted some experiments from the Federal Republic of Germany to the Thai children's context at the National Science and Technology Fair 2012, namely, an IPST exhibition and activities on the theme, *Adventure in Wonderland*, one activity of which was an adaptation of the milk experiment, now called *Milk, Milk, Milk*. Students flocked to join the activity and everyone enjoyed the experiment that allowed them to make paint from milk with their own hands.

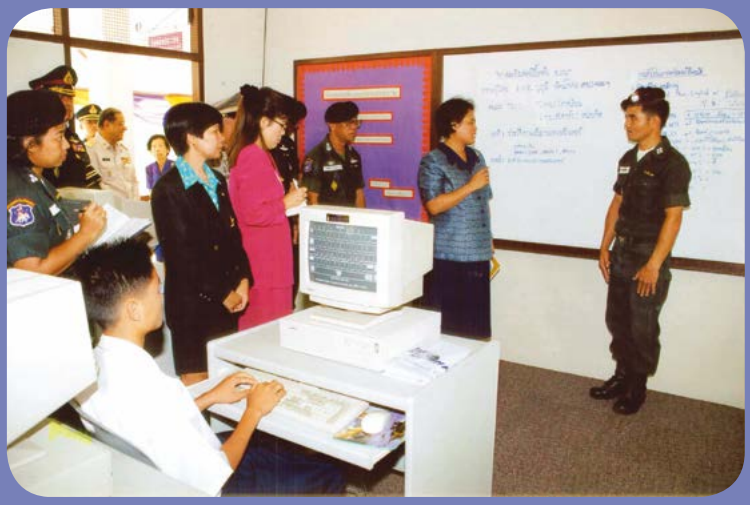
In 2013, IPST launched a project to introduce the activities to regional Scientific and Mathematical Genius Center under its aegis. It succeeded in inviting educational institutions and universities in the region to take part in the project. A total of 12 activities were held for 1,218 primary schoolchildren.

Associate Professor Dr Sakarindr Bhumiratana, President of King Mongkut's University of Technology Thonburi said, "*KMUTT will give full support in terms of personnel, premises, and diverse materials and equipment for experiments. Students will be transferred skills and knowledge in science and technology in a way that focuses on learning with enjoyment. They will no longer be afraid of studying sciences.*"

Thai children and youth who have the opportunity to hone their science process skills under the experts' close supervision and advice are ready to grow up to become persons with scientific spirits. Some may even choose to become scientists, engineers, planners or professionals who work in support of scientific systems which are the vital foundation and the driver of Thai economy and society to greater prosperity.

Students are experimenting on " water droplets rolling on a lotus leaf" to learn about the phenomenon of nanoparticles.

The *Thailand Children's University Project has* received cooperation from several tertiary institutions, including Silapakorn University, Kasetsart University, Srinakarinwirot University, Mahidol University, Chulalongkorn University, King Mongkut's University of Technology Thonburi, King Mongkut's University of Technology North Bangkok, and King Mongkut's Institute of Technology Ladkrabang. These well equipped universities in the network organize activities for children and youth in the neighbourhood, by having their postgraduate students in MSc and PhD programmes join the project as mentors while sending lecturers to provide supplementary knowledge in each activity.



Her Royal Highness Princess Maha Chakri Sirindhorn visits a computer room at Ban NaYao Secondary School, Chachoengsao province, on June 18, 1999.

IT Drives Forward Education in Rural Schools

Her Royal Highness Princess Maha Chakri Sirindhorn has a special interest in Information Technology or IT. She studied how to use IT herself and appreciates the potential and benefit of IT as a tool to develop the country in various aspects. She consulted on several occasions with her group of experts on the use of IT in the projects that she initiated.

In 1995 the expert group, led by Miss Vilavan Vanadurongwan and Professor Dr Pairach Thajchayapong approached the Government Lottery Office to issue a special charity lottery, the proceeds of which would be presented to Her Royal Highness to fund projects under her initiative. On completion of the undertaking, the government presented the proceeds to Her Royal Highness. The funds were the starting point of the *Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn*. In 1996, Her Royal Highness assumed the chairmanship of the project committee that ran the project from interests earned from the lottery funds.

To date, the *Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn* has conducted activities that develop education and enhance quality of life especially for the underprivileged. Among many outstanding achievements of the project are the development of education and quality of life for the handicapped, education and promotion of recreation for hospitalized children, vocational education for prison inmates and children and youths in the observation and protection centres. Her Royal Highness provides operational concepts and guidelines and monitors its implementation closely and continuously. Most importantly, she ensures that every baht from the project funds is well spent.

Members of the committee on the Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn are inspecting the operations of a computer service centre at Ubon Ratchathani Technical College, Ubon Ratchathani province.

Information Technology for Education: Even Used Computers Have Value.

Her Royal Highness realized that IT has the potential to create opportunities for learning as well as occupations and livelihood for children and youths in remote areas. Consequently, she initiated the *Information Technology for Education in Rural Schools Project* under the umbrella of the *Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn*. She advised that it should be run as a pilot project and allowed to grow gradually in accordance with the recipients' readiness. She objected to extravagant expenses involving giving out expensive tools and equipment at the start because they might not be fully utilized.

In the initial stages, the project focused on familiarising teachers and students with the tools and equipment. They learned how to

Students learn how to touch type on purple electric typewriters that Her Royal Highness gave to their school at the initial stage of project implementation.

operate used electric typewriters and computers that had earlier been donated to Her Royal Highness from several sources. Each school received 20 computers from Her Royal Highness to begin with, then teachers were trained to operate them and to apply them to their teaching/learning activities. Each school was monitored closely for its utilization of the equipment. If the follow-up results of a school were satisfactory, it would be given new computers with necessary equipment.

Her Royal Highness intended that project schools utilized tools and equipment to their fullest capacity. Therefore, teachers were trained while making teaching/learning materials so that they would be knowledgeable and able to transfer what they learn to the students. She also suggested that computers could be used not only for teaching/learning but also to make in-school administration more efficient, including to record scores, to keep an account of equipment management, and to operate school cooperatives.

There were 87 project schools in 2014. Each school is located in a remote area and most students are underprivileged. Project performance reveals that students have improved their learning outcomes, especially in technology knowledge and skills. More than 500 project students have been able to continue their education to the tertiary level in IT-related programmes which are in demand in the job market. Many project schools have attained higher O-NET scores in many subjects, while teachers and students of other project schools have won over 800 awards from IT project contests both regionally and nationally.

Computer Clubs – An Activity to Strengthen Sustainable Usage of IT

When computers were first used in rural schools, it was found that the schools ran into the problem of computer and equipment maintenance and repair. Most project schools were situated in remote areas in every region where repair shops were hard to find. Help from Bangkok technicians would be neither timely nor practical. Her Royal Highness suggested a solution through building a network of cooperation with agencies under the purview of the Office of the Vocational Education Commission. They could be found across the country and were able to conveniently assist local schools.

In 1996, Her Royal Highness suggested that a training course on basic computer maintenance and repair be held at vocational colleges where computer and equipment maintenance and repair service centres were subsequently set up. Their target customers were schools in the vicinity. As an added bonus, teachers were also trained in this way to be able to maintain and repair computers and rectify computer problems on a preliminary basis.

Phrae Technical College provides computer maintenance and repair service to Rajaprajanugroh 25 School, while improving the school's Local Area Network (LAN), September 22, 2014.

The Office of the Vocational Education Commission has continued Her Royal Highness's guideline to the present day through a *Project on Maintenance and Repair of and Development of Maintenance and Repair Personnel of Computers and Peripheral Devices and Basic Solar Power Generators under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn*. From the initial 17 service centres in 1996, the number had increased to a total of 88 service centres in 2014. They offer services to agencies under Her Royal Highness IT Projects, from schools, to hospitals to prisons. They have also served border patrol police schools in terms of consultation, examination and repair of electrical appliances, maintenance and repair of solar power generators at hill tribe community learning centres.

In 2007, more network institutions responded to the royal guidelines on maintenance and repair of school computers, i.e. the Rajabhat Universities network. To carry out the activity for the first time, lecturers in computer science surveyed the field themselves and found that whenever the computers broke down, the schools faced such inevitable

problems as teachers'inability to repair the computers themselves, or time and money wasted each year on having repair shops fix the malfunctions.

School Computer Clubs Activity therefore took shape as a solution to the problems. Rajabhat Universities served as mentors and consultants in training and provided assistance in maintenance and repair. Its main objective was to equip students in the computer clubs with the necessary know-how and opportunity to practice maintenance and repair of computers and peripheral devices. Each school would then be able to achieve sustainable self-reliance, as desired by Her Royal Highness.

Ajarn Kitisak KoedToe, head of the Department of Computer Science, Faculty of Education, Uttaradit Rajabhat University, said, "*When we started project implementation, all faculty members went out to provide technical services at the schools ourselves. Our experience made us realize that our Faculty of Education's mandate was to produce teachers. We should integrate our academic camps with the subjects on offer to provide our students with direct experience.*" Consequently, the Faculty of Education organized integrative activities for students participating in academic camps at general Buddhist scripture schools that combined the subject of computer teaching with the subject of training in teacher professional experience. This method not only provided assistance to schools but also practicum to students.

The novice students in project general Buddhist scripture schools were subsequently able to carry out basic maintenance and repair of computers, such as installing programs and dismantling computers. Moreover, the novice students could transfer the know-how to younger club members in more junior classes. The project schools could reduce expenses and became more self-reliant.

Novices give a lecture on how to install operating software and other programs to students of Ban Na Yao School, Uain sub-district, Tha Wang Pha district, Nan province.

Students from Uttaradit Rajabhat University train novice students on computer maintenance and repair as part of their field camp activity at Wat Don Mongkon Santisuk Witthaya, Nan province, March 10, 2009.

Certain project schools could assist smaller schools in other communities nearby, for example, the computer club of Wat Na Khrai Nanthachaisuksa School, Nan province, went out to help Trairath Witthaya School and Ban Na Yao School of Tha Wang Pha district, Nan province.

Her Royal Highness takes note of a report on the adoption of eDLTV in teaching/learning at Piyachat Pattana School under Royal Patronage, on December 26, 2009.

Wherever They Might Be
Thai Youths Could Learn via eDLTV

Several small rural schools face a major problem of teacher shortage. Some teachers have to teach many subjects, while others have to teach a subject that was not their major in their qualification. There is never enough teaching material to enhance students' understanding of a subject content.

One approach to mitigate this problem is to provide education through Distance Learning Television or DLTV. However, the process involves live broadcast of a classroom teaching at Wangklaikangwol School which may not coincide with the timetable of the receiving schools. Tape-recording is not an option due to its high cost.

Once while Her Royal Highness was visiting a school in an underserved area, she remarked to members of the IT Project under her initiative that computers at the school were not fully utilized and should also serve as a teaching/learning medium to make them cost-effective. Coincidentally, the committee was informed of the problem of using DLTV from a number of schools. It occurred to them that they could digitize the content of various subjects taught at Wangklaikangwol School and build an e-learning system. Students could now study the subjects at a convenient time. This is how the *Electronic Distance Learning Television Project* or *eDLTV Project* came to pass. The project was dedicated to the eightieth birthday anniversary celebration of His Majesty the King on December 5, 2007 and run under the *Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn*.

During 2007-2011 the eDLTV Project collaborated with the Distance Learning Foundation, Office of the Permanent Secretary for Education, and Office of the Vocational Education Commission to build up an

e-learning system by digitizing all forms of content, from video clips, to handouts, to work sheets, to classroom presentations of every subject and every class. The system could be accessed online at http://edltv.net and offline through servers or external hard disks.

At present, the online eDLTV is utilized on average more than 500,000 times a month. Its website was ranked 5th-9th out of 52 e-learning websites (as of 2014).

The system was disseminated offline by 35 Rajabhat Universities to at least 15,000 small primary schools (with a maximum enrolment of 120) across the country (as of 2014).

Her Royal Highness has thoughtfully given funds as part of the budget to procure web servers, containing the eDLTV content, for 76 schools in the *Information Technology for Education in Rural Schools Project* and Wangklaikangwol School, totaling 77 schools. They can now utilize the web servers for teaching/learning purposes.

Student and Teacher Experiences

Wat Pho Thaen School at Ongkharak district, Nakhon Nayok province is a primary school with lower secondary classes that has been utilizing the eDLTV system. Most students enjoy their studies more. For example, Wasupon Waenkaeo , a first-year secondary student, recounted his experience in a voice tinged with happiness, "*Whenever I fail to keep up with my note-taking, I will order the teacher to stop, then I can take note. I like to study with the box teacher because I feel at ease, like watching television at home.*" ("*box teacher*" refers to a teacher from Wangklaikangwol School who takes part in distance teaching via satellite) . Another student added, "*It is so good. I can now study with two teachers at the same time: that is the box teacher and the real teacher.*" This is because if the "*box teacher*" could not make students understand a lesson, the "*real teacher*", Mr Sophon Anbangsai, could

What is the content of eDLTV?

There are 8 learning contents for primary grades 1-6: Thai language, English language, Sciences, Mathematics, Social Studies, Health Education, Art, and Occupational Training and Technology. There are 36,661 instructional materials, lasting 4,978 hours, with content provided by Wangklaikangwol School.

For secondary grades 1-6, there are 6 learning contents: Thai language, English language, Sciences, Mathematics, Social Studies, and Health Education. There are 30.302 instructional materials, lasting 4,675 hours, with content provided by Wangklaikangwol School.

Content on occupational training covers 70 occupations, and 1,365 accounts; for example, *Wangklaikangwol Occupational Kitchen, Contemporary Dress Fashion, Beautiful Hand Embroidery, Thai Traditional Massage*. There are 5,204 instructional materials, with content provided by Wangklaikangwol Industrial and Community Education College.

further explain it to them. Moreover, the students could turn on the programme outside school hours and go over the lesson content until they understand it.

Teacher Sophon was a recipient of Khuruthayat Scholarship and graduated with an English major. However, he has been teaching mathematics right from the start because the school had no maths teacher at the time. Despite many years of maths teaching experience,

Teacher Sophon finds the eDLTV useful. He can use it to search for additional knowledge and to help him write his lesson plans. He can add certain techniques to communicate better with his students so they can have a clearer understanding of his lessons.

A teacher told us, *" I teach grade 3 and 4 pupils who sit in the same classroom on the opposite sides. While grade 3 pupils learn from the eDLTV, I teach grade 4 pupils. Then I summarize the lesson to grade 3 pupils after I have finished teaching grade 4 pupils.With the introduction of the eDLTV, our ONET test scores are higher than the national average in many subjects. The eDLTV has helped children to become more engaged in their studies."*

Rajabhat Universities: A Network to Disseminate eDLTV

35 Rajabhat Universities across the country have joined forces as a network to disseminate the eDLTV to local schools. They organize various activities for small schools, border patrol police schools and schools in underserved and remote areas in every region, from offering technical services to setting up camps for students to practise teaching.

In 2014, the Rajabhat Universities Network disseminated the eDLTV to at least 15,000 small schools (with a maximum enrolment of 120) across the country. The Office of the Basic Education Commission, Ministry of Education, has allocated a budget for each school to buy a 2 TB (two Terabytes) external hard disk that would be used by an official from the local education service area office to copy the primary-level eDLTV materials from a Rajabhat University in the vicinity.

Acting Sub-Lieutenant Surachet Muksuwan, director of Ban Khlong Na Yen School, Bang Rakam district, Phitsanulok province, confirmed that after the adoption of the eDLTV system by the school, students' scholastic achievements were much improved. Test scores in major subjects under the Ordinary National Education Test ONET were good. Scores in the 8 learn-

ing content groups were ranked among the top 10 schools in Phitsanulok Education Service Area 1. Consequently, Phitsanulok Office of Primary Education Service Area 1 will expand the coverage of eDLTV to other schools under its supervision.

Use of EDLTV in Short Occupational Training Courses for Prison Inmates

Her Royal Highness Princess Maha Chakri Sirindhorn opined that, "*We should try to select content on diverse occupational training to be included in the system. Those who are underprivileged or living in remote rural areas will have opportunities to be trained in occupations that they are interested in. They can then earn a living to support themselves and their families.*"

The Department of Corrections, Ministry of Justice, responded to her idea by introducing the eDLTV for vocational development to train prison inmates in short courses. They could opt for the occupation that they find attractive, for example, barbering, making paper mache, pleating fabric and table skirts for formal functions. Inmates could turn on the eDLTV for revision until they could complete their tasks.

Her Royal Highness's initiative and commitment to educational development not only benefited children and youths in remote areas but also provided opportunities to the general public who are keen on learning to access knowledge both in basic formal schooling and in occupational training on an equal basis.

Professor Dr Pairach Thajchayapong leads a group of teachers from Islamic private schools to greet Her Royal Highness while on a visit to Narathiwat.

IT for Islamic Private Schools

Her Royal Highness Princess Maha Chakri Sirindhorn places equal emphasis on education for children and youth in every underserved area, and on that for Thai Muslims who live in remote areas in the South. She is determined to step in to promote education for children and youths so that they can have access to good education that in turn could enhance their quality of life. The activity to introduce IT for use in education in Southern Islamic private schools began in 1993 while Her Royal Highness was on a follow-up visit to royally initiated project schools in Narathiwat province. She sent IT Project staff to assist teachers at Chanya Islam School, a Pondok (or Por-nor in Thai), adjoining Ban Sala Mai School at Tak Bai district, Narathiwat province. They were advised to give a training course in IT to principals of 14 Islamic private schools under the royally initiated project so that they could use their IT knowledge in school administration and teaching/learning activities.

In 2014 there were a total of 15 schools under the *IT for Education in Islamic Private Schools Project*, under the umbrella of the IT Project under the Initiative of Her Royal Highness. Situated in Narathiwat, Pattani, Yala and Songkhla, 13 of the project schools were Islamic private schools while the other two were Pondok institutions, offering only theology courses.

Islamic Teaching in Southern Border Provinces.

There are areas in the Southern border where conservative Muslim communities reside, especially in Yala, Pattani, and Narathiwat provinces, and the districts of Chana, Thepha, Saba Yoi, and Na Thawi in Songkhla province. Members of these communities adhere strictly to the teachings of Islam and abide by the holy Quran as the charter that governs their lives.

There are three types of educational institutions where Islam is taught:

1) Mosque-based Islamic Education Centres (Tadika) which opens for Islamic Studies on Saturdays and Sundays. Some offer classes in the morning or in the evening after school hours.
2) Pondok educational institutions open their doors to students who wish to further their study in Islam. Some cooperate with units under the Office of the Non-formal and Informal Education to offer courses which enable graduates to qualify for a lower secondary certificate or to pursue vocational education in parallel with their religious studies.
3) Islamic Private Schools offer basic education courses alongside Islamic studies under the Ministry of Education.

At the initial stages, Her Royal Highness provided computers to these schools to be used for administration and teaching/learning purposes. She focused on developing the potential of principals and teachers so that they could fully utilized the technologies in their assigned duties in the actual school environment. Subsequently, a basic course was held for principals and teachers in information

Hama Pula, a Muslim teacher or Tok Guru of Pondok Islam Darussalam institution. "Tok Guru" refers to a teacher who has an in-depth knowledge of Islam. He is respected by the community and owns the Pondok.

Source: Ministry of Education Regulations on Pondok Institutions (Second Notification) B.E. 2548, A.D 2005.

Religious teachers and subject teachers mingle while being trained to apply IT to teaching/learning activities.

technologies literacy and their application as teaching media for general subjects and Islamic Studies as well as the use of eDLTV. Colleges under the Office of the Vocational Education, Ministry of Education, in the vicinity, were enlisted to hold courses in computer maintenance and repair and to serve as mentors to computer club activities in schools. As a result, both teachers and students are able to rely on themselves in the long run.

A beaming student at Islam Promotion School, Songkhla province.

Avis Mali, a student and president of the computer club of Nirandon Witthaya School, Narathiwat province, told us, "*I have learned how to connect LAN lines, how to identify computer parts and how to assemble a computer. I have been able to use the know-how to look after the computer at home and managed to save on repair costs.*"

Her Royal Highness closely monitored project schools' operations and advised that IT be used to teach Islamic Studies. It could be seen clearly that the quality of life of principals, teachers and students in these schools have considerably improved over the past decade or so. ITs have been utilized extensively for teaching/learning activities and have benefited the students as a result.

Ustazah Mariana Tapo, a religious teacher of Chanya Islam School, Narathiwat province, who taught Tarikh subject (Islamic History), made the following observation: *"At the beginning, I did not think it was necessary to use IT in Islamic teaching/learning. It was good enough to teach according to the textbooks. However, after having been trained under the project, I changed my mind. Now I believe IT is important and necessary for everyone. If one uses the web and social media like Facebook appropriately, one will enjoy a good deal of benefit: not only in terms of religion, technical knowledge, and sciences, but also free communications with friends. Most importantly, IT can be usefully integrated into teaching."*

Primary schoolchildren of Phirayanawin Khlong Hin Witthaya School, Pattani province, pose for a group photo, taken during a visit by project secretariat at the school, on December 21, 2011.

A meeting is held for stakeholders of a school and a mentoring college to plan activities for the school's computer club.

Dr Muhammad Asmi Abubakar, director of Phirayanawin Khlong Hin Witthaya School, Pattani province, and chairman of Islamic private schools network in the project under the initiative of Her Royal Highness remarked with appreciation:

"Every time I have the opportunity to meet Her Royal Highness, I see her kind and smiling face. She always questions me about the well-being of students and their problems. She then gives advice and other guidelines for various undertakings. Whenever I feel discouraged, a picture of her working away comes to my mind, and it gives me fresh energy to continue with my creative work."

Her Royal Highness listens to a report on the Automatic Plant Watering System,
presented by Novice Navapol Khamsaen,
on March 12, 2014.

New Approach to Science Studies in the Age of ICT

"Education is an important factor that contributes to our country's sustainable development. There must be education in science and technology at all levels, from kindergarten to tertiary level. Students must be trained to have practical skills and endowed with the power to think systematically in scientific ways. They must have imagination that leads to creativity and innovation. In order for education to achieve its objectives, it must rely on scientific and technological materials and equipment, such as science laboratories and instruments, books, journals, other printed materials, computers and peripheral devices."

Excerpted from a speech delivered by Her Royal Highness on the topic, "Science and Technology for Development", at a conference entitled, "Globalization: Challenges and Opportunities for Science and Technology," held at Yokohama, Japan, August 23, 2006.

Enhancing Science Studies with ICT integration.

The *Information Technology for Education Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn* attaches importance to an activity – integrating ICT into the teaching/learning of every subject, especially sciences. Using ICT as a learning tool will make learners enjoy asking questions and search for answers by conducting projects. Knowledge does not have to be necessarily acquired in a classroom.

Online Classroom: Project on Integrated Learning through Plant Species

This online classroom was built by Teacher Sojikan Staphorn (Teacher Muk), one of the project core teachers. The website contains several forms of content, including pictures, video clips, and articles. There is also space for many activities which learners could participate in, such as exchange of knowledge, queries, making science projects on plants jointly with experts from several agencies, including the National Centre for Genetic Engineering and Biotechnology (BIOTEC), National Science and Technology Development Agency (NTSDA), and South East Asian Nepenthes Study & Research Foundation.

Interested public can check out the students' science projects on plants at http://botanyschool.ning.com.

"A school with a Swiss atmosphere but an Ethiopian economy" is how a teacher jokingly described her school, the Rajaprajanugroh 31 School, Mae Chaem district, Chiang Mai province. Despite its remote location, and a student body of hill tribe descendants, the school is in the vicinity of Doi Inthanon National Park and enjoys an invaluable environmental asset that its students can learn from.

A documentary was made on local environmental science as an activity under the *Project on ICT Integration for Local Environmental Science Study*. The students' documentary production reflected a development process of important skills, namely, a skill to create and review a knowledge by oneself, and a skill to make an interesting presentation of the knowledge.

Teacher Somsri Rinchai, one of the project core teachers, remarked, *"Students' science classroom has been transformed. Students now use Doi Inthanon National Park as a field classroom where they carry out science projects. They are using the science and computer room as a studio to create their science documentary."*

ICTs have been used to support scientific studies in diverse forms, depending on the type of activities and their management; for example,

Phra Tamnak Suan Kularp School has integrated ICT in scientific studies; for example, primary schoolchildren in grade 5 worked on their science projects during a computer class. A learning atmosphere was created, filled with laughter, applause, and questions from students; for example, *"Teacher, if I want to put some letters on this picture of a tree, what must I do?" or "Teacher, if we want to record something on the computer, what must we do?"*

Piyachart Pattana School under the royal patronage of Her Royal Highness Princess Maha Chakri Sirindhorn has created an online classroom to support the *Project on Integrated Learning through Plant Species* (See details in the framed message on p.128). A former student of this school, Perawat Chantanakul, said, "*I could come up with queries at any time. The online classroom enabled me to have quicker responses than before. And, importantly, the answers were given not by just one teacher, but by experts who logged in from overseas.*" This was one of the main reasons that he managed to master botany quickly and was later admitted to the Department of Botany, Faculty of Science, Chulalongkorn University.

Invention Projects Foster A New Generation of Thinkers

Projects on electronics and computer programming are activities that enhance skills in critical thinking, planning and problem-solving, all of which are crucial and necessary in the 21st century. These activities attract the interest of a number of youngsters. If they learn the process that creates tangible outputs, with support from their teachers and specialists who stand ready to offer advice, they will be able to develop a number of important basic skills, from identifying the problem, to planning, to problem-solving, and to communicating with other people with efficiency.

Students show off their electronics project.

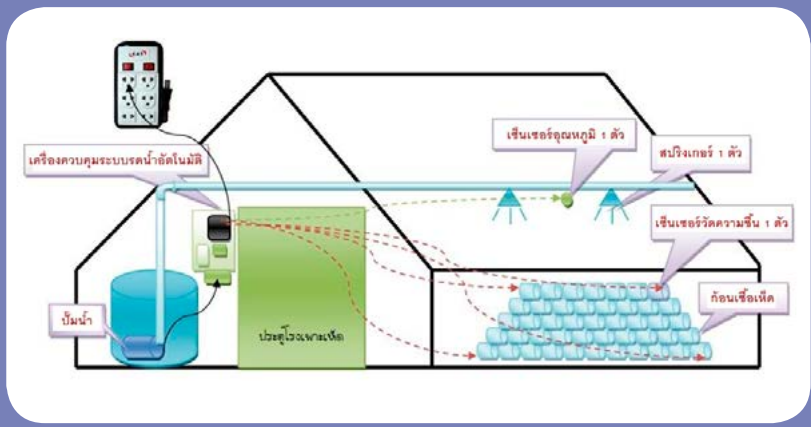
New Age Novices...Paying Attention to Technologies

Chiang Klang Pariyatsuksa School, Chiang Klang district, Nan province, had a project on agriculture for school lunch. Novice students were growing mushrooms for their own consumption but the yield was smaller than expected. An investigation revealed that the problem was caused by inappropriate watering, so a question was raised : what kind of temperature and humidity do the mushrooms need to produce higher yield? This was how the project on growing mushrooms with automatic watering system came about.

Novice Peraphat Hanyut and Novice Panachai Phipakphrau remembered how they came across so many problems while working on their project that they felt discouraged sometimes, but as they explained, "*After we had been trained in the process of scientific thinking, starting with observing and analyzing the conditions of the problem, researching the methods and mapping out a plan to use ICT to solve the problems, we learned the logical functions and mechanism of various instruments.*" So they were able to overcome all obstacles and learned from actual practice.

Novice Panachai Phipakphrau, Novice Peraphat Hanyut and Ajarn Siwaphon Chiranasen from Chiang Klang Pariyatsuksa School, Nan province, have been selected to jointly present the project on a mushroom nursery with an automatic watering system at the fair, Thai Education 2014: Smart Education, held on November 11-13, 2013.

How does a mushroom nursery with an automatic watering system work?



A mushroom nursery is composed of an automatic watering control which orders the water pump to release (or not to release) water to a sprinkler as programmed; for example, if the temperature is lower than 30 degrees Celsius, and the spawn humidity is low, the watering will start.

The success of the project on growing mushrooms with an automatic watering system can be measured concretely. The yield of Nang Fa mushroom from 100 bags of spawn increased from 27.7 kilograms (in 2012) to 33 kilograms (in 2013). Time spent on watering was noticeably saved while the harvest yielded enough mushrooms for cooking.

The above account is only one example out of many projects that provided opportunities to train youngsters to think, to create, and to solve problems in order to utilize their inventions. Other ICT projects that the youngsters thought up and invented themselves include, a smart washbasin which solves the problem of water tap being left on after use; and an automatic light switch, set according to the school time-table, to save energy.

Successful Project Outcome: A Bridge to Higher Education

A number of young people have capitalized on their successful projects in their pursuit of higher education at leading universities; for example,

Mr Wuthinan Longcharoen, a student at Nakhon Nayok Witthayakhom School, was physically impaired and had never written a computer program before. But after participating in project activities, he was eager to learn more by himself. He managed to pass an entrance examination to Thammasat University and is now studying Computer Science.

Miss Athiya Phaophong, an Ongkharak School student, worked on an invention project at the school and was selected to participate in the *2B-KMUTT* Project of King Mongkut's University of Technology Thonburi. Later, she was admitted through a special quota to study in the Department of Construction Engineering, Faculty of Engineering, of this university. Besides, she is a student in the *Junior Science Talent Project (JSTP)* of NSTDA, and has been granted a long-term scholarship through to the doctoral level.

When young people work on these invention projects, not only do they create something that is useful to others, but they also undergo a comprehensive skill training. The projects are a major step forward for them towards the good life.

These are examples of how the force of ICT has been harnessed to enhance the learning of science by the *Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn.* Children and teachers were trained to have ICT skills so that they can use them for teaching/learning purposes. On top of that, children were exposed to the scientific spirit of enquiry at a young age; they were nurtured to think critically, to be analytical and able to study by themselves.

Her Royal Highness Princess Maha Chakri Sirindhorn listens to a report on the results of the integration of ICT usage into science teaching/learning activities from teachers and students from Rajaprajanugroh 31 School, Chiang Mai province, and Rajaprajanugroh 26 School, Lamphun province, at NSTDA's Annual Conference, NAC2012, on March 24, 2012.

Learning through Projects That Integrate the Force of ICT

"People say that, now and in the future, all places in the world will become nearer. It is not caused by the earth crust shrinking and things being moved closer but rather by present-day speed and convenience in travelling and telecommunications. People can now visit and keep close contact with one another. They may have similar thoughts despite living in the opposite corners of the globe. Consequently, if we fail to develop our own knowledge and capabilities, we can never live happily in a society of the future where rapid change takes place in several respects."

Excerpted from a lecture given by Her Royal Highness Princess Maha Chakri Sirindhorn, entitled, Trend in teaching /learning provision for learning in the next decade, at the seminar, IT for Learning in the Next Decade, on September 23, 1999.

Her Royal Highness's initiative led to implementation of a project to prepare Thai youth for the twenty-first century with its rapid changes in several dimensions. Young people should have knowledge and diverse capabilities to keep abreast of changing circumstances and to have important skills, including critical thinking, communicating, problem-solving, ICT competency and necessary life skills.

Students from Faculty of Education, Rajabhat Pibulsongkram University, Phitsanulok province, are being trained and prepared as new-age teachers to multiply the effects and disseminate IT literacy in schools, on January 7, 2015.

The *IT Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn* therefore conduct activities to promote teachers' application of ICT in learning provision in line with constructionism. This learning approach focuses on making the learners learn by creating a piece of work that has meaning to them. The workpiece is thought up to begin with, then put into practice, the learner will then come across problems that need to be solved. Meanwhile, ICTs are utilized as a tool to create diverse works. This process will help the learner to learn and develop skills simultaneously. A student at Somdet Phra Piya Maharaj Romaneeyakhet School, Kanchanaburi province, said : "*My experience in creating a chemistry workpiece has helped me to better understand the subject because I did not learn only theories but must understand*

the subject content first. Then I looked for notable points to remember and later presented in the form of a workpiece. Once I have tried it out, I will understand what I learn more. I also know how to work as a team with friends."

Teacher Angkhana Phawachalothon, a health education teacher at Somdet Phra Piya Maharaj Romaneeyakhet School gave an account of her experience: "*Once I adjusted my teaching/learning in I came to realize that teachers do not have to be that good at computer usage to carry it off. They do not have to worry either that they will not be able to catch up with the teaching. From my experience, I have noticed that the more the content, the better it is for us to organize activities for students to start working on a project. In this way, each group will devote their study to a given topic until they become expert at it. Then we use the process of sharing through joint presentation. Teachers have a major role in giving preliminary knowledge, facilitating the learning process and correcting any misunderstanding on the part of the students."*

Early project implementation in 2004 was spent on adjusting teacher training from creating teaching materials to project-driven learning provision alongside an introduction to ICT tools. The aim was to make students create their own workpieces, to follow-up on the teaching/learning provision by setting up contests, and to review teachers' provision of activities as well as quality of students' workpieces. Nevertheless, it was found that most teachers still used this process for extracurricular activities.

During the next phase, from 2008 to the present, the project has ensured that teachers organize learning provision that is based on projects prescribed by the curriculum. They are no longer to be organized as extracurricular activities. Students can now have the practicum in

Students of Thawatchaburi Welfare School, Roi Et province, proudly display their silk fabric which has been produced through the learning provision that integrates computer studies with occupational training.

their main classroom. During this period, Web 2.0 and social network became widespread and contributed to teachers being able to organize a larger variety of teaching/learning activities. As for teachers, after they have adjusted their teaching methods, they now measure scholastic achievements through research projects that are conducted in the classroom.

Later, the Office of National Education Council, Ministry of Education, supported a research grant "*Development of new-age learners' characteristics to prepare them for the second- decade education*

reform through integrating ICT in project-based learning." Research findings reveal that integrating ICT in project-based learning will help develop learners both in content learning and in five major competencies which constitute 21st century skills, namely, communicating, critical thinking, problem-solving, technology literacy, and life skills.

Her Royal Highness further advised the project committee to "*disseminate these successes to responsible government agencies, or those that are directly concerned with them, so that they could take over the multiplication of project effects on a wider basis."* Consequently, the project successes were multiplied by Rajabhat Universities network. Their undergraduate teachers education undergraduates are apprised of project operational approaches so that they may be able to harness ICT to their own provision of project-based teaching/learning activities in the future.

Her Royal Highness Princess Maha Chakri Sirindhorn visits the residence of U Moe Myint at Yangon, then Union of Burma, on March 17, 2010.

Intellectual Treasure from Burma

Her Royal Highness Princess Maha Chakri Sirindhorn has always been particularly interested in education and knowledge resources. Whenever she visits a foreign country she will make a point of checking out libraries or bookshops in that country. On her visit to the Union of Burma, she inspected a bookshop selling rare and antiquarian books in Yangon. The entire collection of these books was subsequently bought by a Burmese tycoon, U Moe Myint, who conveyed his intent to the Royal Thai Embassy in Yangon to present the collection to Her Royal Highness.

Her Royal Highness truly appreciated the worth of the collection and asked Professor Dr Pairach Thajchayapong and General Vapirom Manasrangsi, Deputy Chief, Aide-de-Camp General to H.M. the King, *"whether it would be possible to digitize those rare books in the Union of Burma."* The two officials were attending Her Royal Highness during her visit to Piyachat Pattana School under the royal patronage of Her Royal Highness on 1 December 2009.

The collection consists of 224 titles, of which 205 were written by Burmese authors or on Burma. The oldest book was published in 1653, titled, *The History of Great Britain*. The year when the greatest number of books, as many as 13, were published was 1911.There were 21 antiquarian books and 32 copies of the journal, *The Burma Digest*.

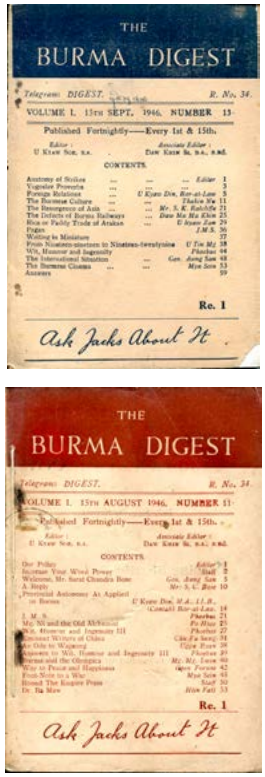
In response to Her Royal Highness's request, the National Science and Technology Development Agency (NSTDA) and the Royal Aide-de-Camp Department jointly launched a project titled, *Digitization of Rare Books from the Union of Burma under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn*.

Her Royal Highness listens with interest to an expert explanation on the rare books, on March 17, 2010.

A team of experts was formed, and equipped with digitizing tools. The project was assisted by a network of organizations, namely, Thammasat University Libraries, Atiz Innovation Co., Ltd, Canon Marketing (Thailand) Co., Ltd, Bangkok Airways Public Company Ltd, with NSTDA's Science and Technology Knowledge Services (STKS) and National Electronics and Computer Technology Centre (NECTEC) serving as project coordinator and administrator.

Project implementation began with a study of the conditions of the books, journals and newspaper, with the assistance from experts in rare books conservation, information resource reserve section, Thammasat University Libraries, in assessing electronically photocopied documents, scanning, touching up and compiling the documents into an e-document in portable document format (PDF), complete with metadata for searching. A team of experts from NSTDA and Atiz Innovation Co.,Ltd jointly gave advice to the Burmese personnel who worked on the project.

The digital data thus obtained was compiled into flash e-book for virtual presentation as well as 3D Flip e-Book as a repository of digital images that had been selected from interesting book illustrations.


THE
BURMA DIGEST
VOLUME I. 15TH SEPT. 1946. NUMBER 13
Published Fortnightly—Every 1st & 15th.
CONTENTS
Re. 1
Ask Jacks About It

THE
BURMA DIGEST
VOLUME I. 15TH AUGUST 1946. NUMBER 11
Published Fortnightly—Every 1st & 15th.
CONTENTS
Re. 1
Ask Jacks About It

Examples of rare books.

When various resources were completed, a digital library was set up to store those ebooks for convenient search and use.

The *Project on Digitization of Rare Books from the Union of Burma under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn* not only demonstrated the synergy of collaborating organizations, but also served as a model for the use of digitizing technology in conserving valuable antiquarian documents. The methods could be replicated systematically by other Thai agencies. Moreover, the resulting digital library has proved to be useful to academics and interested members of the public who wish to study Burma in various respects, including Burmese literature, and Thai-Burmese history.

If one is interested in digitized Burmese rare documents, where could one address one's inquiry?

Interested public can contact the Chulachomklao Royal Military Academy library or search for the documents at the database provided by the Humanity Information Centre, Faculty of Arts, Chulalongkorn University, Tel: 0 2218 4890.

Science and Technology For the Development of the Underprivileged

Her Royal Highness Princess Maha Chakri Sirindhorn visits Phufa Pattana Development Centre under the initiative of Her Royal Highness the Princess at Phufa sub-district, Bo Kluea district, Nan province, on February 25, 2010.

Community Enterprises Strengthening Rural Areas in Thailand

A community denotes a group of people living in the same locality, interacting with one another in several dimensions, and adhering to common values or beliefs. Their quality of life is affected by certain important factors, namely, economic conditions in many cases, and appropriate scientific knowledge. Efficient management can help upgrade economic conditions, especially, when the focus is on the livelihood of community members.

During 1995-2007, the third royal food processing factory at Tao Ngoi district, Sakon Nakhon province, was transformed into Doi Kham Food Products Company Ltd. It was run as a regular business enterprise but did not succeed as it should have while cooperation from member farmers and the community also declined. Upon being informed of the problem, Her Royal Highness suggested using the community enterprise as a model for its operations.

The project commenced in 2008 with the title, *Project on Community Enterprise—The Royal Food Processing Factory*. It operates as a joint undertaking of the community, local organizations, King Mongkut's University of Technology Thonburi (KMUTT) and the National Science and Technology Development Agency (NTSDA).

Its main objective is to make farmers become self-reliant. Target farmer groups of 5,000 households, living in 74 villages in three provinces, namely, Nakhon Phanom, Mukdahan, and Sakon Nakhon provinces that surround Phu Phan. Project method is to support their occupational grouping, provide the right management, improve science and technology knowledge through teaching and study visits and use the factory as a development tool as prescribed by the principle of sufficiency economy.

The community enterprise at Tao Ngoi has outstanding and concrete outputs that may be divided into three groups:

The quality rice seeds group : In the crop year of 2008/2009, its 11 members used the rice variety Kor Khor 6, that was resistant to the rice blast disease, and obtained a yield of 3,515 kilograms. They also used white Jasmine rice variety105, which was flood-resistant, and obtained a yield of 1,560 kilograms. The seeds were sold at 18-20 Baht a kilogram, with the total value of 96,000 Baht. At present, the group earns an income of about 400,000 Baht a year.

The organic rice group: In the crop year of 2008/2009, its 26 members farmed 65 rai (10.4 hectares) and harvested 18,200 kilograms of toxin-free organic rice. In the following crop year of 2009/2010, their yield was 42,000 kilograms, fetching an income of about 590,000 Baht for the group. Today, the group earns an income of about 600,000 Baht a year.

GABA rice.

The processing group: In the crop year of 2008/2009, its 80 members made processed products including Khao Taen (crispy rice cake), Kluai Tak (dried banana) and Kluai Thot (fried banana in batter). Their products were sold in the community and at neighbourhood schools and helped reducing consumption of snack foods from outside. Moreover, the organic rice was processed into GABA (Gamma-Aminobutyric Acid)

rice, and increased its selling price to 80 Baht a kilogram. Today this group makes about 2 million Baht a year.

In 1996, at the villages of Bo Mueang Noi and Huai Nam Phak at Na Haeo district of Loei province, the National Centre for Genetic Engineering and Biotechnology (BIOTEC) of NSTDA, jointly with King Mongkut's University of Technology Thonburi (KMUTT) transferred the technology of strawberry production to farmers. In 2011, they transferred the technology of strawberry runners production to farmers so that they could use the stolons to propagate more plants and save the cost of transporting strawberry runners from Chiang Mai province.

At present, local villagers grow strawberries as their main occupation. Four families produce strawberry runners for sale and earn a total income of about 250,000 Baht a year. About 15-20 families grow strawberries and sell them fresh, earning a total income of about one million Baht a year.

Because processed agricultural products could add rather a lot of value if done properly and up to standards, hygienic food processing technique was transferred to Bo Mueang Noi community members in 2011. Many processed food products were introduced, namely, strawberry juice, strawberry jam, passion fruit juice, roasted Macadamia nuts and chocolate Macadamia nuts. During 2012/2013, the record shows that there were 20 members in the group, with a revolving fund from sales of 7.5 million Baht. Each year, a member earns on average 50,000 Baht and employment was generated for another 20 community members.

Moreover, the two villages are located within the Phu Suan Sai National Park, with tourism resources, ranging from mountains and waterfalls, to forest monasteries, to nature trails, to agricultural plots and their produce. Subsequently, the community earns 200,000 Baht a year

from agri-tourism. A community learning centre was set up as a result to serve as a learning resource for farmers and youths. Science camps were held for children and youths, focusing on themes that relate to their lifestyles and occupations, including, a strawberry camp, an energy camp, a nature conservation camp, and a food processing camp. These camps helped children and youths to learn scientific skills and to be able to apply them to their studies and their day-to-day living.

At Ban Pha Khap village, Bo Kluea district, Nan province, NSTDA collaborated with Rajamangala University of Technology Lanna, Lampang province, to transfer technology of wheat cultivation and wheat strains selection for the locality to farmers. Consequently, their wheat yield

Farmer members of the
"community enterprise group for wheat tea processing of Ban Pha Khap."

per rai (.16 hectare) was as high as 320 kilograms, earning an increased income of about 5,000 Baht per household.

The young wheat shoots can be processed into a wheat tea under the brand "Phufa". There is a market for it because it has won consumer approval. The sales have generated for the group a revolving fund of about 50,000 Baht which is used as an occupational fund and an effective welfare fund for members facing economic problems.

Besides, there are other income-generating activities, such as production of "snack slim" tomatoes, and sweet corn and the transfer of strawberry production technology which all together generated a community revolving fund of about 300,000 Baht. Production of organic fertilizers from local farm residues, such as hay, animal droppings, and other agricultural wastes, helped improve soil quality and reduce the use of chemical fertilizers, while reducing production cost per rai by 500-1,000 Baht. Raising free-range egg-laying chickens under a natural agriculture system generates supplementary income of about 7,000 Baht a year. Farmers rely on local materials to build chicken coops and pens, and to produce their own chicken feeds.

The mechanism of community enterprise has encouraged villagers to join hands in generating jobs and incomes. They have acquired a new set of skills, knowledge and happiness on every level. These conditions will contribute to a better quality of life for every community member on a sustainable basis.

Her Royal Highness Princess Maha Chakri Sirindhorn visits
Ban Thep Phu Ngen Border Patrol Police School, Nam Som district,
Udon Thani province,
on October 29, 2013.

Electrical Safety in Border Patrol Police Schools

"Since textbooks contain the topic of electricity at both primary and secondary levels, you should connect these topics together, that is electrical safety in schools, occupational training, and lessons in science. These activities that I mentioned all provide connection with scientific concepts. Students will learn science through activities, some of which are connected with the subjects they find in textbooks. If they do it themselves, they will remember."

Her Royal Highness's keynote address, "Thai youth and Science," delivered at a symposium in tribute to Her Majesty the Queen, on the occasion of the celebration of Her Majesty's 80th Birthday Anniversary, at Dusidalai Pavilion, Chitralada Palace, on September 21, 2012.

The border patrol police schools were the first group of schools where Her Royal Highness first launched a number of development projects; for example, *Project on Agriculture for School Lunch*, to solve malnutrition problems in schoolchildren; and *Project on the Promotion of Educational Quality*, to enable children to learn and develop themselves. The *Project on Electrical Safety in Border Patrol Police Schools* was launched in response to her concerns for the safety of teachers and students upon learning that the Rappaport Border Patrol Police School, in Chiang Mai, was damaged in a fire.

As Her Royal Highness was aware of a training course on electrical safety in schools that the Thai Red Cross Society was holding for schools in the purview of the Office of the Basic Education Commission, she suggested that the course be held for border patrol police schools also.

The National Science and Technology Development Agency (NSTDA) responded to the royal wish by setting up a working group on electrical safety in schools. It was served by experts and representatives from allied organizations, namely, Provincial Electricity Authority (PEA), Provincial Electricity Authority wives and families, Institute for the Promotion of Teaching Science and Technology (IPST), King Mongkut's University of Technology Thonburi (KMUTT), Department of Disaster Prevention and Mitigation, Office of Her Royal Highness Princess Maha Chakri Sirindhorn's Projects, Border Patrol Police Bureau, and the Secretariat to the Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn.

The working group has adopted three approaches in its project implementation:

1. Development of basic safety procedure, including, maintenance and repair, inspection of equipment and classrooms, and building a cooperative network of local organizations;
2. Management of safety in schools, including setting up a working group on electrical safety in border patrol police schools, educating and providing equipment to the working group;
3. Teaching/learning activities on electrical safety, including curriculum development on electricity, and training in electrical safety for teachers and students.

As a result of committed and continuous implementation of the project, project border patrol police schools have been concretely developed; for example,

Training on electrical safety in schools.

Training on electrical measurement at a border patrol police school in the North.

Ban Khuan Samakkhi Border Patrol Police School of Chumphon province is mentored by Chumphon Polytechnic College under the aegis of the Office of the Vocational Education Commission (OVEC) that assists the school in maintenance and repair of electrical appliances.

The Rappaport Border Patrol Police 33 School, Chiang Mai province, held a meeting to map out a fire prevention plan for relevant persons and organizations, namely, kamnan (sub-district chief), village headsmen, Tambon (sub-district) Administration Organizations, and the Provincial Electricity Authority. In particular, the PEA has allocated a budget to adjust and change school electrical appliances and to install a circuit breaker at the school. It also held a training course on electrical safety in schools.

The Border Patrol Police 14 School, Ban Ta Tum, Surin province, educated its schoolchildren on how to use electricity correctly, a knowledge that they managed to transfer to their families after class as well.

The Union Bank of Bangkok Border Patrol Police 13 School, Kanchanaburi province, carried out several measures, including entrusting teachers with the duty to turn off electrical appliances in every classroom after school hours, and monitoring, reprimanding or punishing the responsible teachers if regulations were violated.

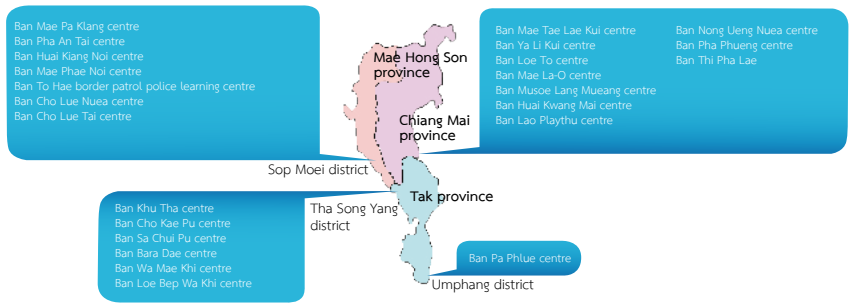
Project implementation not only assured teachers, students and school staff of their safety, but also applied science and technology appropriately to a situation that answered the needs of schoolchildren, developed their occupational skills, and provided an option for a number of them.

Her Royal Highness Princess Maha Chakri Sirindhorn listens to the Director of Chiang Mai Technical College presenting a report on maintenance and repair of a solar power generator at the Hill Tribe Community Learning Centre while she is attending the 2015 Annual Symposium on Development of Children and Youths in Underserved Areas under the Royal Initiative, on January 21, 2015.

Electric Lighting Shining on the Path to Knowledge for Hill Tribe Communities

Without electrification, remote rural areas could not be developed efficiently. In 2008, the Office of Her Royal Highness Princess Maha Chakri Sirindhorn's Projects sent a request to the National Science and Technology Development Agency (NSTDA) for the provision of solar power generating systems at schools and hill tribe community learning centres in the Northern provinces of Tak, Chiang Mai, and Mae Hong Son. These schools and learning centres are located in the areas of royal projects initiated by Her Royal Highness.

NSTDA promptly coordinated with several government agencies and educational institutions to deploy solar cells for power generation at 36 hill tribe community learning centres. To date, 12 centres have been taken over and are now under the care of the Department of Alternative Energy Development and Efficiency, under the Ministry of Energy only 24 centres remain with NSTDA.



All 24 hill tribe community learning centres in 3 provinces:

Hill tribe communities have benefited directly from solar power in the following ways:

Children can watch education programmes on television. They can watch, for example, the distance education programmes from Wangklaikangwol or learn from DVDs with additional explanation from their teachers. As a result, young people can learn faster with better scholastic achievements and have more interest in their studies.

Television viewers can keep up with current news and changing circumstances in the country. They can watch newscast and documentary as well as drama (which may be construed as informal education that helps them understand social etiquette.)

Community members have access to various services. Not only can they learn about local community news, the village news tower also relays news broadcast from the Department of Public Relations' radio station, and help facilitate community meetings. Other audio-visual equipment, such as amplifiers, television sets and DVD players can be utilized on important occasions (e.g. Father's , Mother's and Children's days, and New Year's Day). With electricity, community members can now have their hair cut by electric hair clippers.

Community members watch the news from television, using electricity that is generated by solar cells from 18.00-21.00 hrs.

Solar cells in a solar power generator.

These activities were implemented during the first phase of the project (2008-2011), titled, Pilot project on the management of solar power generating systems in educational institutions and hill tribe community learning centres located in areas under the projects initiated by Her Royal Highness Princess Maha Chakri Sirindhorn. The first phase was a collaboration of NSTDA with several agencies and educational institutions, namely, Office of Her Royal Highness Princess Maha Chakri Sirindhorn's Projects, Office of the Basic Education Commission, Office of the Non-Formal and Informal Education, Office of the Vocational Education Commission, Institute for the Promotion of Teaching Science and Technology, Department of Alternative Energy Development and Efficiency, and King Mongkut's University of Technology Thonburi.

During the first phase, the pilot project had laid down the infrastructure that benefited the hill tribe communities concretely. Subsequently, the second phase of the project was launched and implemented during 2012-2014, focusing on follow-up and evaluation. Reporting was done conventionally through paper reports submitted to the Office of the Non-Formal and Informal Education. Telemetry was first introduced on an experimental basis to follow up on the use of electricity and maintenance and repair of solar power generators in order to ensure that electricity was used efficiently for education.

Students watch the education programme
from the Distance Learning Foundation channel

During the second phase, project activities were conducted with collaboration from a number of agencies with NSTDA, namely, Office of the Vocational Education Commission (OVEC), King Mongkut's University of Technology Thonburi, Rajamangala University of Technology Lanna, Office of the Non-Formal and Informal Education, Border Patrol Police Bureau, and Institute for the Promotion of Teaching Science and Technology (IPST)

Examples of the roles played by certain organizations at different operational procedures may be given as follows:

NSTDA carried out research and development of solar cell panels and installed telemetry systems to be used in system monitoring.

IPST trained teachers, students, and villagers on solar power generation and included the subject of solar cell panels in its curriculum.

OVEC was responsible for maintenance and repair of solar power generators through the assistance of local vocational colleges.

The deployment of solar power generating systems not only benefited directly villagers and their communities, but also reflected the cooperative spirits of several organizations and sectors that joined hands to strengthen the highland communities, thus enabling them to be self-reliant in the long run since good education is the basis of an equitable and just society. Besides, electricity can help create occupations that generate incomes for community members whose economic status will consequently be upgraded. Electricity also contributes to national security when a wide coverage of and access to communication networks enables Thai people living in remote border areas to be informed of current news and other developments in the country as and when they actually occur.

How does telemetry work in hill tribe communities?

NECTEC's Solar Energy Technology Laboratory (STL), under the purview of NSTDA, installed telemetry systems at four hill tribe community learning centres. In order to achieve maximum efficiency, three technical criteria of telemetry were chosen:

Criterion 1: data transmission through GPRS. This was used in areas where there were sufficient telephone signals for data transmission through GPRS, namely, Ban Loe To, Mae Tuen sub-district, and Ban Mae La-O, Na Kian sub-district, both of Omkoi district, Chiang Mai province.

Criterion 2: data transmission through GPRS with additional signal boosters. This was used in areas where the signals were too weak for data transmission through GPRS and had to be improved by signal boosters, namely, Ban Huai Kiang Noi, Kong Koi sub-district, Sop Moei district, Mae Hong Son province.

Criterion 3: data transmission via IPStar satellite. This was adopted in areas where there are no telephone signals, namely, Ban Cho Lue Tai, Mae Suad sub-district, Sop Moei district, Mae Hong Son province.

N.B. GPRS or General Packet Radio Service upgrades the standards of mobile telephony under GSM (global system for mobile communications) by enabling continuous transmission of data packets, for example, in searching for information on the Internet and e-mail sending and receiving.

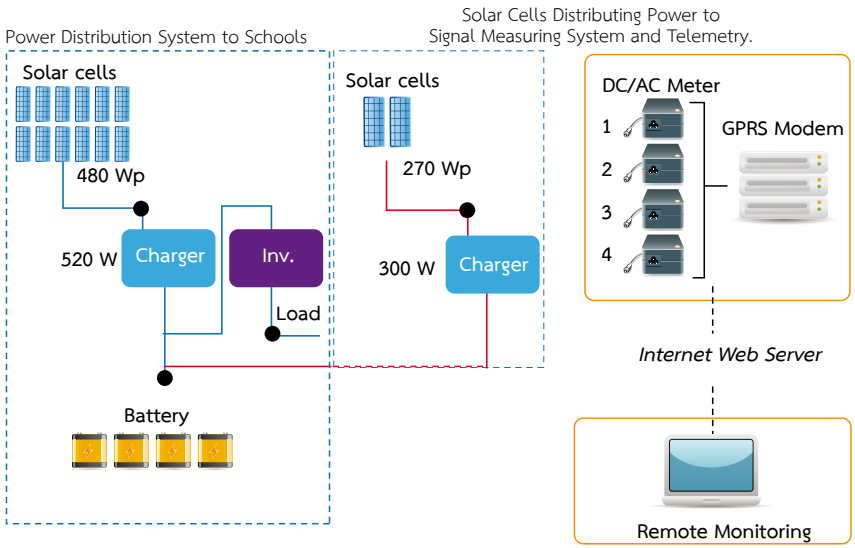
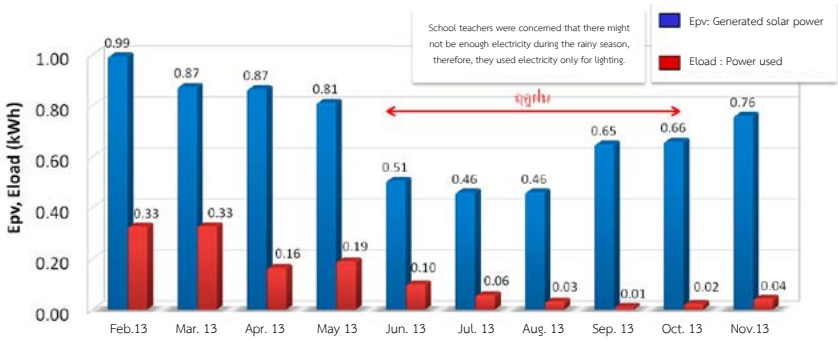


Chart showing power generating system and telemetry system

Dr Kobsak Sriprapha, Chief, Solar Energy Technology Laboratory, NECTEC, NSTDA, who is responsible for technical matters of the project said, "*Our team is very proud to have participated in an undertaking that is useful to children and these highland schools. We have learned and acquired many experiences, for example, how to solve technical problems at challenging landscape.. I do hope that the solar power generating systems that everyone has built will be the conduit of knowledge that contributes to improving the quality of life of villagers in each community on a sustainable basis.*"



Telemetry Data Showing Volume of Generated Power and Volume of Power Use of Hill Tribe Community Learning Centre at Ban Huai Kiang Noi, Sop Moei district, Mae Hong Son province in 2013.

Good management and use of appropriate technologies as in this project could be used as a model to be replicated in other areas, in particular, for management of solar power generating systems that use telemetry to measure data, and for their systematic maintenance.

Her Royal Highness Princess Maha Chakri Sirindhorn and Samdech Akeak Moha Sena Padey Techo Hun Sen preside over the opening ceremony of Kampong Chheuteal High School on November 10, 2003.

Kampong Chheuteal High School Thai-Cambodian Relationship

"I am pleased that Kampong Chheuteal High School has been operating for quite a while and the committee members from both countries have performed their tasks very well. It is my wish to play a part in educating Cambodian children. They have high potential and, given access to good education and training, will benefit from such opportunity themselves and become assets to Cambodia and to the world in the future."

An address delivered by HRH Princess Maha Chakri Sirindhorn to the Thai-Cambodian Joint Commission appointed as the Joint Ad Hoc Working Group In charge of Her Royal Highness's project to provide assistance in education to the Kingdom of Cambodia. At the Meeting Room of the Royal Aide-de-Camp Department, Chitralada palace. On August 22, 2005

The close tie between Thailand and Cambodia and Her Royal Highness's keen interest in the Khmer civilization led to several visits of HRH Princess Maha Chakri Sirindhorn to the Kingdom of Cambodia, each of which was warmly welcomed by the Cambodian people. In appreciation of their hospitality Her Royal Highness wished to give them a lasting gift, i.e. education.

The Government of the Kingdom of Cambodia, led by Samdech Akeak Moha Sena Padey Techo Hun Sen responded to her initiative by providing the site of the school covering an area of 45-rai (expanded to 117 rai afterwards) in Prasat Sambor District, Kampong Thom Province.

Kampong Chheuteal High School

Her Royal Highness Princess Maha Chakri Sirindhorn gave financial support for the construction of buildings and other facilities, which began in September 2001 and was completed in April 2005.

Kampong Chheuteal High School was officially opened on November 10, 2005. This educational institution is the only secondary school in the Kingdom of Cambodia that provides dual-system, i.e. vocational and general education.

The initial preparation of the infrastructure gained support from several agencies. The Royal Thai Army by the Engineering Department, for example, provided assistance in site survey and improvement, while the Border Patrol Police Bureau provided support for improvement of the quality of life of students and school personnel.

With respect to educational programmes, the project also received

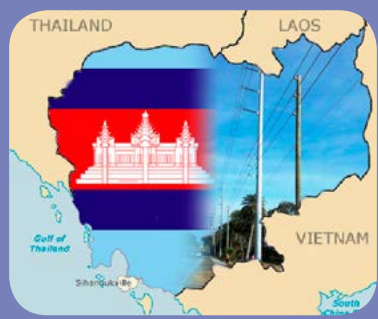
cooperation from several educational institutions, namely the Faculty of Education, Chulalongkorn University, Buriram Rajabhat University and Sisaket Rajabhat University, as well as the Office of the Vocational Education Commission provided assistance in human resource development by offering scholarships for further study and organising observation tours in Thailand. Other forms of assistance included curriculum development for both the general and vocational tracks and training on how to organise teaching and learning activities.

Miss Sam Chhuna, a student in the first class of Kampong Chheuteal High School who was awarded Her Royal Highness's scholarship for further study in the bachelor's and master's degree programmes at Burapha University said that, "*I am proud to have been given an opportunity for self-development and I will make use of the knowledge gained for further development of Cambodia. Recipients of Her Royal Highness's scholarships who graduated from educational institutions in Thailand are now teaching at Kampong Chheuteal High School or working at companies in Cambodia. They have succeeded in their careers and this has helped to improve their quality of life.*"

To bring about the improvement of quality of life and education for residents in the community, Her Royal Highness Princess Maha Chakri Sirindhorn initiated over twenty school development and extracurricular activity projects at Kampong Chheuteal High School. One of this was the *108 Vocations Training Project*, aimed at providing vocational options and means for income generation for students and local residents in the community. Two other projects included the *Sufficiency Economy Project* to advocate the concept of being resilient and self-reliant, and the *Kampong Chheuteal Co-operative Project* to instil the cooperative ideology, principles and methods in the students' minds.

Electric Power Status in Cambodia

Based on available information, in 2013 power generation capacity in Cambodia was 390 Megawatt and diesel oil was the main source of fuel used for power generation. Cambodia also imported approximately 600 Megawatts of electricity from Thailand, Laos, and Vietnam, 400 MW of which was for usage in Phnom Penh.



Source: "Electrical Energy Security in ASEAN," an article by Dr. Suthikorn Kingkaew, published in Business Plus Magazine, June 2014, Vol. 24, No. 304, Pages 88-93.

Solar Cells – Sustainable Renewable Energy

The area where Kampong Chheuteal High School was situated at that time was without electricity and water supply. The school had to rely on the use of diesel fuel for power generation, which incurred a lot of expenses. In view of this, Her Royal Highness advised that there should be efficient and cost-saving energy management at the school.

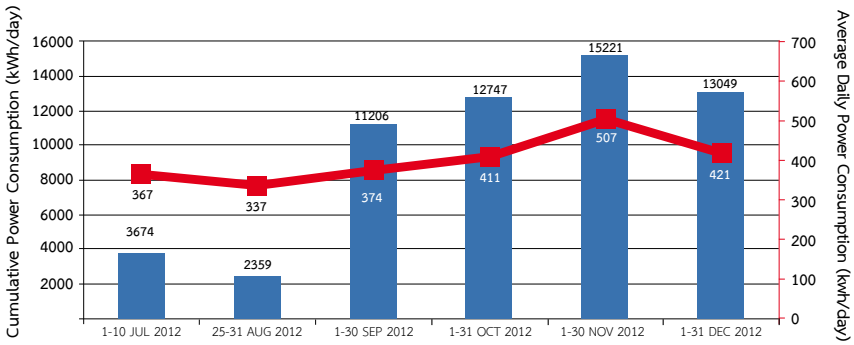
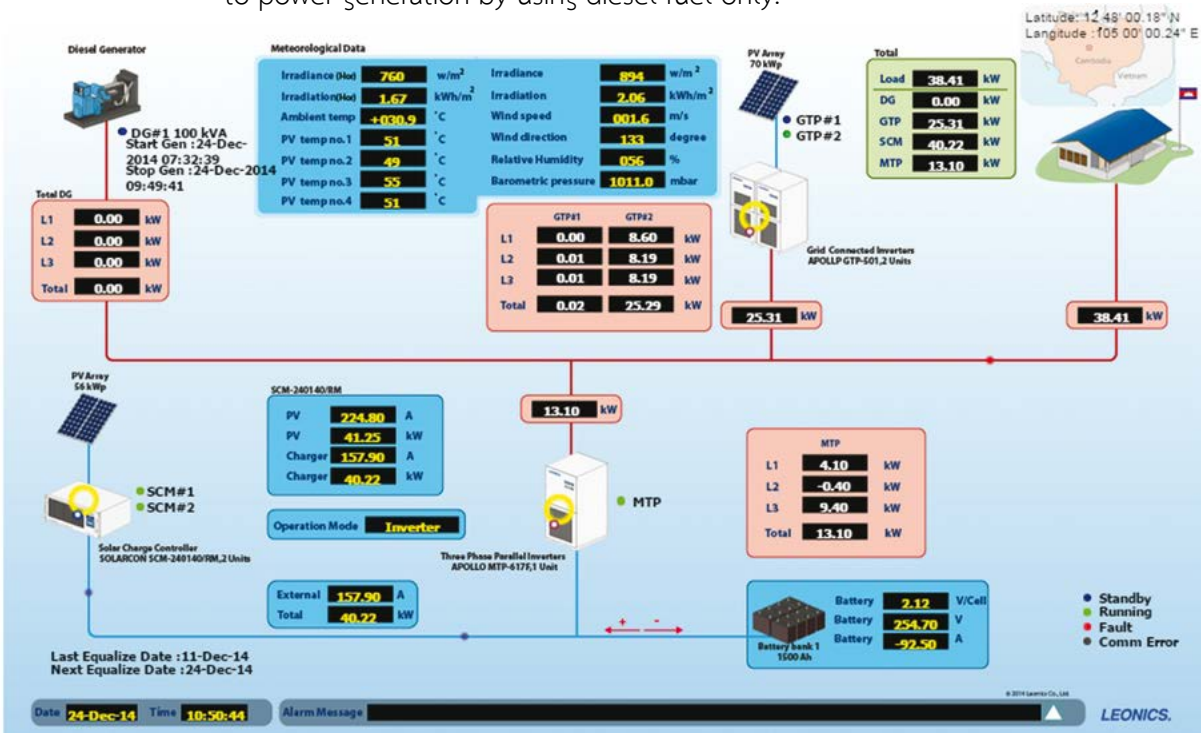


Chart showing power consumption at Kampong Chheuteal High School from July to December 2012

The PTT Public Company Limited kindly donated 15 million baht to support this project. NSTDA installed a 126-kWp PV system at the school. The system comprised a 70-kWp (56%) subsystem that generated power directly during the day and a 56-kWp (44%) subsystem equipped with a photovoltaic battery storage unit to provide solar power at night. At any time that power consumption exceeded the production capacity of solar cells, the system would activate the diesel-powered generator to ensure that there was sufficient electricity for consumption. Using electricity generated by the PV system could reduce the huge expenses that would have to be spent on the cost of diesel fuel.The cost-benefit analysis conducted showed that the pay-back period of the PV system would be six years, when compared to power generation by-using diesel fuel only.



A diagram demonstrating how the PV system works, delivered in a real-time basis via the Internet to NSTDA

Students at Kampong Chheuteal High School study the PV System.

Students and personnel at Kampong Chheuteal High School could manage the PV system operation and maintenance themselves, because the topic of solar energy was included in the curriculum. Training was also organized on relevant technical aspects, such as the design, operation, and maintenance of PV systems. NSTDA also installed a real-time motoring system via the Internet to enable remote control of the PV system.

At present the school's administrators, teachers, staff, and over 1,500 students benefit from the electricity generated by photovoltaic cells--the infrastructure that allows educational activities at the school to be carried out smoothly. Needless to say, this project has not only played a part in upgrading the quality of education of rural Cambodians, but also strengthening the close tie between Thailand and Cambodia.

The PV system installed at Kampong Chheuteal High School

Mr. Mia Chantheng, the Director of Kampong Chheuteal High School said, "*On behalf of the Cambodian people and Kampong Chheuteal High School, I feel a deep gratitude to Her Royal Highness for her kindness in giving Kampong Chheuteal High School as a gift to the people of Cambodia, especially those who live in remote areas with limited access to a higher level of learning. Her Royal Highness is keen to give equal opportunity in education to all people, so that they can make use of it for the development of their communities and country. Granting scholarships to teachers and students at this school to study in Thailand and China is one example. This royal project has given teachers and students at Kampong Chheuteal High School opportunities for ongoing self-development, helped them to overcome educational challenges and poverty, and empowered them to help other people*".

Her Royal Highness Princess Maha Chakri Sirindhorn listens to a report from representatives of youths in the Children and Youth Training Centre on the outcome of a multimedia training course under the Information Technology for the Development of Children and Youths in the Juvenile Observation and Protection Centres Project, at Thailand Science Park on March 30, 2013.

With ICT, Youths Can Create Works

A mistake made during childhood does not mean that life has reached a dead end. Youths aged 18-24 can gain new and useful knowledge if given appropriate opportunities and support. Her Royal Highness Princess Maha Chakri Sirindhorn advised that if children and youths in juvenile observation and protection centres have computer knowledge and skills, they can use them to create works and make a living.

The Information Technology for the Development of Children and Youths in Juvenile Observation and Protection Centres Project was implemented jointly by the *Information Technology Project under the Initiative of Her royal Highness Princess Maha Chakri Sirindhorn* and the Department of Juvenile Observation and Protection, together with the Internet Foundation for the Development of Thailand and King Mongkut's University of Technology Thonburi (KMUTT).

During the first phase (2011-2012) a computer and multimedia training course was organised for children and youths from five youth training and observation centres, namely:

1) Ban Kanchanapisek Juvenile Vocational Training Centre for Boys, Nakhon Pathom province
2) Ban Karuna Juvenile Vocational Training Centre for Boys, Samut Prakan province
3) Ban Pranee Juvenile Vocational Training Centre for Girls, Nakhon Pathom province
4) Ban Ubekha Juvenile Vocational Training Centre for Boys, Nakhon Pathom province
5) Ban Bueng Juvenile Vocation Training Centre for Boys, Chon Buri province.

Examples of activities during the first phase are given below:

Courses in photography, graphic design and printed matters, and stop motion filmmaking techniques were organized by Assistant Professor Bunliang Kaewnapan, an instructor in Media Arts at King Mongkut's University of Technology Thonburi, for youths at Ban Kanchanapisek Juvenile Vocational Training Centre for boys in Nakhon Pathom province. Children were found to enjoy themselves and take pride in their achievements, especially when they were given opportunities to present their works in public fora.

The "*Learning to Be Professional Graphic Designers*" course was organized by Mrs. Srida Tantha-athiphanit, manager of the Internet Foundation for the Development of Thailand, at four vocational training centres. Children and youths were able to apply their graphic design knowledge and skills to create a variety of products such as business cards, calendars, postcards, posters, brochures, fliers, newsletters, report covers, etc.

During the second phase (2013), the emphasis was on the development of youths' ability to apply their computer and information skills to social service works and for commercial purposes, i.e. to use these skills professionally.

Highly creative works of youths from the five training centres were shown to the public at the fair, "*New Generation of Youths' Creations with ICT*", held on Saturday 27 October 2013 at TK Park (Thailand Knowledge Park), Central World shopping centre. The fair provided a forum for an exchange of knowledge among youths from various training centres.

A Stop Motion Film by Youths Receives Ministry of Culture's Awards

A team of youths from Ban Kanchanapisek Vocational Training Centre won a second prize award in the 2013 Annual Thai Children and IT Video Clip Competition under the topic of "*Igniting Ideas and Gathering Courage to Join Video Clip Making Challenge*" organised by the Ministry of Culture.

Their video clip "Bad Media Nearby" featured a story of two siblings, Din and Dao. They grew up receiving little attention from their parents and, as a result, made a mistakes in life. The less-than-five-minute film took three weeks to produce, using the stop-motion technique (whereby photographed objects move slightly one after another and an illusion of movement is created when the images are played back rapidly as a continuous sequence).

A team member said, "When we were making the film, we were not expecting any prize. We did it because we wanted all the youths to be aware of dangers from bad media and how serious they could be. However, I am glad that we won an award and will continue to produce good media like this so that all the youths will beware of bad media".

To watch this video clip, look up "Bad Media Nearby" on YouTube or go to http://www.youtube.com/watch?v=GEX4UCT-yVs

Her Royal Highness Princess Maha Chakri Sirindhorn
opens the Phrom Panya Library at Bang Kwang Central Prison
on June 16, 2014.

IT and Art Enhance Prison Inmates' Quality of Life

"The organization mentioned earlier talked about ex-prisoners, but we are talking about prison inmates. This is a project implemented with cooperation from the Department of Corrections. Having seen what they have accomplished, I do appreciate the Department's initiative to encourage prison inmates to develop themselves to be capable of performing good deeds even when they are detained in prison. After they have served their sentences, they can take up honest jobs by using the acquired skills, not only IT skills, because they have been taught other subjects and have received technical training. IT is only complementary to the knowledge and skills they already have. They can use it to perform contracted work from external sources. The prison staff can also transfer their knowledge to inmates."

Excerpted from a special lecture on "Application of IT for Improvement of Quality of Life of the Socially Disadvantaged" on the occasion of Her Royal Highness presiding over the opening ceremony of the Seminar and Exhibition to the commemorate "12th Anniversary of the Information Technology Project under the Initiative of Her royal Highness Maha Chakri Sirindhorn at the Miracle Grand Convention Hotel, Lak Si, Bangkok. On November 20, 2008

Computer Class: Inmates' Golden Opportunity

Her Royal Highness Princess Maha Chakri Sirindhorn has compassion for and pays special attention to prisoner's quality of life. She advised that IT be used as an important development tool to equip inmates with computer knowledge and skills that they could use to create income-generating works while detained in prison and after completion of the prison time. Moreover, inmates can make good use of their time.

The pilot project started in 1997 at the Central Women's Correctional Institution where a basic computer training course based on the curriculum of the Department of Non-formal Education was conducted for inmates. Twenty computers and three printers were given to the correctional institution to be used for various activities.

Following the success of the pilot project, during 1999 to 2002, the course was extended to three other prisons, namely the Central Correctional Institution for Drug Addicts, Bangkok Remand Prison, and Klong Prem Central Prison. In 2003, the Department of Corrections further expanded the scope of the project to include 21 other prisons/ correctional institutions nationwide, making a total of 25 facilities under this project (as of June 2014).

A computer classroom at each prison/ correctional institution was equipped with computers and necessary equipment, textbooks and instructional media. With regard to project implementation, careful consideration was given to all aspects, from instructors to facilities and human resources at each prison and correctional institutions. The curriculum included short-term, and medium-term courses, and a college-level

course to meet the needs and potential of prison inmates.

Inmates benefited from this project in many aspects. A number of them were able to earn income from jobs such as document printing/preparation, designing greeting cards, and making business cards and New Year cards for sale on family reunion days or in special occasions. Some were able to start their own business (such as digital photo shops, computer repair shops) when they were released from prison.

For those wishing to study at a higher level, they could enrol in an undergraduate programme in Science and Technology at Sukhothai Thammathirat Open University, with Commercial Technology as their study area. A total of 53 inmates enrolled in this programme and graduated with a bachelor's degree (based on records from 2008 to January. 2014).

A number of inmates took part in the production of audio books for the blind, under the *DAISY Talking Book Production in Detention Centres Project*, which resulted from collaboration among three parties: the IT Project under the Initiative of HRH Princess Maha Chakri Sirindhorn, the Thailand Association of the Blind and the Central Women's Correctional Institution. The experts from DAISY Consortium in Japan, trained inmates on correct methods of reading and producing audio books. Over 1,500 audio books produced under this project were given to the Thailand Association of the Blind to serve blind members of their library.

Getting to Know DAISY Digital Talking Book

A DAISY digital talking book is an electronic book that can present voices, text messages and images all in one book and can make a synchronised presentation, with the relevant text being marked up by a colour tab while the voice of the reader is being heard.

The term DAISY refers to a standardized Digital Accessible Information System. The outstanding features of DAISY digital talking books are the ability to present audio, visual and text messages all in the same book. There are functions to adjust font sizes, change background colours, search for desired words, insert bookmarks, skip to other pages or chapters, and control reading speeds.

DAISY digital talking books are based on universal design to allow usage by all. People with visual impairment can listen to and set their preferred reading speed. Those with hearing impairment can adjust the font size of the video subtitles. People with learning disability can listen to the voice by choosing colour coded tabs. Elderly people can listen to the voice or adjust the fonts to a bigger size.

Additional information is available on DAISY Consortium website at http://www.daisy.org.

A total of over 15,000 inmates received vocational training in computer (as of Jan. 2014) and an income of over 13 million Baht was generated (based on records from 2002 to 2013). Some of the income was given to inmates as a compensation for their work. Small it might be, this income was sufficient to cover their necessary expenses or send to their families while they were still in prison. What was important was the fact that they were able to put into practice the computer knowledge and skills they gained from the training courses.

Art Healing for Inmates with Maximum Penalties

In the case of inmates facing maximum penalties such as life imprisonment or a death sentence, Her Royal Highness Princess Maha Chakri Sirindhorn advised that, as they were under stress, art therapy could be used as a mental health and emotional healing tool.

Professor Dr. Channarong Pornrungroj, Chairman of the Art for All Foundation adopted the advice of Her Royal Highness as a guideline for the *Art Therapy for Inmates Project*. Two activities, an art class and an art camp, were initially organised at Bang Kwang Central Prison.

Participants in the art class were screened based on interviews and reviews of "*paintings created by inmate themselves*" submitted together with the application forms. The screening criteria emphasised the hidden meaning in each painting that reflected the inmate's emotional state. The evaluation was performed by psychologists from the Department of Corrections. At the Art Camp, participants spent 3-5 days joining activities such as drawing, sculpturing, making paper mache, and singing.

A warden remarked, "*The fact that inmates can leave the cells where they are detained, even from one zone to another, already make them feel good. One particular inmate in the project who needs a tranquilizer on a daily basis does not need this medication on Fridays when he participates in therapeutic art activities.*"

Mrs. Kobkarn Wattanavrangkul, CEO of Toshiba Thailand Company Limited and adviser and sponsor of the *Art Therapy for Inmates Project* talked about what she had seen, "*When the exhibition of paintings by inmates participating in this project was organised for the first time, their families were invited to attend the opening ceremony. I was deeply touched when I saw a child bringing his mother to see his father's work of art and proudly telling people nearby that "This is my dad's work."*

Her Royal Highness Princess Maha Chakri Sirindhorn observes the work at the Computer Centre for Child Patients, Queen Sirikit National Institute of Child Health on August 13, 2004.

IT for Learning and Quality of Life of Child Patients

"The Ministry of Education had been sending special education teachers to provide assistance at children's wards. During that time, there were many child patients. Only one special education teacher could not rush around to visit all bed-ridden patients. I was wondering back then whether it would be better if computer equipment was readily available to these children for self-study, and teachers would play a role of a facilitator. In fact, teaching people how to use the media is easier than teaching them the subject matter."

Excerpted from a special lecture Given by Her Royal Highness Princess Maha Chakri Sirindhorn On "Application of Information Technology for Improvement of the Quality of Life of the Socially Disadvantaged." on the occasion of Her Royal Highness presiding over the opening ceremony of the Seminar and Exhibition to commemorate the 12th Anniversary of Rattana Rajasuda IT Project: Experience from the Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn" at the Miracle Grand Convention Hotel, Lak Si, Bangkok on November 20, 2008.

Children who need to make frequent visits to hospitals or be hospitalised for a long period of time tend to have trouble catching up with their classmates. Some may fail to move on to the next level. These children may feel bored and depressed. Taking care of them, therefore, does not mean only giving them medical treatment, but also reviving their mental health to keep them happy and giving them an opportunity to access education that is appropriate to their age.

Her Royal Highness's initiative led to the establishment of a computer classroom for child patients, where information technology became a tool to make sick children happy. At the hospitals where there were not enough teachers, the use of information technology also lessened their burden.

Teaching/learning activities in the classrooms for child patients at hospitals under this project.

The pilot project was implemented at four hospitals, namely King Chulalongkorn Memorial Hospital, Lerdsin General Hospital, Maharaj Nakorn Chiang Mai Hospital, and Queen Sirikit National Institute of Child Health. Afterwards, the Ministry of Public Health took over the responsibility and expanded the scope of the project to 22 other hospitals nationwide (as of December 2014).

Teachers at each hospital selected the methods suitable for the actual condition to offer maximum benefits to patients and their family members. For example,

- At Paholpolpayuhasena Hospital, Kanchanaburi province, where a large number of bed-ridden children suffered from bone and joint diseases, teachers took teaching media and tools to teach them at their bedsides.
- At Khon Kaen Hospital, the emphasis was on activities which involved parents and the community, and religious activities, for children having hematologic diseases and cancer who needed long-term hospitalization.
- At Hat Yai Hospital, Thai Language classes were organized for children and family members who came from southern border provinces. Teachers from a non-formal education centre also provided vocational training for their parents/guardians.

One boy with health problems came from a broken home. He was raised by his poor grandparents and received only a third grade education. He was hospitalised and had an opportunity to attend classes for child patients where the Computer-Aided Instruction (CAI) software was used under the teacher's close supervision. After one year, the boy acquired computer

skills and his academic performance improved. More importantly was the improvement of his mental well-being. Eventually the boy informed the teacher that he wished to go back to the school he had earlier attended. With the assistance and coordinating effort of his teacher and nurses, his wish was granted.

Another child with a brain disease that caused visual and hearing impairments became self-dependent after receiving assistance from a special education centre. This child's mental health was also improved. Moreover, the teachers at the Learning Center for child patients also gave the child a tablet PC with a text enlargement software and magnifying lenses for reading from the Sirindhorn National Medical Rehabilitation Centre and coordinated with the authorities concerned to enrol this child in a non-formal and informal education centre until the child completed lower secondary education and informed the teacher of a plan to continue studying in the upper secondary level.

Nampet Petcharamont, a teacher at the Learning Centre for Child Patients at Maharat Nakhon Si Thammarat Hospital said, "In doing this work, I was impressed by the fact that through physical rehabilitation programs, hospitalised children became capable of joining activities and competing in the hospital's various projects. Moreover, those who had been hospitalized for several months were able go back to their schools to continue their study with their classmates. They came back to inform their teachers here that they had passed their final examination. They made their teachers very proud."

This success stemmed partly from the use of state-of-the-art teaching equipment and media, such as tablets and the Computer-Aided-Instruction software. However, the key to this achievement was the way teachers devoted themselves physically and mentally to make classrooms for child patients a place where joy and happiness were brought back to the children's lives.

Her Royal Highness Princess Maha Chakri Sirindhorn visits Srisangwan School, Foundation for the Welfare of the Crippled Under the Royal Patronage of Her Royal Highness The Princess Mother on March 28, 2004.

Srisangwan School for Disabled Children

"I have used Srisangwan School as a pilot school for the program to help physically and movement disabled children. Later, I have chosen a few more settings to work on other types of disabilities, such as the blind, the deaf, and the mentally or learning disabled, as each of them needs different kinds of assistive technologies and requires different supports to augment their potential..."

Excerpted from the Keynote Address of Her Royal Highness Maha Chakri Sirindhorn at the "i-CREATe 2007" Conference, Republic of Singapore on April 24, 2007

Carrying on the Legacy of The Princess Mother

In 1955 Her Royal Highness Princess Srinagarindra, The Princess Mother, accepted the Foundation for the Crippled to be under her royal patronage. Afterwards, in 1965, Her Royal Highness The Princess Mother gave the name Srisangwan to the school under the administration of the Foundation. It was the first school in Thailand that was established to educate children with physical disabilities and mobility impairment. Students could attend classes regularly during their long-term stay for medical treatment or physical rehabilitation at the Foundation.

Her Royal Highness Princess Maha Chakri Sirindhorn visits Srisangwan School, Foundation for the Welfare of the Crippled Under the Royal Patronage of Her Royal Highness The Princess Mother.

After the passing of Her Royal Highness Princess Srinagarindra, The Princess Mother, Her Royal Highness Princess Maha Chakri Sirindhorn carried on the work of the late Princess Mother. She visited the Foundation for the Crippled under the Royal Patronage of Her Royal Highness The Princess Mother, and the Foundation's Srisangwan School.

Considering that educational opportunities were important for children with disabilities, Her Royal Highness initiated the *IT Project for the Persons with Disabilities* at the Foundation's Srisangwan School in 1995. She advised the Committee on the *Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn* to assist children with physical and mobility impairments by providing them with information and assistive technologies so that they would have equal educational opportunities as other children. Addressing the audience at the *First Information Technology for the Persons with Disabilities Seminar*, Her Royal Highness said, "*People may not have the same capability, but the most important thing is opportunity. Educational opportunities, for example, are of utmost*

importance. People must have access to opportunities. Their ability to make use of such opportunities may not be the same, but they should be given equal opportunities."

Computer Room Equipped with Assistive Technology: A Royal Gift

Having paid several visits to Srisangwan School, Her Royal Highness Princess Maha Chakri Sirindhorn understood the learning difficulties and limitations of students with physical disabilities and mobility impairment. She believed that information technology and assistive equipment and technology would enhance their learning ability.

The *Information Technology for the Disabled Project* at Srisangwan School started with two computer rooms, a gift from her Royal Highness. The rooms were equipped with assistive devices and technologies, such as switches, track balls, keyboards and keycards, special keyboards for children who, due to their physical disabilities, could not easily handle regular mouse devices and keyboards.

Her Royal Highness supported the development of teachers, helping them to acquire knowledge and skills in various aspects, i.e. using assistive technology as a tool to enhance the students' capability, preparing lesson plans by using the CAI (Computer-Aided Instruction) method, and developing an IEP (Individualized Education Programme) to help each student realize their full potential.

Ms. Waraporn Panyaprachot, a computer instructor at Srisangwan School said, "*I have been teaching at Srisangwan School for 17 years and have attended several training courses on how to use various types of assistive technologyies and tools, both in theory and in practice. This has given me knowledge and skills in usage of assistive devices and technologies that can be applied to students at Srisangwan School.*

In addition, I was able to transfer my knowledge to teachers at two other Srisangwan Schools. I am very proud that I have been given an opportunity to do something that benefits my country."

Her Royal Highness Princess Maha Chakri Sirindhorn also gave notebook computers to students to be used as a writing, reading, and communicating tool. Miss Buntida Chinawong, a secondary grade 3 student (in the 2014 academic year) born with no arms and deformed legs and unable to write, expressed deep gratitude to Her Royal Highness whose gift of a notebook computer had helped her with her school work, *"I have to thank Her Royal Highness Princess Maha Chakri Sirindhorn for giving me this notebook computer. It has enabled me to do my homework and write reports just like my classmates. I have also been using it to gain additional knowledge until now."*

Speech Training Programme and the Augmentative and Alternative Communication Room

Students with physical disabilities and mobility impairment at Srisangwan School were mostly children with cerebral palsy (CP). They had poor control of body movements. Several of them had muscle spasms that limited their ability to control muscles and other speech

Students are having a computer lesson in the computer room donated by Her Royal Highness Princess Maha Chakri Sirindhorn.

An armless student uses her foot to control a trackball mouse instead of using a regular mouse.

organs. Because of this, they had trouble speaking or were unable to speak at all. These problems became obstacles when they wanted to communicate with other people.

Her Royal Highness Princess Maha Chakri Sirindhorn recognized these students' communication problems and gave them computers together with Speech Viewer software, a speech therapy computer program for people with speech disabilities. Her Royal Highness also gave them computer software and electronic equipment as augmentative or alternative communication tools for those who cannot utter comprehensible speeches and had an Augmentative and Alternative Communication (AAC) Room set up to be used for production of communication devices and for children with speech defects to practise and improve their speaking skills.

Students who are unable to speak can communicate by using a communication board.

Teachers received training on how to use communication software and equipment as well as techniques to produce simple tools and communication aids such as communication boards, communication picture books, alphabet boards, and vocabulary bulletin boards. Furthermore, the Augmentative and Alternative Communication Room was also used as storage for a variety of media developed for teachers' usage at the school.

A teacher teaches a boy with speech impairment by using the Speech Viewer program given by Her Royal Highness.

"The variety of teaching media motivated the students to be eager to practise speaking and were able to speak up to the level of their individual capabilities. Teachers made self-improvement in using these media. Children who could neither speak nor write could communicate by using communication boards or communication picture books and could express their needs to other people. Children could relieve their frustration when their feelings became known to others. All this happened because of Her Royal Highness' kindness to disabled children at our school." These statements conveyed the impression of Mr. Amnuay Hongto, a speech and communication skills trainer at Srisangwan School.

Camp for Students with Speech Impairment

Srisangwan School gave great emphasis on skill development of students with communication problems and expanded the scope of work to their families by organizing an augmentative and alternative camp. At this camp, there were activities that helped parents/guardians to learn how to use communication aids with students and encouraged students to use such aids all day long in addition to normal classroom usage.

Representatives from Srisangwan Khon Kaen School and Srisangwan Chiang Mai School were invited to join these camp activities because there were also physically disabled students at these two schools. This was an effort to realize the wish of Her Royal Highness Princess Maha Chakri Sirindhorn to use Srisangwan School under the administration of the Foundation for the Welfare of the Crippled under the Royal Patronage of Her Royal Highness The Princess Mother as a pilot school in organizing teaching/learning programmes for students with physical disabilities.

At the camp, a student uses a communication picture book to chat with her friends, teacher, and parents.

"*I am very happy to have joined the communication camp. Camp activities gave me opportunities to participate in various activities myself. The vocabulary in the communication picture book helped me to communicate with everyone. I could prepare a report on educational excursions at the camp by using the presentation software that could speak for me. I was very happy,*" said Miss Supannika Kangram, or 'Wawa', who attended the Augmentative and Alternative Communication Camp twice. Although Wawa could not talk, she could very well understand what others were saying. In the academic year 2014, she was a secondary grade 1 student and was using a computer as an assistive tool for communication and learning.

Science Camp for Students with Physical Disabilities and Mobility Impairment

All three Srisangwan Schools participated in the Science and Technology Camp for Students with Physical Disabilities and Mobility Impairment in 2013 and 2014 at Sirindhorn Science Home, Thailand

Science Park. This activity was jointly organized by the National Science and Technology Development Agency (NSTDA), the Thai Health Promotion Foundation, and the National Science Museum.

The objective of these two camps were to promote and develop knowledge in organizing science teaching and learning activities that were appropriate to the capabilities of students with physical disabilities; offer opportunities for students to learn and practise their scientific and technological skills and thinking process; and provide a venue for science teachers and other parties involved to meet and share their knowledge and experience in organizing teaching/learning programmes and techniques in transferring knowledge in science and technology to students.

Despite their physical disabilities, students enjoyed taking part in science activities. Once the media and devices used in scientific experiments had been adjusted and made appropriate to their capabilities, students were observed to be more at ease when they were engaged in camp activities. Campers were proud of themselves and were more enthusiastic about learning science. "Science is not as difficult as we imagined it to be" was the feeling of all the campers.

A student with arms and hands spasms conducts an experiment on the wheel of colours by using a tool that has been modified for convenient handling.

Students enjoy learning by using computer-aided-instruction software

Pride of the School

With strong commitment to carrying on the work initiated by Her Royal Highness Princess Maha Chakri Sirindhorn, Srisangwan School has tailored educational programmes to the needs of students with physical disabilities and mobility impairment. The outstanding achievements of the school are well recognized and have earned the school a royal award in the category of medium-sized elementary schools in the academic year 2013. Her Royal Highness' kindness bestowed upon the teachers and students at Srisangwan was deeply appreciated.

Her Royal Highness Princess Maha Chakri Sirindhorn observes communication skill development activities of autistic students at Kawila Anukul School, Chiang Mai on June 9, 2010.

Kawila Anukul: A Learning Centre for Intellectually Disabled Students

The rousing rhythms of music could be heard upon entering the school gate. A group of beaming students were joyfully moving in time with the music during a break. Whoever witnessed this heart-warming scene couldn't help admiring the school for giving such happiness to these intellectually impaired students by letting them demonstrate their full potential.

According to Mrs. Pijit Jarunet, a former Director of Kawila Anukul School, Her Royal Highness Princess Maha Chakri Sirindhorn has been very kind to the school and has paid as many as ten visits there. Her Royal Highness is very interested in educational programmes organized for students with intellectual disability and is very concerned about this group of students. Her Royal Highness once said to the Committee on the *Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn*, "*In addition to helping them to develop their learning ability, what can we do to enable this group of students to make a living according to their capabilities?*"

Computer Room for Learning

In 1996 Her Royal Highness gave Kawila Anukul School their first computer room together with four computers and a 29-inch screen television set for one-on-one coaching and group teaching.

For group teaching, the computer was connected to the television screen so that the images would be clearly visible. Students would sit in a circle and learn from computer-aided media. When questions were asked, students who knew the answers would put their hands up or the answer would be given by the whole group. That was a new learning approach at that time. An autistic student in the model IT Room uses the visual strategy to find out how to start a computer.

An autistic student in the model IT Room uses the visual strategy to find out how to start a computer.

Later on in 2002 Her Royal Highness gave ten more computers to the school to be used in organizing teaching/learning activities whereby computer media were integrated to core subjects, namely Thai, Maths, and Life Experiences. As a result, elementary students from grade 1 to grade 6 from 16 homerooms had the opportunity to learn via multimedia in parallel with classroom learning. This approach could be considered a pilot scheme -- using computer-aided learning in a special education school. At present, activities in the computer room are still being carried out according to the curriculum and computer-aided-instruction (CAI) is used for supplementary learning activities.

Model IT Enabled Classroom

Her Royal Highness Princess Maha Chakri Sirindhorn gave five computers to the Model IT Enabled Classroom to be used experimentally for teaching/learning activities. Learning approaches suitable for specific groups were used, i.e. the project-based learning approach for students capable of learning and the activity-based learning approach for trainable and autistic students.

The school had carried out learning activities in IT enabled classrooms continuously. There were 13 IT enabled classrooms where information technology was applied to project-based learning and activity-based learning.

When Teacher Pornnapin Inta was first assigned to experiment with project-based learning, her impression was, "*In my past teaching/learning experience teachers taught and students answered and*

followed instructions, so I did not expect that students would be able to learn or explore anything on their own."

Still Teacher Pornnapin dedicated herself to making lesson plans based on the concept of project-based learning. After one year of experimental teaching/learning using this approach, she found that, *"These students actually had their own views. They cooperated with me and learned the work procedures. This new learning approach had changed the children's learning process and enhanced their intellectual growth. It induced students' involvement in learning through mutual cooperation. I had been so impressed that I continued to teach this group of students until they finished elementary grade 3 and passed them on to the next level. In 2013, this group of students were in secondary grade 6."*

Augmentative and Alternative Communication Room

Kawila Anukul School provides educational programmes for intellectually disabled and autistic children, several of whom had communication, behavioral, or emotion management problems. The Project Committee therefore organised a training programme on augmentative and alternative communication techniques for teachers, enabling them to help the students communicate, adjust their behaviour to be more appropriate, and learn to control their emotions.

Afterwards, with the assistance of Her Royal Highness, an augmentative and alternative communication room was established at the school. It was to be used for production of communication skill development tools such as picture cards, picture boards, and communication (pictorial) notebooks. Also produced here were behavioural adjustment tools based on the visual strategy approach such as pictorial timetables and visual displays of classroom rules and of activities procedures.

The augmentative and alternative communication room was also used for storage and collection of media developed at the school and are available for classroom usage by other teachers.

Autism Learning Camp

The Project Committee invited three agencies, namely Kawila Anukul School, the Northern Welfare Centre for the Mentally Retarded, Chiang Mai, and the Child Psychiatric Ward, Maharaj Nakorn Chiang Mai Hospital to participate in the organisation of the autism learning camp. The objective of this camp was to give autistic students, their families and teachers, and the staff of the three agencies to spend time and engage in activities together. The goal was to learn new techniques that would enhance their communication skills and develop suitable educational programmes for these students. The event also served as an open venue for personnel from various agencies to exchange their knowledge and experience.

The learning camp was organised twice, in 2010 and 2011. Teachers, parents/guardians, and autistic students were observed to have formed a good collaborative relationship. Several parents/guardians gained a better understanding of the communication process and behavioral adjustment of students with autism.

One of the teachers talked about the impression of camp attendance. To this teacher, it was an opportunity to create something that was "*just right*" that could help students with autism to really communicate. Because it was learning by doing, students had a better understanding than just reading or listening.

By creating a conducive learning environment for them, students who were not able to communicate could pick up or pointed to pictures to convey their messages. Teachers organized activities by

using tools such as regular time tables and more detailed time tables and other management tools to improve students' understanding and their ability to convey their thoughts to others. In each activity, students learned something different. This teacher was greatly moved upon seeing a grandmother lovingly watched over her grandchild.

An autistic schoolboy uses a communication picture books to chat with his friends, teachers and parents.

In another case, a 12-year old girl patiently took care of her 14-year old autistic brother without complaining. The way she kept asking her brother with questions like 'Is it hot here?' or 'Is that itchy?' made the two of them very popular among campers who observed them. Several people's eyes welled up with tears when the younger sister came up to receive her award. They were deeply moved by the responsibility that was far beyond her age.

When asked, "*Are you tired of taking care of your brother?*" She replied, *"No. This is fun. When we are at home, my brother hardly gets to go anywhere. He is happy coming here. Yesterday when we returned home he kept smiling and he slept soundly throughout the night."* The girl delighted everyone involved when she said that a camp like this should be organized more often.

Science Camp for Intellectually Disabled Students

A science camp for intellectually disabled students was a result of collaboration among the National Science and Technology Development Agency (NSTDA), the Thai Health Promotion Foundation (ThaiHealth) and the National Science Museum (NSM). The objective was to help science teachers to develop knowledge and skills in teaching science to intellectually disabled students as well as knowledge in conducting activities and creating media for activities that were appropriate to these students. The camp also offered students opportunities to practice their skills and thinking process and participate in science activities.

An intellectually disabled student conducts an experiment on atmospheric pressure.

Kawila Anukul School joined the Science Camp at Sirindhorn Science Home, located in the Thailand Science Park, in 2013 and 2014. Intellectually disabled students were able to demonstrate their learning capacity and, when given the opportunity, showed how they were capable of doing and enjoying science activities, answering questions, and summarising the results of the experiments. Together they made a poster displaying the conclusions drawn from the experiment—an achievement that even their teachers did not expect from them. *"I can do it."* was the message that the students took home at the end of each Science Camp.

Students Who Were the Pride of the School

With the support for their development is several areas, students at Kawila Anukul School were able to participate in regional and national art and handicraft contests organised annually by the Ministry of Education and received prizes that made them proud.

- At the 61st Students Art and Handicraft Fair in 2011, two students won national gold medal awards in the handwriting contest opened to Elementary grades 1-6 students and the Reading Aloud Contest for students in secondary grades 4-6. Two other students received first-prize or gold medal certificates in the Paint Program Contest opened to secondary grades 1-3 and 4-6 students in the northern region.
- At the 62nd Students Art and Handicraft Fair in 2012, a student won a gold medal at the national level Paint Program Contest for students in secondary grades 1-3.
- At the 63rd Students Art and Handicraft Fair, 2013, two students won a gold medal in the Paint Program Contest for students in secondary grades 1-3 and 4-6 in the northern region, and one student won a silver medal in a handwriting contest for elementary students.
- At the 64th Students Art and Handicraft Fair, 2014, two students won first prize and four gold medals from the secondary grades 1-6 students' reading aloud contest and one student won a second prize gold medal award from a secondary grades 1-3 Paint Program Contest in the northern region

A Promise from the Heart to Express Deep Gratitude to Her Royal Highness

The teachers and students at Kawila Anukul School felt deep gratitude for the kindness that Her Royal Highness Princess Maha Chakri Sirindhorn had for the students at this school. The teachers made a promise from their hearts: *"We promise that we shall devote ourselves to the development of our students so that they will be educated and capable of helping themselves in earning a living."*

Her Royal Highness Princess Maha Chakri Sirindhorn hands a diploma to Mr. Wasan Paengpujuan at Khon Kaen University on December 1, 2014.

Blind Students Can Succeed in Science Programme

In January 2006, when Her Royal Highness visited the Northern School for the Blind under the Patronage of Her Majesty the Queen to observe the school's education programme, a blind student from Chiang Mai University reported to her that blind students were not allowed to enrol in the science stream in upper secondary school and were admitted to the language/arts stream only. Her Royal Highness advised the IT Project Committee to find a way to assist these students. In this light, the Committee implemented a pilot project to support and promote science and maths programmes for blind students.

Change of Attitude... First Thing to Do

During that time upper secondary schools could not enrol blind students in their science stream programme. The schools reasoned that they were not ready because they did not know how to transfer science knowledge to blind students. Besides, experimentation, an essential activity in the science programme, would be problematic.

Thus, the first thing to do is to change this attitude. Everyone had to be convinced that blind students could succeed in the science stream, if appropriate preparations were made in all aspects, from teachers to necessary teaching media and other equipment.

To this end, the National Science and Technology Development Agency (NSTDA) formed a *Committee in Support of Teaching Science and Mathematics to Blind Students* to define a guideline to support and promote science education programmes for blind students in Thailand.

Government agencies and educational institutions that joined forces with NSTDA in an endeavour to accomplish this important task included the National Science Museum; the Institute for the Promotion of Teaching Science and Technology; Bureau of Special Education Administration, Ministry of Education; Thailand Association of the Blind; Foundation for the Blind in Thailand under the Royal Patronage of Her Majesty the Queen; Christian Foundation for the Blind in Thailand under the Royal Patronage of Her Majesty the Queen; Rajasuda College, Mahidol University; Mahidol Wittayanusorn School; Saint Gabriel's School and Kanjanapisek Witthayalai Nakhon Pathom School.

Teacher Training and Science Camp for Blind Students

The *Committee in Support of Teaching Science and Mathematics to Blind Students* invited Dr. Yoshiko Toriyama from Tsukuba University, Mr. Akiyoshi Takamura and Ms. Shizuko Hamada from Tokyo School for the Blind in Japan to share their teaching techniques with teachers from schools for the blind, schools with mainstreaming programmes, and staffs of the Institute for the Promotion of Teaching Science and Technology. The idea was to formulate guidelines for the development of a basic science education programme. The knowledge gained from the training programme was used to prepare the *Handbook for Teaching Science and Mathematics to Blind Students* (2008).

Dr. Yoshiko Toriyama and Mr. Akiyoshi Takamura give a lecture on teaching science and mathematics to people with visual impairment.

The first science camp for blind students was organized in 2006 and until 2014, seven such camps had been organized. Blind students

interested in studying in the science stream, accompanied by their teachers, were selected to join the science camp to learn from scientists, academics, and experts through such activities as physics and chemistry experiments.

The Committee then offered scholarships to 13 selected campers to study in the upper secondary through to undergraduate levels. In 2014, two students completed their bachelor's degree. Mr. Terdkiat Buntiang was conferred a B.S. in Computer Science from the Faculty of Science and Technology, Thammasat University and Mr. Wasan Paengpuanju received a B.S. in Computer Science from the Faculty of Science, Khon Kaen University. Two students were studying in the tertiary level and one student in the upper secondary level.

Terdkiat - First Blind Student to Enrol in Science Stream

Terdkiat Buntiang was sent from the Bangkok School for the Blind to study in a mainstreaming programme at St. Gabriel's School while he was in secondary grade 3. He applied to join the first Science Camp for Young Scientists with Visual Impairment in 2005. That was the turning point of his life because he had the opportunity to enjoy conducting science experiments and participating in other activities. Those activities ignited his desire to study science further. With his determination, the Committee selected him and a friend to be among students in their pilot project to support and promote science and mathematics education programmes for blind students from 2006 onwards.

Mr.Terdkiat Buntiang receiving a B.S. in computer science in 2014

Terdkiat studied in the science stream at the upper secondary level at Saint Gabriel's School from 2006 to 2008. He had to make adjustments to learn several science subjects, spend more time studying, and take supplementary lessons with volunteer tutors in mathematics, chemistry, physics and biology provided by the Committee on Saturdays and Sundays for three consecutive years to keep up with the rest of the class. He successfully finished secondary grade 6 with the joint effort of his regular teachers, assistant teachers for academic support, volunteer tutors, and most importantly, his own determination and perseverance.

Afterward he was qualified for the disabled student quota and studied computer science at the Faculty of Science and Technology, Thammasat University. Pursuing college education required a great deal of adjustment. Terdkiat liked to participate in activities, as they were challenges of college life. He played sports and five-team-member soccer for the blind, joined Thammasat University Chorus, and worked as a waiter at Dine in the Dark Restaurant, where people dined in total darkness to experience the true tastes of the dishes.

Associate Professor Dr. Songsak Rongviriyapanich, his academic supervisor paid great care and attention to Terdkiat. He was earnestly committed to teaching and giving Terdkiat advice on academic and other aspects of life in college. Terdkiat could study on his own. For courses that he needed additional assistance, tutors were provided. With respect to learning materials, his instructors sent them to the Service Centre for Students with Disabilities, to be converted into braille documents. Terdkiat continued to make progress and, after five years at the university, graduated in 2014.

Speaking about the secrets to his academic success, Terdkiat said, *"Students with disabilities must pay attention in class and capture the important points. They must record the instructors' lectures and review them regularly. They must also learn from their classmates and on their own."*

Terdkiat left the following encouraging message for his friends and other students with disabilities, *"There is nothing that you cannot do if you put your heart and soul into it. It depends on to what extent you set your goal. To younger blind students, you have my moral support. Concentrate on your studies because there are good opportunities awaiting you. Overcome obstacles and never give up. As for me, I will work hard to serve society to the best of my ability."*

A Day of Jubilation

Terdkiat was conferred a degree by Her Royal Highness on August 6, 2014. It was a day of jubilation for his family, teachers, friends, and relatives, having witnessed a successful step in Terdkiat's life, before he moved on to build a career and his future.

A Dream Come True for Wasan Paengpuanju

For Wasan Paengpuanju, a 15-year old, completely blind student at Bunyawat Wittayalai School in Lampang province, a journey to his dream started in the morning of 21 November 2006 when he travelled to the National Science Museum to join the 2nd science camp for blind students. He was excited to study science with 22 friends from schools all over the country. The goal of this boy with strong determination was: *"Seven years from now I will successfully complete my education in the field of science."*

Wasan Paengpuanju

In 2007, he was granted a scholarship that completely transformed his life. A hard- working student, everyday he would spend one to two hours after school reviewing the subjects he had learned at school, in particular, science and mathematics. His teachers helped him in his academic endeavour and produced educational media and learning materials for him, such as braille documents, braille textbooks, and embossed illustrations. Wasan said, "*I tried to pay attention in class and remember as many important points as I could. If I did not understand any part, I wrote it down and asked my teacher afterwards or tried to search for additional information on the Internet.*

Although he had to face several challenges, such as grasping the outcomes of experiments and trying to understand mathematical graphs and illustrations in physics and biology textbooks, with the help of his teachers and tutors, his grade point average was quite high. During the three years at Bunyawat Wittayalai School, he was loved by everyone because he worked hard and focused his attention on schoolwork. Teacher Sin-arn Lampunpong, his physics teacher, had this to say about him: "Wasan was a blind student who tried very hard. His physical limitations posed no obstacle to his ability to learn. He had a good memory and sometimes he was the one who helped tutoring his sighted classmates."

Wasan furthered his tertiary education at the Department of Computer Science, Faculty of Science, Khon Kaen University. He said, *"I liked to work with a computer. I thought that it was something close to me. I could access a computer and build on from there. However, after actually studying computer science, I realized that it was not all that easy when I had to be in the same class as my sighted classmates. They could communicate with the instructors more easily while I had to try harder and to be well prepared before class. The instructors gave me class materials in advance, and I had to convert them into embossed materials. I also had to study supplementary materials before going to class by having my classmates read them for me."*

The Committee made arrangements to have readers and tutors help him review important subjects, supported production of instructional materials for blind students, and followed up and evaluated his academic achievements together with the Department throughout the four years.

Dr.Wararat Rungworawut, his academic supervisor commented that, *"Wasan was very determined and made great efforts. One advantage was the fact that with no distractions or, very few temptations, he could exercise great imagination in his learning. The major problem was when he took courses that dealt with formulae or lab practice, or where there were pictorial illustrations, because he could not see. However, he was allowed to submit his assignments later than other students. He attended classes regularly just like other students, but his classmates helped him with things he could not do himself."*

Finally, Wasan was able to overcome the obstacles and graduated with a B.S. degree in computer science. He was the first blind graduate of the Faculty of Science, Khon Kaen University, the pride of his parents, teachers, and friends, and a role model who would inspire other young blind students to dare to pursue their dreams.

Her Royal Highness Princess Maha Chakri Sirindhorn visits First Lieutenant Mangkorntong Limprasertsakul on the occasion of the New Year 2009 at Phramongkutklao, Bangkok

A Hero of Krong Penang

"*Lottery tickets. Lottery tickets*" A young disabled man spoke almost incoherently in front of the cafeteria. In the afternoon he moved to an area in front of Chalermprakiet Building (in tribute to His Majesty the King's 6th Cycle Birthday Anniversary) in Phramongkutklao Hospital. Who would imagine that once this young man was a hero who sacrificed his flesh and blood to protect Thai people in the three southern border provinces?

Mr. Mangkorntong Limprasertsakul is the second son of Mr. Nopparat Limprasertsakul, a fruit vendor in Chiang Rai province. His childhood dream was to be a soldier and serve his country. His devotion to public interest was evident in the way he joined up as a rescue volunteer and civil defence volunteer in Phan district, Chiang Rai province. When he turned 19 in 2007 he enlisted and was assigned to the 1st Infantry Battalion, 7th Infantry Regiment at Kawila Camp in Chiang Mai province. A journey to his dream started there. Private Mangkorntong was very proud of his duty and made a plan for his future, "*to try to qualify as a sergeant if I successfully completed my education. If not, I would apply to join the Ranger Forces.*"

Private Mangkorntong Limprasertsakul, serves at the 1st Infantry Battalion, 7th Infantry Regiment, Kawila Camp, Chiang Mai province, in 2007.

Situations Created a Hero

Private Mangkorntong was assigned to a mission to protect teachers in Krong Penang district, Yala province. He was injured in two violent incidents. First, he suffered 30% hearing loss from an explosion caused by a bomb planted by insurgents. Then on May 28, 2008, he had shrapnel wounds around his left jaw and the left side of his head, and was shot in the mouth. As a result, he was in a critical condition and the left side of his brain was severely damaged.

Private Mangkorntong had been treated initially at Yala Central Hospital before he was transferred to Phramongkutklao Hospital. Another brain surgery was performed to remove a bullet still lodged in his brain. Waking from over three months of a coma, during which his father watched over him, he learned that his body would never recover its normal condition.. The right side of his body was paralysed, and he was having problems seeing, hearing, speaking, and thinking. Because of his condition, he needed to attend physical rehabilitation sessions regularly. Mr. Nopparat, his father, took very good care of him and kept encouraging him. He said, "*You are like this because you sacrificed yourself for the country. I am proud of you and I will be everything that you missed. I will try to save money for our future.*"

Unforgettable Kindness of Her Royal Highness

On the occasion that Her Royal Highness Princess Maha Chakri Sirindhorn presided over the Opening Ceremony of the Annual National Science Week 2009 on August 9, 2009 at the IMPACT Exhibition and Convention Centre, Muang Thong Thani, Private Mangkorntong and his father were there to present a letter asking for her assistance. Her Royal Highness, upon learning of his plight, advised the IT Project Committee to provide assistance to help Private Mangkorntong so that he could make a living without being a burden to other people. She arranged for Private Mangkorntong and his father to have a job selling government lottery tickets.

In addition to helping him with his job, the Committee also found a way to help Private Mangkorntong with his physical and cognitive rehabilitation needs. Working collaboratively with a team of doctors, nurses, and professionals from the Rehabilitation Medicine Division, Phramongkutklao Hospital, and the Sirindhorn National Medical Rehabilitation Centre, the Committee organised programmes in physical therapy, activity therapy, speech therapy, and vocational training for him. New rehabilitation technologies, such as the Thai pronunciation assessment software for speech training, computer software for memory and thinking process development, computer skills training, Wii games to revive motor skills, and a robot-assisted walking therapy to improve his ability to walk at the Sirindhorn National Medical Rehabilitation Centre.

Private Mangkorntong and his father make a living by selling government lottery tickets at Phramongkutklao Hospital.

Private Mangkorntong practises walking by using the robot-assisted walking therapy programme at the Physical Therapy Department, Sirindhorn National Medical Rehabilitation Centre.

The Pride

Private Mangkorntong was promoted to the rank of First Lieutenant. He received his insignia on March 18, 2013. This gave him and his father great pride. Although he was aware that he would never be able to serve the country as a soldier again, he was not discouraged and would not let himself become anyone's burden. First Lieutenant Mangkorntong always says, "*I am like this, but I must not be discouraged. If I had a chance to do it again, I would still choose to be a soldier and serve my country*".

Moving on with His New Life

First Lieutenant Mangkorntong receives his insignia in a ceremony held on March 18, 2013.

First Lieutenant Mangkorntong started a new life after he had been discharged from the army. Her Royal Highness Princess Maha Chakri Sirindhorn kindly gave him a new occupation as a lottery vendor through the quota of the National Council on Social Welfare of Thailand under the Royal Patronage of His Majesty the King. He could communicate with customers, knew the numbers well enough to pick the lottery tickets with the numbers specified by the customers, and gave buyers the right change.It was an occupation that provided a considerable income. His father helped him put aside some money and spent it on building a hostel in Chiang Rai province to generate long-term income that would ensure their financial security in the future.

Master Tanasak Na Chiang Mai, a student at the Northern School for the Blind under the Royal Patronage of Her Majesty the Queen, greets Her Royal Highness Princess Maha Chakri Sirindhorn on January 25, 2006.

A Blind Student with Multiple Disabilities Who Is Keen on Learning

When he was just a child Tanasak became totally blind in both eyes after having febrile seizures. Upon hearing of his misfortune, Her Royal Highness Princess Maha Chakri Sirindhorn advised his family to enrol him in the Northern School for the Blind under the Royal Patronage of Her Majesty the Queen in Chiang Mai province. He started his schooling in the kindergarten level. His teacher noticed that he was different from other blind students. Tanasak had behavioral and emotional impairments and showed several signs of slow development. He was a slow learner and did not have good small motor skills. As a result, he could not handle his daily activities himself. His homeroom teacher decided to place him in a group of blind kindergarten students with multiple disabilities where the teaching focused on helping students to be able to carry out their daily activities. This arrangement continued until Tanasak was 12 years of age.

Ms. Wantanee Phantachat, a member of the Committee on the *Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn* recalled, "*When I was granted an audience with Her Royal Highness during an Academic Symposium organised by NSTDA in 2005, she instructed me to follow up on the learning progress of Tanasak at the Northern School for the Blind, because he was already twelve years old and was still in kindergarten. I was really touched by how Her Royal Highness kindly showed her great concern for Tanasak. She never forgot about him even though several year had passed.*" In 2005 the IT Project working group went to visit Tanasak who, at that time, was in elementary grade 1 in a special class for children with multiple disabilities. His homeroom teacher reported that he had a lot of problems with social and behavioural

skills. He was impatient, tended to isolate himself from the group, and had problems with analytical thinking. He had to be taught repeatedly.

The IT Project working group and teachers at the school worked together to draw a suitable plan of teaching/learning provision for Tanasak that would enable him to fulfil his learning potential. The IT Project working group also organized a training on designing an activity programme corresponding to the needs of students with visual impairment and behavioral and emotional problems, by using additional techniques, tools, and instructional media that would answer their needs. Necessary IT equipment such as computers, colour identifiers, and tactile (raised-line) drawing boards were also provided to facilitate the children's learning.

Tanasak uses a Brailler to practise typing braille.

Tanasak showed development in his learning ability and was gradually able to control his behavior. He was transferred from the class of students with multiple disabilities to a regular class of blind students when he was in elementary grade 4 in the academic year 2007 and completed elementary grade 6 when he was seventeen. By then, he had made considerable progress. He was able to communicate verbally, write with a braille typewriter, and use screen reader software reasonably well, although he still had some problems with his social skills and behavior when he was in the company of people.

In the academic year 2010, the school opened one classroom for students in secondary grade 1. It was a dual-system programme

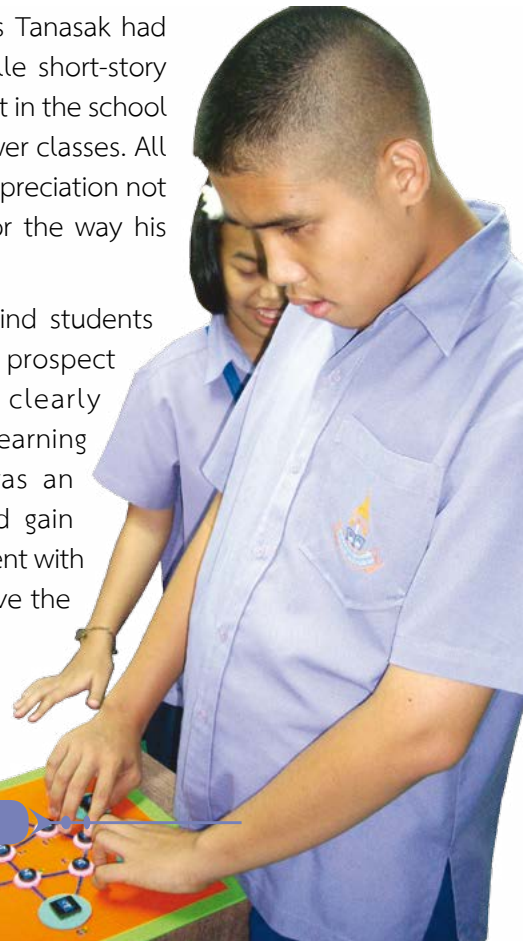
that combined general with vocational education. Tanasak and his classmates continued to study in this programme until they finished secondary grade 3.

Activities that Enhance Learning

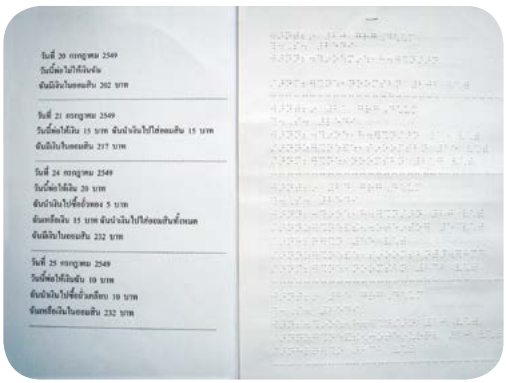
Tanasak was extremely keen on learning. Several teachers reported in agreement that although he was blind and had multiple disabilities, he always made the best effort and liked to do homework, to type and read in braille. At home, he would ask his parents, maternal grandmother, and younger sister to read for him while he typed what he heard on the typewriter given by Her Royal Highness. He practised typing using a Brailler in order to do his homework and submit it to his teacher at the school.

Ms. Wantanee paid a visit to Tanasak and his family every year and noticed his progress in several areas. His homeroom teacher once showed her a book of tales Tanasak had typed in braille. It was one of those braille short-story books, prepared in multiple copies and kept in the school library, to be used by blind students in lower classes. All the teachers at the school showed their appreciation not only for his industrious effort, but also for the way his work could benefit others.

Some people may think that for blind students with multiple disabilities, there is little prospect of much development. Yet Tanasak clearly demonstrated that when appropriate learning activities were organised and there was an analytical process that could reach and gain insight into the learner's mind, a blind student with multiple disabilities could learn and achieve the desired results.



Mathematics, for example, was thought to be a difficult subject to teach, but Teacher Siriporn Tanta-opas never felt intimidated by it. In the case of Tanasak, Teacher Siriporn organised a teaching programme that was applicable to his daily life. She showed Tanasak's money diary, which contained daily records of the money he brought to school, the amount spent, the amount saved at the end of each day, and the total balance when added to the amount previously saved. Tanasak had an exceptional memory. When asked, he could give a correct answer on the amount of his savings. By practising addition and subtraction systematically every day, he acquired the skills that could be used practically.



Tanasak's money dairy

Tanasak got along better with his friends, showed scholastic improvement, and could concentrate on his lesson throughout each learning period. He still had some behavioural and emotional problems, but the teachers knew how to manage them effectively. Thus Tanasak won a place in every teacher's affections.

Life after Leaving School

After he had completed secondary grade 2, his parents tried to send Tanasak to spend his school break with his aunt to help out at her shop at Pang Ma Pha district, Mae Hong Son province. With permission from the school, the teachers prepared homework for him so that he could practise reading and writing. They also let him take along an electric typewriter to do his work.

Tanasak at work, at a grocery store in Pang Ma Pha district, Mae Hong Son province.

The IT Project working group and the teachers from the Northern School for the Blind visited Tanasak at Pang Ma Pha and found that he could make some contribution to the work at the shop. He could show customers the shelves where their desired products were placed. The team was impressed by the way he could remember the price of each product.

As Tanasak could handle his daily routine to some extent, he was not a big burden to his aunt. His family, from his parents to his maternal grandmother and his younger sister, loved him and gave him support in his vocational training.

Tanasak successfully finished secondary grade 3 in 2012 with the support of his family, teachers and the kindness of Her Royal Highness Princess Maha Chakri Sirindhorn, who cared about and helped a blind boy with multiple disabilities to receive suitable education. Tanasak carried on with his self-development until he was able to help his family and contribute to the greater good through his creativity.

One of the daily activities that he never missed was to do his work by using an electric typewriter as a way to master typing skills – an act that reflected the determination of a person keen on lifelong learning.

Her Royal Highness Princess Maha Chakri Sirindhorn gives a present to boost the morale of Second Lieutenant Tuan Amran Kuso on the occasion of the New Year 2011 at Phramongkutklao Hospital.

From A Soldier...to An Artist

"Please consider providing appropriate assistance to Private Tuan Amran Kuso, a handicapped soldier who lost both legs, so that Private Tuan Amran Kuso can take care of himself to the best of his ability, have a happy life, and make a living by a suitable means."

Words of Her Royal Highness Princess Maha Chakri Sirindhorn Documented by Her Royal Highness Princess Maha Chakri Sirindhorn's Personal Affairs Division (2010)

A Soldier Who Served His Country

There are unforgettable things in life, especially if they have totally transformed our life's path. Friday 29 January 2009 was the day that Private Tuan Amran Kuso would never forget. He recalled what had happened on that day,

"I was doing my duty to provide protection to teachers. As I was waiting in a roadside shop, a bomb hidden under my seat exploded. After the explosion my legs felt numb. When I took a look, I saw that my left leg was amputated and my right leg was a bloody mess. I could not see with my left eye, but with my right eye I could see bone fragments, blood, flesh and shells scattered all over the place..."

Private Tuan Amran was sent to Yala Central Hospital for initial treatment and was transferred to Phramongkutklao Hospital on February 15, 2009. When Her Royal Highness Princess Maha Chakri Sirindhorn visited patients wounded on active duty at Phramongkutklao Hospital on January 1, 2010, he was granted an audience.

"When Her Royal Highness arrived, I presented her with a garland and she handed me a survival pack. She asked me about what had happened, showed her concern, and gave me encouragement. That was the first time that I was received in Her Royal Highness's company."

Her Royal Highness Princess Maha Chakri Sirindhorn then advised the IT Project Committee to give him assistance. The IT Project Committee, the Sirindhorn National Medical Rehabilitation Centre, and the Sai Jai Thai Foundation under Royal Patronage jointly considered the possibility of replacing his missing legs with limb prostheses. However, the medical team at the hospital viewed that it would be very difficult, as his legs were shattered to pieces because of the explosion, with both stumps externally rotated and there was bone overgrowth at the end of the left leg stump.

However, First Lieutenant (his rank then) Tuan Amran was hoping that he would be able to walk again. The IT Project Committee then submitted a request for prostheses to Her Royal Highness. Following her approval, Dr. Piyawit Sorachaimetha, a doctor at the Sirindhorn National Medical Rehabilitation Centre had prosthetic legs made for Tuan Amran. Initially short prosthetic legs were used so that he could learn to balance. Longer prostheses that fit his height would be used afterwards. Dr. Piyawit informed him that changing to prosthetic limbs took time and great patience.

"When I started to put on short-leg sockets, as I placed all my body weight on the sockets of both prostheses, the pain I felt was beyond words. Because I lost both legs, I could not put weight on one leg. When I did that, it doubled the pain," said Second Lieutenant Tuan Amran.

"I could put my weight on the artificial legs for no more than five minutes, then I had to tell the staff that I needed a rest. The pain was excruciating. It was such a torture that I could not bear it. I had

to practise standing up and keeping balance for about 15-20 minutes every day. My heart wanted to do it for it, but my legs gave in."

Despite his indomitable courage, his relentless and exhausting practice, he eventually realized that he could never walk again.

"I had to make up my mind to accept reality and this made me smile."

Second Lieutenant Tuan Amran also offered a piece of advice, *"Having watched TV and read about several people's stories, I realized that I was not the only person faced with misfortune. Everyone had difficult times, so we should make the rest of our lives worthwhile. When we are still alive, we have to keep on fighting."*

Second Lieutenant Tuan Amran learns to walk with endoskeleton above-knee prostheses.

From that point onwards, everyone knew that he would "move forward" in his life, with the assistance of a wheelchair.

Towards a New Life

Second Lieutenant Tuan Amran had started his vocational training with the Sai Jai Thai Foundation since he was hospitalised at Phramongkutklao Hospital. When the medical treatment was over, he applied for a position at the Foundation's Vocational Training Unit. He talked about his feeling towards his current job that, "*When I was a soldier, I learned about duties, responsibilities, team unity, strength and patience, and sacrifice in the public interest. When I chose my occupation in art, my life changed. I had to sit with others, my hand holding a paint brush and my mind concentrating on the work under my responsibility, and we helped one another.*"

With earnest practice, his wood painting works were exquisite. Once Her Royal Highness Princess Maha Chakri Sirindhorn complimented on his work that it was "*a very beautiful piece of work.*" It gave him the feeling of great joy and pride.

Second Lieutenant Tuan Amran Kuso and his wife.

Second Lieutenant Tuan Amran saw the brighter side of life when he met his future wife. They were married on October 15, 2012. It was a day of rejoicing for their families and colleagues from every division of the Sai Jai Thai Foundation. To him, it was a day of happiness that marked the beginning of a small family that he would have to take care of.

Second Lieutenant Tuan Amran Kuso was thankful to everyone

Second Lieutenant Tuan Amran Kuso at work
at the Sai jai Thai Foundation's Brushwork Unit

who had helped him. In his article 'Walk Again', he thanked the army unit he was affiliated with for the encouragement and the activities organized for injured and disabled soldiers; the teams of doctors from various disciplines for giving him medical treatments and help with physical and mental rehabilitation, and nurses 'Mae Sri' and "Pi Tom" who took care of him while he was hospitalised. He also thanked several groups of volunteers for their moral support and sincere concern.

Most of all, Second Lieutenant Tuan Amran was deeply grateful to Her Royal Highness Princess Maha Chakri Sirindhorn for her support in many ways that has enabled him to live a happy life. He talked about his feeling when Her Royal Highness visited the hospital, *"The memory of her visit has lingered vividly in my mind until today. I was overwhelmed with the feeling of deep gratitude for the magnanimity of Her Royal Highness. I felt immensely elated."*

Miss Toyeebah Suemae, a student at Nara Sikhalai School, Narathiwat province greets Her Royal Highness Princess Maha Chakri Sirindhorn in 2010.

A Limbless Student from Mueang Nara

"We could not choose how we were born, but we can choose who we want to be" was the life motto of Miss Toyeebah Suemae, a limbless student from Lamphu sub-district, Mueang district, Narathiwat province. She had overcome all kinds of obstacles in order to attend mainstreaming classes with other students. She studied in kindergarten and elementary levels at Ban Plak Pla School, had her secondary education at Nara Sikhalai School and was recently admitted to Prince of Songkhla University, Pattani Campus.

Toyeebah's Early Life

A baby girl was born with no limbs on August 10, 1991 at Narathiwat Rajanagarindra Hospital, Narathiwat province. Her name is Toyeebah Suemae. Despite her congenital anomalies, her mother, Mrs. Romulah never thought of abandoning her and vowed to *"raise this child to the best of my ability."*

Toyeebah grew up in a loving and caring family. Sophia Suemae, a sister one year her junior, was her best friend who always helped her. Their father died in a car accident when Toyeebah was only two years old, but her mother took good care of her and trained her to develop motor skills to be as close as possible to the development of normal children at her age. She could keep her balance when seated and could move around sitting up at a very young age. Her intellectual development was normal and she could learn and communicate like other children, because of the way her mother took care of her. Her mother once said, "Children mean everything to their parents. No matter what happened to them, we have to overcome the obstacles and are

Young Toyeebah with her mother and sister

ready to fight and raise them well so that they can fit into society."

First Step in Education

Toyeebah started her Kindergarten 1 Class together with her sister at Ban Plak Pla School in Mueang district, Narathiwat province. Mr. Tawee Nuwun, the school principal at the time, enrolled her because he saw that she had normal intellectual ability despite her physical disability, and believed that she had the ability to learn. Teachers at the school were willing to teach her. That was her first step in education. Her mother got a job as a cook at the school and was able to take care of her there while also making a living.

Given Royal Support

When Toyeebah was five years old and studying in kindergarten 2, she was granted an audience with Her Royal Highness Princess Maha Chakri Sirindhorn at Ban Khao Tanyong Friendship 153rd School in North Kaluwa Sub-district, Narathiwat province. Having seen the limbless girl and heard about her story, Her Royal Highness took the girl under her royal patronage.

Toyeebah was given a medical check-up at the Sirindhorn National Medical Rehabilitation Centre. The medical team evaluated her condition and decided that prostheses could not be used in her case because there were neither leg stumps nor arm stumps. Her Royal Highness gave her a wheelchair for transportation and referred her to an ongoing physical rehabilitation programme at the Foundation for the Welfare of the Crippled under the Patronage of Her Royal Highness Princess Srinagarindra, The Princess Mother.

In 2002 Her Royal Highness visited Ban Plak Pla School and met Toyeebah once again. She enlisted the IT Project Committee to devise assistive and IT technologies to enable Toyeebah to attend classes and joined class activities more conveniently. Moreover, Her Royal Highness advised that this should be supplemented with physical rehabilitation and modification of home and school environment. With such support, Toyeebah was making steady progress with her studies and in self-reliance.

Her Royal Highness Princess Maha Chakri Sirindhorn provided her with assistive technology to enhance her abilities in several aspects. She was given a notebook computer to use at home, a personal computer for school work together with a trackball mouse, monitor keyboard

Toyeebah uses a trackball mouse together with a monitor keyboard program to type her work.

Toyeebah feeds herself using a specially designed plate.

software, an electric wheelchair with an adjustable seat that could be adjusted down to the floor level. A movement control unit, affixed to her shoulder, allowed her to move around conveniently, and a specially designed plate enabled her to feed herself.

Miss Toyeebah Suemae uses an electric wheelchair with an adjustable seat that can be adjusted down to the floor level.

A Caring Community

The IT Project Committee used the implementation guidelines given by Her Royal Highness to provide assistance to Toyeebah and her family. The idea was to involve several parties such as the community, the school, and local agencies to take care of Toyeebah and her family as an example of ongoing collaborative efforts. The community where the Suemae family was a member demonstrated impressive acts of caring, such as:

Modification of the environment at Ban Plak Pla School: The village headman and alumni worked together to make desks, chairs and ramps in the school for Toyeebah and several other disabled students.

Modification of Toyeebah's home environment: The village headman, neighbours and government agencies, namely Narathiwat Polytechnic College, Lamphu Sub-district Administrative Organization, and Narathiwat Provincial Electricity Authority, modified her house, did electrical wiring work, built a roadway with a ramp to her house, and modified the bathroom to make it more convenient for her to use.

The ramp in Ban Plak Pla School was made by the community collaboration.

Maintenance of Toyeebah's electric wheelchair and computer: Narathiwat Polytechnic College and Pattani Industrial and Community Education College took on the maintenance responsibility from the time she was studying at the upper secondary level through the university level.

The principle that Her Royal Highness Princess Maha Chakri Sirindhorn adheres to in performing her work is based on the concept of creating mutual assistance networks and giving opportunities for communities to express their acts of caring to the disadvantaged.

College Life

"*I want to be a radio disc jockey or a public relations officer,*" was Toyeebah's answer when asked about her dream career. After completing secondary grade 6, Toyeebah and her sister continued their tertiary education in the academic year 2014 in the field of Communications at the Faculty of Communication Sciences, Prince of Songkhla University, Pattani Campus. The two sisters had always wished to study at this Faculty because they wanted a career in mass communication in the future.

"*Miss Toyeebah Suemae's educational programme should comply with the University's standards, but we will provide assistance*

where she cannot do it by normal means due to her disability. The course contents should conform to standards, otherwise she will not be able to work after her graduation," Professor Dr. Pairash Thajchayapong, Vice Chairman of the Committee on the *Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn* cited Her Royal Highness's advice during a meeting with the University's Executive Board to discuss Toyeebah's enrolment at Prince of Songkhla University, Pattani Campus on January 12, 2011.

Miss Toyeebah Suemae expressed her feeling about her admission to the University. "*I was glad and excited to be accepted to study in the field and at the university that I had always wished to, despite my being a disabled person with no limbs.*" She had confidence that the university would take good care of her while she herself had to make adjustments in order not to be a burden to other people. She added that, "*I will also have to work hard and overcome physical barriers. This is where I can prove myself. To pass this point, I need to have mental strength and hope. I am thankful to the University and the staff of the Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn for giving me this opportunity. When I graduate, I will make the best use of my knowledge and dedicate myself to society and the country.*"

Mrs. Amornrat Chanakarn, her academic supervisor who took care of her and helped with her education plan said that, "*Toyeebah is joyful and has self-confidence. She dares to speak and express her feelings. I am glad and proud to have been assigned to perform this special duty. I hope that in the future Toyeebah will be a university graduate who has professional knowledge and ability as well as integrity,*

Toyeebah took a photo with her teacher and classmates at the Faculty of Communication Sciences, Prince of Songkla University - Pattani Campus

lives her life happily in society, and conducts herself to be worth the magnanimous kindness of Her Royal Highness Princess Maha Chakri Sirindhorn."

Toyeebah and her family always remember that they have a better life today because of the great kindness that Her Royal Highness Princess Maha Chakri Sirindhorn bestowed upon them since she was a little girl.

Abbreviation

AAC	Augmentative and Alternative Communication
ALICE	A Large Ion Collider Experiment
AOFSRR	Asia-Oceania Forum for Synchrotron Radiation Research
BME	Biomedical Engineering
BMEiCON	Biomedical Engineering International Conference
CAA	Chinese Arctic and Antarctic Administration
CAI	Computer-Aided Instruction
CAS	Chinese Academy of Sciences
CERN	Conseil Européen pour la Rocherche Nucléaire (European Organization for Nuclear Research)
CHINARE	Chinese Antarctic Research Expedition
CMS	Compact Muon Solenoid
DAAD	Deutscher Akademischer Austausch Dienst
DESY	Deutsches Elektronen-Synchrotron
DLTV	Distance Learning Television
eDLTV	Electronic Distance Learning Television
	Engineering and Assistive Technology
	Environment Sciences
GABA	Gamma-Aminobutyric Acid
GISTDA	Geo-Informatics and Space Technology Development Agency (Public Organization)
GPRS	General Packet Radio Service
GUCAS	Graduate University of Chinese Academy of Sciences
GYSS	Global Young Scientists Summit
HAII	Hydro and Agro Informatics Institute
HCMR	Human-Chicken Multi-Relationship Research
IAP	Institute of Atmospheric Physics
ICCES	International Center for Climate and
i-CREATe	International Convention on Rehabilitation
ICT	Institute of Computing Technology
IEP	Individualized Education Program
IHEP	Institute of High Energy Physics
IPST	Promotion of Teaching Science and Technology
IRGSP	International Rice Genome Sequencing Project
JARE	Japanese Antarctic Research Expedition
JSTP	Junior Science Talent Project
KMUTT	King Mongkut's University of Technology Thonburi
LHC	Large Hadron Collider
NCBME	National Conference on Biomedical Engineering
NPI	Norwegian Polar Institute
NSTDA	National Science and Technology Development Agency
PITZ	Photo Injector Test Facility at DESY, Location Zeuthen
PMMA	Polymethyl methacrylate
RADI	Institute of Remote Sensing and Digital Earth
RGD	Rice Gene Discovery Unit
SiRS	Science in Rural Schools
SLRI	Synchrotron Light Research Institute
SUT	Suranaree University of Technology
UCAS	University of Chinese Academy of Sciences
UNIS	University Centre in Svalbard
WLCG	Worldwide LHC Computing Grid
XFEL	The European X-Ray Laser Project
YAO	Yunnan Astronomical Observatory

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Supporting Persons and Organizations

Thai Scientists Move Forward to CERN

1 Agricultural Research Development Agency
2 Chulalongkorn University
3 Hydro and Agro Informatics Institute
4 King Mongkut's University of Technology Thonburi (KMUTT)
5 Mahidol University
6 Ministry of Science and Technology
7 National Astronomical Research Institute of Thailand (Public Organization)
8 National Electronics and Computer Technology Center (NECTEC), NSTDA
9 Office of the Higher Education Commission
10 Suranaree University of Technology
11 Synchrotron Light Research Institute
12 Thailand Center of Excellence in Physics (ThEP)
13 Thailand Institute of Nuclear Technology (Public Organization)
14 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn
15 The Institute for the Promotion of Teaching Science and Technology (IPST)
16 The Thailand Research Fund

Thai Youths Gain Experience at DESY

1 Chiang Mai University
2 Chulalongkorn University
3 Ministry of Science and Technology
4 Suranaree University of Technology
5 Synchrotron Light Research Institute
6 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn

Lindau Nobel Laureates Meetings

1 Faculty of Medicine Siriraj Hospital, Mahidol University
2 Faculty of Medicine, Chulalongkorn University
3 Faculty of Science, Mahidol University
4 Faculty of Science, Srinakharinwirot University
5 Institute of Molecular Biosciences, Mahidol University
6 National Nanotechnology Center (NANOTEC), NSTDA
7 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn
8 The Siam Cement Public Co., Ltd.

Reaching Out to the Chinese Academy of Sciences

1 Faculty of Medicine Siriraj Hospital, Mahidol University
2 Geo-Informatics and Space Technology Development Agency (Public Organization)
3 Hydro and Agro Informatics Institute
4 Institute of Field Robotics, King Mongkut's University of Technology Thonburi
5 Ministry of Foreign Affairs
6 Ministry of Science and Technology
7 National Astronomical Research Institute of Thailand (Public Organization)
8 National Electronics and Computer Technology Center (NECTEC), NSTDA
9 National Nanotechnology Center (NANOTEC), NSTDA
10 Office of the Civil Service Commission
11 Suranaree University of Technology
12 Synchrotron Light Research Institute
13 Thailand International Cooperation Agency (TICA), Ministry of Foreign Affairs
14 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn

Polar Research

1 Chulachomklao Royal Military Academy
2 Department of European Affairs, Ministry of Foreign Affairs
3 Faculty of Science, Chulalongkorn University
4 Geo-Informatics and Space Technology Development Agency (Public Organization)
5 L'Oreal (Thailand) Ltd.
6 National Astronomical Research Institute of Thailand (Public Organization)
7 National Institute of Development Administration
8 T.C. Pharmaceutical Industries Co.,Ltd. (Red Bull)
9 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn

Human-Chicken Multi-Relationships Research Project

1 Biodiversity-Based Economy Development Office (Public Organization)
2 Charoen Pokphand Group CO., LTD.
3 Department of Livestock Development, Ministry of Agriculture and Cooperatives
4 Faculty of Agriculture, Kasetsart University
5 Faculty of Agriculture, Khon Kaen University
6 Faculty of Archaeology, Silpakorn University
7 Faculty of Arts, Chulalongkorn University
8 Faculty of Science, Chulalongkorn University
9 Faculty of Veterinary Medicine,Kasetsart University.
10 Geo-Informatics and Space Technology Development Agency (Public Organization)
11 Indigenous Chicken Conservation Society
12 National Center for Genetic Engineering and Biotechnology (BIOTEC), NSTDA
13 The Department of National Parks, Wildlife and Plant Conservation, Ministry of Natural Resources and Environment
14 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn

Innovations in Thai Rice through Genome Technology

1 Bang Ban Agricultural Cooperative Ltd.
2 District Agricultural Extension Office
3 Farm Chokchai
4 Hug Muang Nan Foundation, Joko Learning Center
5 Kasetsart University
6 Phak Hai Agricultural Cooperative Ltd.
7 Plant Genetic Conservation Project Under The Royal initiative of Her Royal Highness Princess Maha Chakri Sirindhorn
8 Provincial Administrative Organization (PAO)
9 Provincial Agricultural Extension Office
10 Rajamangala University of Technology Lanna
11 Rice Gene Discovery Unit
12 Sam Ko Agricultural Cooperative Ltd.
13 Sankhaburi Agricultural Cooperative Ltd.
14 Sapphaya Agricultural Cooperative Ltd.
15 Subdistrict Administrative Organization (SAO)
16 Tha Ruea Agricultural Cooperative Ltd.
17 The National Center for Genetic Engineering and Biotechnology (BIOTEC), NSTDA
18 The Siam Cement Public Co., Ltd.
19 Wat Sing Agricultural Cooperative Ltd.

Thailand Biomedical Engineering Consortium

1 Chiang Mai University
2 Chulalongkorn University
3 Institute of Field Robotics, King Mongkut's University of Technology Thonburi
4 King Mongkut's Institute of Technology Ladkrabang
5 King Mongkut's University of Technology Thonburi
6 King Mongkut's University of Technology Thonburi
7 Mahidol University
8 National Electronics and Computer Technology Center (NECTEC), NSTDA

9 National Metal and Materials Technology Center (MTEC), NSTDA
10 National Nanotechnology Center (NANO-TEC), NSTDA
11 Prince of Songkla University
12 Srinakharinwirot University
13 Thai Engineering in Medicine and Biology Society
14 Thailand Centre of Excellence for Life Sciences (Public Organisation)
15 Thammasat University
16 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn
17 The National Center for Genetic Engineering and Biotechnology (BIOTEC), NSTDA

Science Advancing in Rural Schools

1 Border Patrol Police Bureau, Royal Thai Police
2 Chiang Mai University
3 Chiang Rai Rajabhat University
4 Group of General Budhist Scripture School at Nan, Phrae, Phayao and Lampang province
5 H.R.H. Princess Maha Chakri Sirindhorn Foundation
6 Hala Bala Wildlife Research Station, Narathiwat
7 Kasetsart University Chalermphrakiat Sakonnakhon Province Campus
8 King Mongkut's University of Technology Thonburi
9 Lampang Rajabhat University
10 Land Development Regional Office 7
11 Land Development Station Nan, Phrae, Chiang Rai and Phayao Province
12 Mae Hong Son Primary Education Service Area office 1 and 2
13 Nan Primary Education Service Area office 1 and 2
14 National office of Buddhism
15 Office of Buddhism Nan, Phrae, Chiang Rai, Phayao, Lampang
16 Office of Buddhist Scripture School Department of Education Group 6
17 Office of Her Royal Highness Princess Maha Chakri Sirindhorn's Projects
18 Office of Non Formal and Informal Education Chiang Mai
19 Office of Non Formal and Informal Education OM-Koi District of Chiang Mai
20 Office of the Basic Education Commission
21 Phangnga Primary Education Service Area office
22 Phuket Rajabhat University
23 Prince of Songkla University Hatyai Campus and Pattani Campus
24 Rajamangala University of Technology Lanna
25 Sakon Nakhon Primary Education Service Area office 1 and 2
26 Sakon Nakhon Rajabhat University
27 secondary education Service Area office 23
28 Secondary Education Service Area office 34
29 Srinakharinwirot University
30 Thai Health Promotion Foundation
31 Thammasat University
32 The Institute for the Promotion of Teaching Science and Technology (IPST)
33 The National Center for Genetic Engineering and Biotechnology (BIOTEC), NSTDA
34 The research project on breeding wild flowers South (Hala - Bala) Narathiwat
35 Udon Thani Rajabhat University

Little Scientist's House for Preschoolers

1 B.Grimm Group
2 Nanmeebooks Co. Ltd.
3 Nationnal Science Museum
4 Office of the Basic Education Commission
5 Princess Maha Chakri Sirindhorn Foundation
6 Srinakharinwirot University
7 The institute for the Promotion of Teaching Science and Technology

Children's University For Thai Children with A Heart for Science

1 Chulalongkorn University
2 Kasetsart University
3 King Mongkut's Institute of Technology Ladkrabang
4 King Mongkut's University of Technology North Bangkok
5 King Mongkut's University of Technology Thonburi
6 Mahidol University
7 Silapakorn University
8 Srinakharinwirot University
9 The institute for the Promotion of Teaching Science and Technology

IT Drives Forward Education in Rural Schools

1 Distance Learning Foundation
2 Office of The Basic Education Commission, Ministry of Education
3 Office of the Permanent Secretary, Ministry of Education
4 Office of the Vocational Education Commission, Ministry of Education
5 Rajabhat Universies Network, Ministry of Education
6 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn

Wherever They Might Be Thai Youths Could Learn via eDLTV

1 Distance Learning Foundation
2 Electronic Government Agency (Public Organisation)
3 Hitachi Asia (Thailand) Co., Ltd. (HAS-TH)
4 National Electronics and Computer Technology Center (NECTEC), NSTDA
5 Office of the Permanent Secretary, Ministry of Education
6 Office of the Vocational Education Commission, Ministry of Education
7 Rajabhat Universities , Ministry of Education
8 SVOA Public Company Limited
9 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn
10 Wangklaikangwol School
11 Wangklaikangwong Industrial and Community Education College

IT for Islamic Private Schools

1 Office of Her Royal Highness Princess Maha Chakri Sirindhorn's Projects
2 Office of the Private Education Commission, Ministry of Education
3 Office of the Vocational Education Commission, Ministry of Education
4 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn

New Approach to Science Studies in the Age of ICT

1 Boonmeg Phamornsing
2 Chalongchai Teevasuthornsakul
3 Chevron Thailand Exploration and Production, Ltd
4 Electricity Generating Authority of Thailand (EGAT)
5 Faculty Of Engineering, Chiang Mai University
6 Faculty of Science and Technology, Thammasat University
7 Genome Technology Research Unit, The National Center for Genetic Engineering and Biotechnology (BIOTEC), NSTDA
8 Geological Society of Thailand
9 Montida sitathani
10 National Disaster Warning Center
11 PTT Exploration and Production Public Company Limited
12 PTT Public Company Limited

13 Rajabhat Universies , Ministry of Education
14 Ratchaburi Electricity Generating Holding Public Company Limited
15 South East Asian Nepenthes Study & Research Foundation (SEANSRF)
16 Thai Meteorological Department, Ministry of information and Communication Technology
17 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn
18 We By The Brain

Learning through Projects That Integrate the Force of ICT

1 Buppachart Thunhikorn, Assoc.Prof, Kasetsart University
2 Rajabhat Universies , Ministry of Education
3 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn

Intellectual Treasure from Burma

1 Atiz Innovation Co.,LTD.
2 Bangkok Airways Public Company Limited
3 Canon Marketing (Thailand) Co., Ltd.
4 National Electronics and Computer Technology Center (NECTEC), NSTDA
5 Office of the Attache, Royal Thai Embassy, Yangon, Myanmar
6 Royal Aide-De-Camp Department, Ministry of Defence
7 Royal Thai Embassy, Yangon, Myanmar
8 Science and Technology Knowledge Services, NSTDA
9 Thammasat University Libraries
10 U Moe Myint

Community Enterprises Strengthening Rural Areas in Thailand

1 Bo Kluea Community, Bo Kluea District, Nan province
2 Bo Kluea District Agricultural Extension Office, Nan province
3 Chanpen Subdistrict Administrative Organization, Tao Nhoi district, Sakonnakhon province
4 Dansai Crown Prince Hospital, Loei Province
5 Hug Muang Nan Foundation
6 Kasetsart University Chalermphrakiat Sakonnakhon Province Campus
7 King Mongkut's University of Technology Thonburi (KMUTT)
8 Kusuman District Agricultural Extension Office
9 Land Development Department
10 Loei Rajabhat University
11 Nahaeo Hospital, Loei Province
12 National Center for Genetic Engineering and Biotechnology (BIOTEC), NSTDA
13 Phufa Development Centre
14 Project Contrary to the Security Area, Phukhat Phumiang, Phusoidao
15 Rajamangala University of Technology Isan Sakonnakhon C]ampus
16 Rajamangala University of Technology Lanna, Lampang
17 Rajamangala University of Technology Lanna, NaN
18 Saeng Pha Subdistrict Administrative Organization, Tao Nhoi district, Loei province
19 Sakonnakhon Rajabhat University
20 Srinakharinwirot University
21 Tao Ngoi Agricultural Cooperative Limited, Sakon Nakhon province
22 Tao Ngoi District Agricultural Extension Office , Sakonnakhon province
23 Tao Ngoi Subdistrict Administrative Organization, Tao Nhoi district, Sakonnakhon province
24 Tiang Chirathivat Foundation

Electrical Safety in Border Patrol Police Schools

1 Border Patrol Police Bureau
2 Department of Disaster Prevention and Mitigation, Ministry of Interior
3 King Mongkut's University of Technology Thonburi

4 King Mongkut's University of Technology Thonburi Savings and Credit Cooperative Limited
5 Office of Her Royal Highness Princess Maha Chakri Sirindhorn's Projects
6 Office of the Vocational Education Commission
7 Provincial Electricity Authority
8 Provincial Electricity Authority wives and families
9 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn
10 The Institute for the Promotion of Teaching Science and Technology (IPST)

Electric Lighting Shining on the Path to Knowledge for Hill Tribe Communities

1 Border Patrol Police Bureau
2 Department of Alternative Energy Development and Efficiency
3 King Mongkut's University of Technology Thonburi
4 National Electronics and Computer Technology Center (NECTEC), NSTDA
5 Office of Her Royal Highness Princess Maha Chakri Sirindhorn's Projects
6 Office of Non Formal and Informal Education, Ministry of Education
7 Office of The Basic Education Commission, Ministry of Education
8 Office of the Vocational Education Commission
9 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn
10 The Institute for the Promotion of Teaching Science and Technology (IPST)

Kampong Chheuteal High School Thai-Cambodian Relationship

1 Kampongchheuteal College
2 Ministry of Education, Youth and Sport (Cambodia)
3 National Electronics and Computer Technology Center (NECTEC), NSTDA
4 Office of the Vocational Education Commission, Ministry of Education
5 PTT Public Company Limited
6 Royal Aide-De-Camp Department, Ministry of Defence
7 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn
8 TOT Public Company Limited

With ICT, Youths Can Create Works

1 Department of Juvenile Observation and Protection, Ministry of Justice
2 Internet Foundation for the Development of Thailand
3 King Mongkut's University of Technology Thonburi (KMUTT)
4 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn

IT and Art Enhance Prison Inmates' Quality of Life

1 Art for All Foundation
2 Department of Corrections, Ministry of Justice
3 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn
4 Toshiba Thailand Co., Ltd.

IT for Learning and Quality of Life of Child Patients

1 Bureau of Special Education, Office of Basic Education Commission, Ministry of Education
2 Office of Non Formal and Informal Education, Ministry of Education
3 Queen Sirikit National Institute of Child Health, Department of Medical Services, Ministry of Public Health
4 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn

Srisangwan School for Disabled Children

1 Boonpa IT Solution Co., Ltd.
2 Bureau of Special Education, Office of Basic Education Commission, Ministry of Education
3 Foundation for the Welfare of the Crippled under the Royal Patronage of Her Royal Highness the Princess Mother.
4 Fujitsu Systems Business (Thailand) Ltd.
5 IBM Thailand Co., Ltd.
6 Montida sitathani
7 National Electronics and Computer Technology Center (NECTEC), NSTDA
8 National Institute of Information and Communications Technology (NICT) Japan
9 National Science MUSEUM
10 Science Camp Management, NSTDA
11 Srisangwal Chiangmai School
12 Srisangwal Khonkaen School
13 Srisangwal School of Foundation for the Welfare of the Crippled under the Royal Patronage of Her Royal Highness the Princess Mother.
14 Thai Health Promotion Foundation
15 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn

Kawila Anukul: A Learning Centre for Intellectually Disabled Students

1 Bureau of Special Education, Office of The Basic Education Commission, Ministry of Education
2 Child Psychiatric Ward, Maharaj Nakorn Chiang Mai Hospital
3 Kawila Anukul School
4 National Electronics and Computer Technology Center (NECTEC), NSTDA
5 National Science Museum
6 Science Camp Management, NSTDA
7 Special Education Center, Educational Service Area 8, Chiang Mai Province
8 Thai Health Promotion Foundation
9 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn
10 The Northern Welfare Center For The Mentaily Retarded, Chiangmai Province

Blind Students Can Succeed in Science Programme

1 Bunyawat Witthayalai School
2 Bureau of Special Education, Office of The Basic Education Commission, Ministry of Education
3 Department of Computer Science, Kasetsart University
4 Department of Computer Science, Khonkaen University
5 Faculty of Information and Communication Technology, Mahidol University
6 Faculty of Science and Technology, Thammasat University
7 Foundation for the Blind in Thailand Under The Royal Patronage of H.M. The Queen
8 Kanjanapisek Wittayalai Nakhon Pathom School
9 Korat Pittayakhom School
10 Mahidol Wittayanusorn School

11 National Electronics and Computer Technology Center (NECTEC), NSTDA
12 Nationnal Science Museum
13 Ratchasuda College, Mahidol University
14 Saint Gabriel's College
15 Science Camp Management, NSTDA
16 Thailand Association of the Blind
17 Thammik Witthaya School
18 The Christian Foundation for the Blind in Thailand
19 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn
20 The Institute for the Promotion of Teaching Science and Technology (IPST)
21 The Stock Exchange of Thailand Foundation
22 Yapparaj Wittayalai School Under the Patronage of HRH Princess Bejaratana of King Rama VI

A Hero of Krong Penang

1 National Electronics and Computer Technology Center (NECTEC), NSTDA
2 Phramongkutklao Hospital
3 Sirindhorn National Medical Rehabilitation Centre
4 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn

A Blind Student with Multiple Disabilities Who Is Keen on Learning

1 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn
2 Special Education Program, Faculty of Education, Suan Dusit Rajabhat University
3 The Northern School for the Blind under the Patronage of the Queen
4 National Electronics and Computer Technology Center (NECTEC), NSTDA
5 Bureau of Special Education, Office of The Basic Education Commission, Ministry of Education

From A Soldier...to An Artist

1 National Electronics and Computer Technology Center (NECTEC), NSTDA
2 Otto Bock Southeast Asia Co. Ltd.
3 Phramongkutklao Hospital
4 Sai Jai Thai Foundation Under Royal Patronage
5 Sirindhorn National Medical Rehabilitation Centre
6 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn

A Limbless Student from Mueang Nara

1 Aid to Asian Disabled Peoples
2 Ban Plak Pla School, Lumpoo Subdistrict, Mueang Narathiwat District, Narathiwat Province
3 Disabled Peoples' International Asia Pacific (DPI/AP)
4 Foundation for the Welfare of the Crippled under the Royal Patronage of Her Royal Highness the Princess Mother.
5 Lumpoo Subdistrict Administrative Organization
6 Nara Sikhalai School, Mueang Narathiwat District, Narathiwat Province
7 Naradhiwas Rajanagarindra Hospital
8 Narathiwas Primary Education Service Area office 1
9 Narathiwat Polytechnic College
10 Narathiwat Provincial Administrative Organization
11 Narathiwat Provincial Social Development and Human Security Office
12 National Electronics and Computer Technology Center (NECTEC), NSTDA

13 National Metal and Materials Technology Center (MTEC), NSTDA
14 Pattani Hospital
15 Pattani Industrial and Community Education College
16 Prince of Songkla University, Pattani Campus
17 Provincial Electricity Authority of Narathiwat Province
18 Ramun Industrial and Community Education College
19 Ratreesawat thananan
20 Sawangkaniwas Rehabilitation Centre
21 Sirindhorn National Medical Rehabilitation Centre
22 Special Education Center, Narathiwat Province
23 Srisangwal School of Foundation for the Welfare of the Crippled under the Royal Patronage of Her Royal Highness the Princess Mother.
24 The Information Technology Project under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn
25 Vichai cholprasertsook
26 Voraphot Srimahachota

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Ms. Vilawan Wanadurongwan	Committee Member
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Ms. Korapin Srisuksawadi	Committee Member
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Ms. Chadamas Thuvasethakul	Committee Member and Secretary

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