

# Report: Status of ICT Integration in Education in Southeast Asian Countries



- Brunei Darussalam
- Cambodia
- Indonesia
- Lao PDR
- Malaysia
- Myanmar
- Philippines
- Singapore
- Thailand
- Timor Leste
- Vietnam



Southeast Asian  
Ministers of Education  
Organization



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Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar,  
Philippines, Singapore, Thailand, Timor Leste, Vietnam

Report: Status of ICT Integration in Education in Southeast Asian Countries:  
Bangkok: SEAMEO, 2010  
183 pp.  
ISBN: 978-616-90041-1-0

Published by  
The Southeast Asian Ministers of Education Organization (SEAMEO) Secretariat  
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Printed in Thailand  
©SEAMEO 2010

Editor: Chulalongkorn University Language Institution (Chapter 1 to 5 and Appendix XIII)  
Design: Kaew&Crew Co.,Ltd

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In the past few decades, we have seen the rapid development of information communication technologies which has opened up and maximized great opportunities for its use in education. Despite this potential, there are certain challenges and issues regarding the use of ICT in education that concern us all. By working together and learning from each other, we can overcome these challenges and ensure efficient, quality and accessible education through the use of ICT.

As an initial step towards knowledge sharing of ICT practices and experiences, the Southeast Asian Ministers of Education Organization (SEAMEO) conducted a preliminary survey on the state of ICT integration in education in the SEAMEO Member Countries. This initiative was inspired by the Education Ministers' directive at the 42nd SEAMEO Council Conference in 2007, in Bali, Indonesia.

This report on the status of ICT integration in education in Southeast Asia is based on the results of this survey and presents a holistic picture of the status of ICT integration in education in the 11 SEAMEO Member Countries: namely Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor Leste and Vietnam. The report identifies strengths and examines how each country integrates ICT in their educational system.

Moreover, the report contains best practices and lessons learnt which can serve as a reference in policy formulation, development, and implementation of activities related to integrating ICT in teaching and learning, and even in administrative-related matters.

Particularly, in the last chapter, the report provides a summary of SEAMEO Regional Centres' strengths and initiatives on ICT integration in education and the capacity with which the SEAMEO Regional Centres can provide assistance to the SEAMEO Member Countries on ICT integration.

The SEAMEO Secretariat wishes to thank the heads of the ICT Division and ICT experts of the Ministries of Education of the 11 SEAMEO Member Countries who provided up-to-date information and best practices on ICT in education in their respective countries. Appreciation is also extended to the SEAMEO Regional Centre for Vocational and Technical Education (SEAMEO VOTTECH), SEAMEO Regional Centres, the UNESCO Asia and Pacific Regional Bureau for Education, and Microsoft Asia Pacific for the support of this initiative. Special thanks goes to Dr. Cher Ping Lim, who worked with the SEAMEO Secretariat in synthesizing the country case studies.

The SEAMEO Secretariat hopes that this report will be useful for SEAMEO Member Countries to further develop ICT integration in education with the aim of providing greater access to quality education in the Southeast Asia.



Dato' Dr. Ahamad bin Sipon  
Director, SEAMEO Secretariat

# Executive Summary

Governments of Southeast Asian countries (SEAMEO Member Countries) have committed substantial financial resources over the last decade to bring ICT into schools. Integrating ICT in education provides opportunities for students to search for and analyse information, solve problems, communicate and collaborate and hence, equips them with a set of competencies to be competitive in the 21<sup>st</sup> century marketplace (Bereiter & Scardamalia, 2006; Fullan, Hill, & Crévola, 2006; Jonassen, Howland, Marra, & Crismond, 2008). As the process of ICT integration in education has reached a considerable level of maturity and stability in some SEAMEO member countries, the key question is how ICT has been integrated in education among the countries in Southeast Asia. This comparative report by the SEAMEO Secretariat provides a synthesis of the ICT in education case studies submitted by the 11 SEAMEO countries that include Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor Leste and Vietnam. Ten ICT in education dimensions are identified based on the country case studies where these dimensions are necessary and sufficient conditions that support the integration of ICT in education: (1) national ICT in education vision; (2) national ICT in education plans and policies; (3) complementary national ICT and education policies; (4) ICT infrastructure and resources in schools; (5) professional development for teachers and school leaders; (6) community/partnerships; (7) ICT in the national curriculum; (8) teaching and learning pedagogies; (9) assessment; and (10) evaluation and research.

In order to make sense of the differences and commonalities among the countries, regions and areas, four stages of ICT in education are identified based on UNESCO's model of ICT Development in Education (UNESCO, 2005): emerging, applying, infusing, and transforming [See Appendix I(A)]. It is important to note that the synthesis is based on the information that has been extracted from the self-reporting case studies and self-assessment of the stages of ICT in education of the countries. These case studies and assessments are prepared by the representatives of the Ministry of Education from each country. The synthesis of the country case studies and each country's stage of ICT in education with respect to the 11 SEAMEO member countries' will provide Ministries of Education with up-to-date information about and a holistic view of the capacity of each country to integrate ICT in education, and hence, assist them in future planning for the integration of ICT into education. Based on the synthesis, each Ministry of Education may construct policy and pedagogical models and approaches of ICT integration for education in its own country.

The 11 SEAMEO Member Countries are at very different stages of integrating ICT in education. There are countries that are already at or moving towards the transforming stage and there are countries that have just started out and at the emerging stage of ICT in education. Based on these different stages of development, the countries may be categorised into three groups. It is important to note that besides the differences of ICT in education development among the three groups, there are also differences among the countries within each group.



Group 1 countries are Brunei Darussalam, Malaysia, and Singapore. These countries are at the infusing and transforming stages for most of the dimensions of ICT in education. In this group, Malaysia and Singapore are well-ahead on the ICT in education journey than Brunei, especially in the dimensions of teaching and learning pedagogies and community/partnership. Some schools among the Group 1 countries are in the transforming stage or moving towards the transforming stage of ICT-mediated teaching and learning pedagogies; these pedagogies are most likely to equip students with a set of competencies to be competitive in the 21<sup>st</sup> century marketplace. For these pedagogies to be implemented in the schools of a country, the other dimensions of ICT in education have to be in the infusing or transforming stage. Singapore is in the transforming stage for all of the dimensions except the ICT in the national curriculum and assessment dimensions. None of the 11 SEAMEO Member Countries have assessed themselves to be in the transforming stage for these two dimensions. Brunei and Malaysia are in the transforming stage for most of the other dimensions except the evaluation and research dimension.

Group 2 countries are Indonesia, Philippines, Thailand, and Vietnam. They are mainly at the infusing stage for most of the dimensions and most of them already have developed ICT plans and policies in education. But due to the rural-urban gap and different levels of access to ICT infrastructure, there are still some parts of the dimensions that are in the applying and even emerging stage. Among the countries in this group, Thailand and Vietnam are in more advanced stages of ICT in education than Indonesia and Philippines. Among these four countries, only some schools in Vietnam are in the transforming stage of ICT-mediated teaching and learning pedagogies. The rest of the schools in Vietnam and the three countries, Indonesia, Philippines and Thailand are in the infusing and applying stages with the exception of Indonesia which has schools in the emerging stage. Vietnam has three dimensions of ICT in education in the transforming stage: national ICT in education plans and policies, complementary national ICT and education policies and ICT infrastructure and resources in schools; and these may have provided the necessary and sufficient conditions for some schools to transform their ICT-mediated teaching and learning practices.

Group 3 countries are Cambodia, Lao PDR, Myanmar, and Timor Leste. Although each of these four countries has either started to develop and implement ICT in education plans and policies or implemented ICT in education projects on a small scale, all of them are still at the emerging stage for most of the dimensions. The main concern of these countries is access to ICT infrastructure, hardware and software. In this group, Cambodia and Myanmar are at more advanced stages of ICT in education than Lao PDR and Timor Leste. There are some schools in Cambodia and Myanmar that are in the applying stage of ICT-mediated teaching and learning pedagogies; but for the rest of the schools in Cambodia and Myanmar, and all schools in Lao PDR and Timor Leste, they are in the emerging stage.

From the discussion, six issues have emerged for the Ministries of Education of the SEAMEO Member Countries to address as a group and as a country:

1. Holistic approach towards the development of the national ICT in education plans and policies;
2. Provision of professional development to staff at all levels in the education system;
3. Emphasis on ICT in national curriculum and assessment;
4. Sharing and transfer of ICT in education best practices and lessons learnt among SEAMEO Member Countries, and among schools and provinces/states in the country;
5. Support of Group 3 countries' ICT in education efforts through partnerships; and
6. Planning for evaluation and research of ICT in education.

As we move further into the 21<sup>st</sup> century, students in Southeast Asian countries must be prepared to meet the future needs of the knowledge-based economy. Students have to learn to seek out new information, think critically, and show initiative to meet the challenges of the fast-changing world. ICT in education offers such teaching and learning opportunities. This report discusses how the ten dimensions of ICT in education support or fail to support the effective integration of ICT in schools among the 11 SEAMEO Member Countries. This account emphasises what works and what appears right in a particular setting, and the problems encountered and addressed in a particular situation. The account provides a sample of pedagogical and policy issues that were discussed over the course of writing this report. Like a good guidebook, the account sensitises the audience to what is likely to happen given a particular stage of a dimension. Not only may we understand the various processes within and between dimensions, we may construct pedagogical and policy models of ICT in education based on that understanding.

# Chapter 1

## Introduction



# Chapter 1

## Introduction

Information and communication technologies (ICT) are fast becoming everyday tools in the lives of Southeast Asians both at work and at play. ICT refers to the various technologies, tools and devices that are used to transmit, process, store, create, display, share or exchange information by electronic means. This broad definition of ICT includes technologies such as computers, radio, television, video, CD, DVC, telephone (both fixed line and mobile phones), PDAs, satellite systems, network hardware and software, and the equipment and services associated with these technologies, such as video conferencing, e-mail, and blogs. Governments of Southeast Asian countries (SEAMEO Member Countries) have committed substantial financial resources over the last decade to bring ICT into schools. Integrating ICT in education provides opportunities for students to search for and analyse information, solve problems, communicate and collaborate and hence, equips them with a set of competencies to be competitive in the 21<sup>st</sup> century marketplace (Bereiter & Scardamalia, 2006; Fullan, Hill, & Crévola, 2006; Jonassen, Howland, Marra, & Crismond, 2008).

In this report, ICT integration is interpreted as ICT functioning as an integral or mediated tool to accomplish specific teaching or learning activities to meet certain instructional objectives. For ICT to be effectively integrated in schools, it is used as a mediational tool in these activities to engage students in higher order thinking. Higher order thinking skills are goal-directed strategic processes that include analyzing, evaluating, hypothesizing, elaborating and synthesizing. And engagement entails mindfulness, cognitive effort and attention of the students in the teaching and learning activities (Lim, 2007). As the process of ICT integration in education has reached a considerable level of maturity and stability in some countries in Southeast Asia, the pertinent questions are:

- How has ICT been integrated in education among the countries in Southeast Asia?
- What are the strengths and capacities of these countries to integrate ICT in education?
- What are the ICT in education best practices in these countries and how can they be shared among the countries in Southeast Asia?

At the 42<sup>nd</sup> SEAMEO Council Conference in Bali, Indonesia in 2007, during the Ministerial Policy Forum, these questions were raised and the Council tasked the SEAMEO Secretariat with conducting a survey on 'the state of ICT integration in education in the Southeast Asian region'. The findings from the survey would allow the Council to learn more about each SEAMEO Member Country's situation in ICT integration in education. In response to the assigned task, the SEAMEO Secretariat together with SEAMEO Regional Centre for Vocational and Technical Education (SEAMEO VOTTECH) in Brunei Darussalam developed a set of guiding questions for countries to prepare a case study to identify the state of ICT integration in their respective countries. Countries were required to map out their ICT integration development based on the four stages of ICT in education adopted from UNESCO's model of ICT Development in Education (UNESCO, 2005).

Appendix I is the case study guidelines developed by the SEAMEO Secretariat and SEAMEO VOCTECH that were sent out to all 11 SEAMEO Member Countries.

After submitting their case studies at the end of May 2009, the ICT in education policymakers from the SEAMEO Member Countries met on 2-3 June 2009 for the 'Regional Workshop on Integrating ICT in Education in the SEAMEO Member Countries' in Bangkok, Thailand. The main activities of the workshop included:

- Sharing of information about each country's state of ICT in education, especially in integrating ICT in teaching and learning;
- Discussing common ICT in education issues and challenges; and
- Identifying and making sense of the different stages of ICT in education and their related dimensions and indicators.

The presentations and discussions during the workshop identified two changes to be made to the case studies: (a) each country has to provide at least one ICT in education best practice; and (b) ten ICT in education dimensions are identified based on the country presentations where these dimensions are the necessary and sufficient conditions that support the integration of ICT in education. The dimensions are:

1. National ICT in education vision;
2. National ICT in education plans and policies;
3. Complementary national ICT and education policies;
4. ICT infrastructure and resources in schools;
5. Professional development for teachers and school leaders;
6. Community/partnerships;
7. ICT in the national curriculum;
8. Teaching and learning pedagogies;
9. Assessment; and
10. Evaluation and research.

Table 1 provides the details of the indicators for each stage of ICT implementation in schools within each of the ten dimensions.

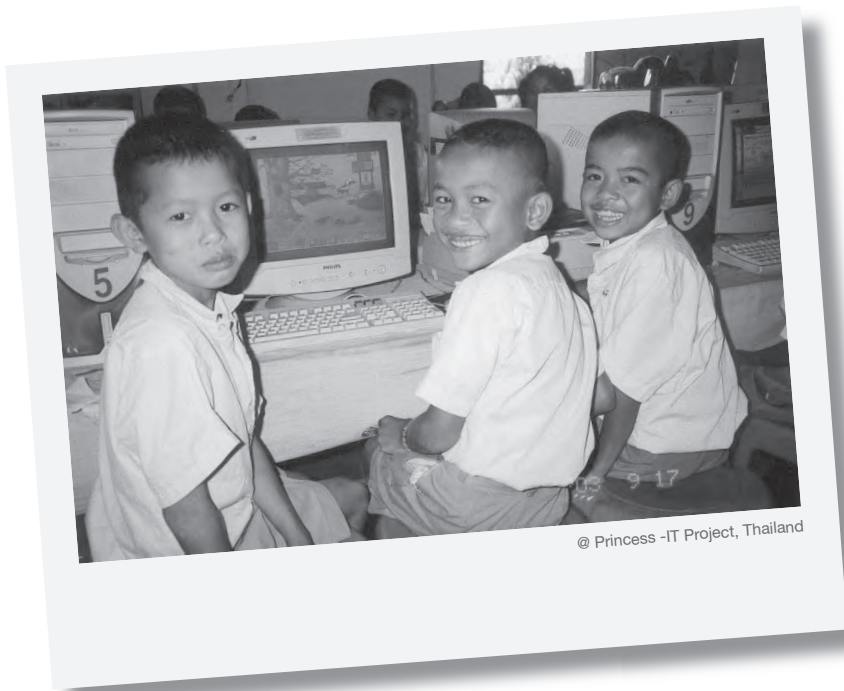
Based on these changes, the SEAMEO Member Countries reworked their case studies and resubmitted them to the SEAMEO Secretariat at the end of July 2009. This comparative report provides a synthesis of the ICT in education case studies submitted by the 11 SEAMEO Countries that include Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor Leste and Vietnam. It is important to note that the synthesis is based on the information that has been extracted from the self-reporting case studies and self-assessment of the stages of ICT in education of the countries. These case studies and assessments were prepared by the representatives of the Ministry of Education from each country.

**Table 1: Indicators of Stages of ICT in Education**

ICT in Education Dimensions	Emerging	Applying	Infusing	Transforming
1. National ICT in Education Vision	Vision in ICT-driven with no or lack of consideration for existing culture, policies and practices.	Vision focuses on the use of ICT to support existing culture, policies and practices.	Vision focuses on driving changes in culture, policies and practices mediated by ICT.	Vision is of exemplary quality and is being studied and emulated by other countries.
2. National ICT in Education Plans and Policies	Non-existent or ICT-driven plans and policies. No planned funding.	Limited. ICT development led by specialist. Centralized policies. Hardware and software funding. Automating existing practices.	Individual subject plans include ICT. Permissive policies. Broadly-based funding, including teacher professional development.	ICT is integral to overall school development plan. All students and all teachers involved. Inclusive policies. All aspects of ICT funding integral to overall education budget. Integral professional development.
3. Complementary National ICT and Education Policies	There is no or lack of linkage between the ICT in education policies and national ICT and education policies	There is a linkage between the ICT in education policies and national ICT and education policies but some of the policies are contradictory.	The ICT in education policies complements the national ICT and education policies. However, it is usually the latter that inform and/or support the former.	The ICT in education policies complements the national ICT and education policies. The policies inform and support one another.
4. ICT Infrastructure and Resources in Schools	Stand-alone workstations for administration. Individual classrooms. Computers and printers. Word processing, spreadsheets, database, presentation software. School administration software.	Computer lab or individual classrooms for ICT specific outcomes. Computers, printers and limited peripherals. Word processing, spreadsheets, databases, presentation software. ICT software. Internet access.	Computer lab and/or classroom computers. Networked classrooms. Intranet and Internet. Resource-rich learning centres. Range of devices, including digital cameras, scanners, and video and audio recorders. Video-conferencing. Range of subjects-oriented content. Range of subject specific software and localized digital resources accessible via the central repository system.	Whole school learning with ICT with access to technology resources and a wide range of current devices. The whole range of devices in the column to the left and web-based learning spaces. Conferencing and collaboration. Distance education. Web courseware. Student self-management software. Schools have the autonomy to manage their own infrastructure and resources. Schools share the digital resources that they have created with one another.

ICT in Education Dimensions	Emerging	Applying	Infusing	Transforming
5. Professional Development for Teachers and School Leaders	Awareness of needs for professional development but no plan for teachers and school leaders. If a plan exists, it is not based on a needs and situation analysis.	ICT applications training. Unplanned. Personal ICT skills.	Subject specific. Professional skills. Integrating subject areas using ICT. Evolving.	Focus on learning and management of learning. Self-managed, personal vision and plan, school supported. Innovative and creative. Integrated learning community with students and teachers as co-learners.
6. Community/ Partnerships	Discreet donations. Problem-driven. Accidental.	Seeking donations and grants. Parental and community involvement in ICT.	Subject-based learning community providing discrete, occasional assistance, by request. Global and local networked communities.	Broad-based learning community actively involves families, business, industry, & universities. School is a learning resource for the community – physically and virtually.
7. ICT in the National Curriculum	ICT literacy development is part of the national curriculum.	Applying ICT within discrete subjects. Use of artificial and isolated contexts.	Infusion with non-ICT content. Integrated learning systems. Authentic contexts. Problem solving projects.	Virtual and real-time contexts. ICT is accepted as a pedagogical agent & the curriculum is delivered online and face-to-face.
8. Teaching and Learning Pedagogies	Teacher-centred. Didactic	Factual knowledge-based learning. Teacher-centred. Didactic. ICT a separate subject.	Learner-centred learning. Collaborative.	Critical thinking. Informed decision-making. Whole learner, multi-sensory learning styles. Experimental.
9. Assessment	Equipment-based. Budget-oriented. Discrete subjects. Didactic. Paper and pencil. Closed tasks.	Skills-based. Teacher-centred. Subject focused. Reporting levels. Moderated within subject areas	Integrated. Portfolios. Subject-oriented. Learner-centred. Multiple media to demonstrate attainment. Moderated across subject areas.	Continuous. Holistic – the whole learner. Peer-mediated. Learner-centred. Learning community involvement. Open-ended. Project-based.
10. Evaluation and Research	There is no evaluation and research plan in the formulation and implementation of the ICT plan.	Evaluation of the implementation of the ICT plan is summative in nature. There is no research to provide evidence-based policies.	Evaluation is both summative and formative. Research provides evidence-based policies but does not push the boundaries of existing policies and practices.	Evaluation is both summative and formative in nature. Research provides evidence-based policies and pushes the boundaries of existing policies and practices.

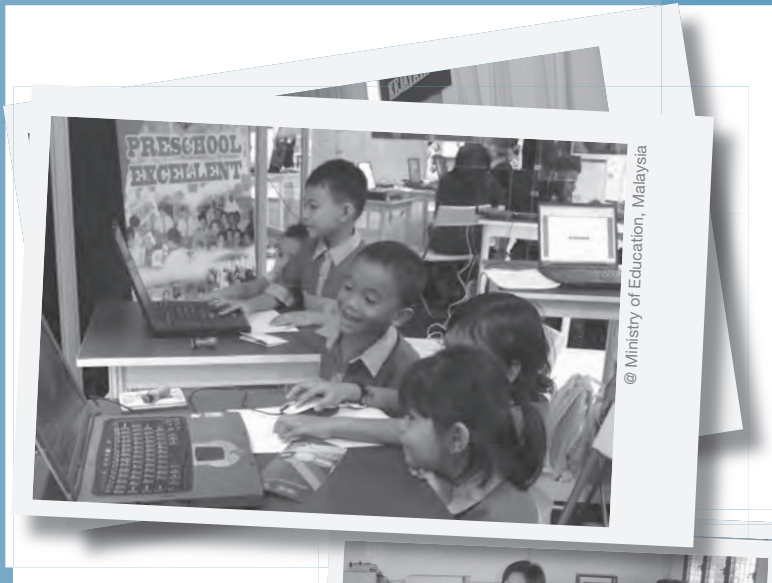
The synthesis of the country case studies and each country's stage of ICT in education with respect to the 11 SEAMEO Member Countries' will provide Ministries of Education with up-to-date information about and a holistic view of the capacity of each country to integrate ICT in education, and hence, assist them in future planning for the integration of ICT into education. The selected best practices in each dimension discussed will emphasise what works and what appears right in a particular setting, the problems encountered and addressed in a particular situation and identify and describe the sociocultural setting elements that promote or inhibit the integration of ICT in education. This report will then conclude with a discussion of emerging issues that the ministries of education have to address as a group or a country. The ministries may then construct policy and pedagogical models and approaches of ICT integration for education based on this understanding.





# Chapter 2

## Overview of the Southeast Asian Countries' Stages of ICT in Education



# Chapter 2

## Overview of the Southeast Asian Countries' Stages of ICT in Education

The Southeast Asian region is very diverse in terms of geographic, demographic, economic, educational and cultural factors. As a result, the 11 SEAMEO Member Countries in this report are at different stages of ICT in education. These different stages may also vary from region to region and area to area within a country. In order to make sense of the differences and commonalities among the countries, regions and areas, four stages of ICT in education are identified based on UNESCO's model of ICT Development in Education (UNESCO, 2005):

- Emerging - Those who have just started their ICT in education journey;
- Applying - Those who have developed a new understanding of the contribution of ICT to learning;
- Infusing - Those who have integrated ICT into existing teaching, learning and administrative practices and policies; and
- Transforming - Those who have used ICT to support new ways of teaching, learning and administration.

Each SEAMEO Member Country has been asked to self-assess its stage of ICT in education for each of the ten dimensions described in Table 1. Table 2 below provides an overview of the SEAMEO Member Countries stages of ICT in education in all ten dimensions of necessary and sufficient conditions that support the integration of ICT in education.

**Table 2: Overview of Southeast Asian Countries' Stages of ICT in Education**

ICT In Education Dimensions	Emerging	Applying	Infusing	Transforming
1. National ICT in Education Vision	Lao PDR; Timor Leste	Cambodia; Myanmar	Brunei (Towards Transforming); Indonesia; Philippines; Thailand; Vietnam (Towards Transforming)	Malaysia; Singapore
2. National ICT in Education Plans & Policies	Lao PDR; Timor Leste	Cambodia; Myanmar	Indonesia; Philippines; Thailand	Brunei; Malaysia; Singapore; Vietnam
3. Complementary National ICT & Education Policies	Lao PDR; Timor Leste	Cambodia; Myanmar	Indonesia; Philippines; Thailand	Thailand Brunei; Malaysia; Singapore; Vietnam
4. ICT Infrastructure & Resources in Schools*	Cambodia; Indonesia; Lao PDR; Philippines; Timor Leste	Cambodia; Indonesia; Philippines; Myanmar	Malaysia; Thailand; Vietnam	Brunei; Malaysia; Singapore; Thailand; Vietnam

ICT In Education Dimensions	Emerging	Applying	Infusing	Transforming
5. Professional Development for Teachers & School Leaders	Lao PDR; Timor Leste	Cambodia; Indonesia; Myanmar	Malaysia; Philippines; Thailand; Vietnam (Towards Transforming)	Brunei; Singapore
6. Community/ Partnership	Lao PDR; Timor Leste	Brunei; Cambodia; Indonesia; Myanmar	Philippines; Thailand; Vietnam	Malaysia; Singapore
7. ICT in the National Curriculum	Cambodia; Lao PDR; Timor Leste	Indonesia; Myanmar; Philippines; Thailand	Brunei; Malaysia; Singapore (Towards Transforming); Vietnam	
8. Teaching & Learning Pedagogies*	Cambodia; Indonesia; Lao PDR; Myanmar; Timor Leste	Cambodia; Indonesia; Malaysia; Myanmar; Thailand; Vietnam	Brunei (Towards Transforming); Indonesia; Malaysia; Philippines; Thailand; Singapore; Vietnam	Malaysia; Singapore; Vietnam
9. Assessment	Cambodia; Indonesia; Lao PDR; Myanmar; Philippines; Timor Leste	Thailand; Vietnam	Brunei; Malaysia; Singapore	
10. Evaluation & Research	Cambodia; Lao PDR; Philippines; Timor Leste	Indonesia; Thailand; Myanmar	Brunei (Towards Transforming); Malaysia; Vietnam	Singapore

Note : \*In dimensions 4 (ICT Infrastructure & Resources in Schools ) and 8 (Teaching & Learning Pedagogies) , some of the countries appear in more than one stage of ICT in education due to the differences in stages of development among the provinces or areas within each of these countries.

From Table 2, it is clear that the 11 SEAMEO Member Countries are at very different stages of integrating ICT in education. There are countries that are already at or moving towards the transforming stage and there are countries that have just started out and at the emerging stage of ICT in education. Based on these different stages of development, the countries may be categorised into three groups. It is important to note that besides the differences of ICT in education development among the three groups, there are also differences among the countries within each group.

- Group 1 countries: Brunei Darussalam, Malaysia, and Singapore. All three countries have highly-developed national ICT in education plans and policies that are integral to the overall education development or improvement plans. These plans and policies complement the national ICT and education policies, where the policies inform and support one another. Almost all the classrooms in these three countries (except in the less developed areas in Malaysia) have been equipped with computers and other ICTs, have a high student-computer ratio, a high level of Internet access to all schools and an education delivery system that is increasingly online. These countries are at the infusing and transforming stages for most of the dimensions of ICT in education. In this group, Malaysia and Singapore are much further ahead on the ICT in education journey than Brunei, especially in the dimensions of teaching and learning pedagogies and community/ partnership.



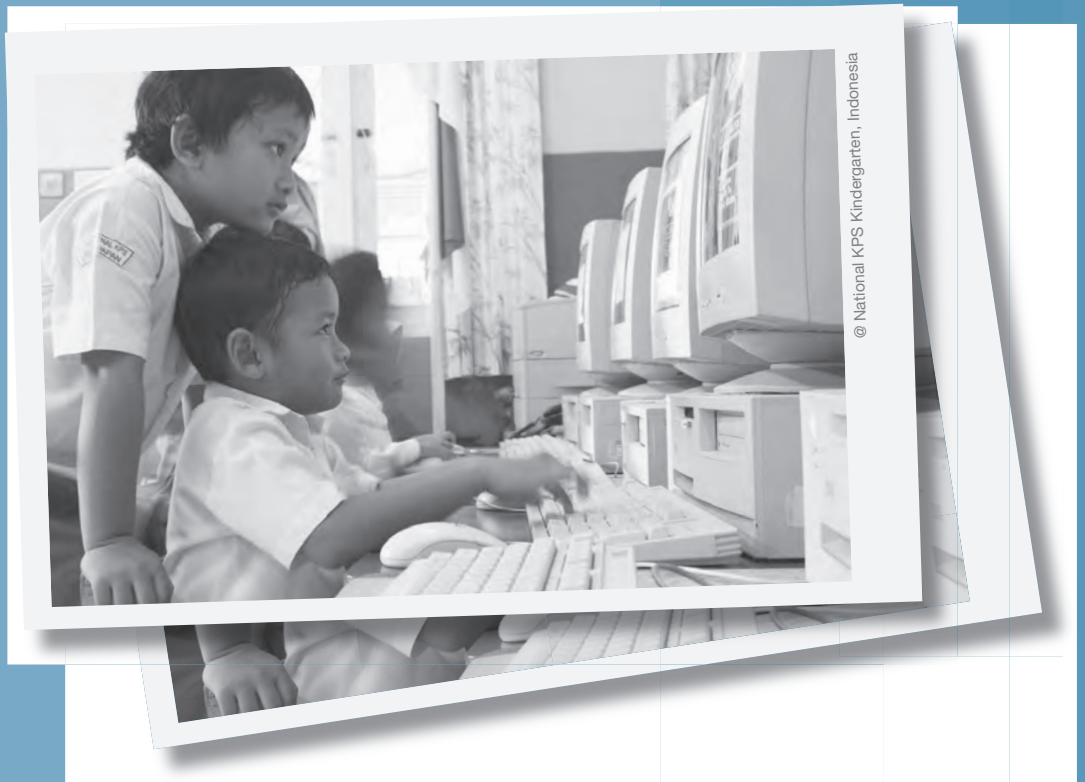
- Group 2 countries: Indonesia, Philippines, Thailand, and Vietnam. They are mainly at the infusing stage for most of the dimensions and most of them already have developed ICT plans and policies in education. But due to the rural-urban gap, there are still some parts of the dimensions that are in the applying and even emerging stage. For example, under the teaching and learning pedagogies dimension, Indonesia's stages of development range from emerging in the less developed provinces to infusing in the more developed provinces; and in the case of Vietnam, the stages range from applying to transforming. Among the countries in this group, Thailand and Vietnam are in more advanced stages of ICT in education than Indonesia and Philippines.
- Group 3 countries: Cambodia, Lao PDR, Myanmar, and Timor Leste. Although each of these four countries has either started to develop and implement ICT in education plans and policies or implemented ICT in education projects on a small scale, all of them are still at the emerging stage for most of the dimensions. The main concern of these countries is access to ICT infrastructure, hardware and software. In this group, Cambodia and Myanmar are at more advanced stages of ICT in education than Lao PDR and Timor Leste. The former countries are at the applying stage from the dimensions of national ICT in education vision, plans and policies, complementary national ICT and education policies and ICT infrastructure and resources in schools, whereas the latter counties are at the emerging stage for these dimensions.

To gain a better understanding of these different stages of development among the three groups of countries, the following section examines each of the ten dimensions of ICT in education in detail.



# Chapter 3

## Examining the Ten Dimensions of ICT in Education among the Southeast Asian Countries



## Chapter 3

# Examining the Ten Dimensions of ICT in Education among the Southeast Asian Countries

Teachers' efforts to integrate ICT into schools are facilitated and limited by factors that are either extrinsic to teachers (for example, access to ICT infrastructure and resources and supporting ICT in education policies) or fundamentally rooted in their beliefs about teaching and learning or both (Ertmer, 2005; Zhao, Pugh, & Sheldon, 2002). Policymakers, education researchers and practitioners have been searching for appropriate strategies to manage these factors to support effective ICT integration. Based on the relevant literature reviewed and the case studies of the 11 SEAMEO Member Countries, this section provides a descriptive and interpretive account of each of the ten dimensions of ICT in education. These dimensions represent different levels of context in which ICT is situated in schools where the effects between various levels of context are multidirectional; that is the level above or below each level of context may affect and may be affected by the activities, norms, goals and motivations of that particular level. For example, the ICT infrastructure and resources in schools are situated within the context of the national ICT in education plans and policies, and serve as the context for teaching and learning pedagogies in the classrooms. The ease of access to ICT infrastructure and resources provide the necessary condition for ICT-mediated teaching and learning pedagogies to be transformed. At the same time, the ease of access to ICT infrastructure and resources may be due to a highly developed set of national ICT in education plans and policies. As the pedagogies in the classrooms are transformed, there may be a higher demand from teachers for better ICT infrastructure and resources; this then provides feedback to the Ministry of Education which may revise and refine its national ICT in education plans and policies. Such a perspective provides a more holistic account of ICT in education among the SEAMEO Member Countries in this report.



During the workshop in June 2009, the countries were encouraged to submit best practices of ICT in education projects to be incorporated in this report. These best practices are presented in the discussion of the dimensions to provide concrete examples of how an ICT in education dimension or a set of dimensions transform classroom and school practices, and as a result, impact students' learning outcomes. These best practices also provide a good springboard for the SEAMEO Member Countries to share their lessons learnt as they scaffold one another's ICT in education journey. The detailed write-ups of the best practices submitted by the countries are in the appendices and they are presented without editing from the SEAMEO secretariat.

## 1. National ICT in Education Vision

The establishment of a shared ICT in education vision and its underlying philosophy provide policy makers, education leaders and educators with a vehicle for coherent communication about how ICT may be effectively used for teaching, learning and administration; more importantly, it provides the ICT in education plans and policies with coherence, direction and meaning and has the potential to drive changes in culture, policies and practices mediated by ICT (Hew & Brush, 2007). Group 3 countries are in either the emerging or applying stage of this dimension. In Lao PDR and Timor Leste, there is the recognition of ICT as an increasingly crucial tool for education by the government, but there is no national ICT in education vision. In Cambodia and Myanmar, there is a national ICT in education vision, but the vision focuses on the use of ICT to support existing culture, policies and practices to broaden the access and improve the quality of education.



Group 1 and 2 countries are in the infusing and transforming stage of this dimension, and most countries are in the transforming stage or moving towards the transforming stage. For example, the ICT in education vision for Brunei in 2001 is “transforming Brunei Darussalam to a more knowledgeable, thoughtful, multi-skilled, competitive and smart nation”. Such a vision drives changes in educational culture, policies and practices mediated by ICT. Within this dimension, only Malaysia and Singapore are in the transforming stage where the vision is of exemplary quality and is being studied and emulated by other countries. For example, the Smart School concept translated from Malaysia's Vision 2020 has been emulated in various countries in the region and Middle East. Moreover, the national ICT in education vision of both Malaysia and Singapore is reviewed every three to five years for timely response to educational and socio-economical needs. The third ICT in Education Master Plan in Singapore represents a continuum and fine-tuning of the vision of the first two master plans, which is to “enrich and transform the learning environment of our students and equip them with the critical competencies and dispositions to succeed in a knowledge-based economy”.

## 2. National ICT in Education Plans and Policies

The implementation of ICT in education strategies has to be guided by a strategically developed national ICT in education plan. It is a complex task, requiring careful planning, consultations with various stakeholders and financial resources. It also requires understanding of various socio-cultural-historical aspects of the system, current and emerging technologies, and global trends and developments (Glennan & Melmed, 1996; Lim, & Hung, 2003). Of the 11 SEAMEO Member Countries, only Lao PDR and Timor Leste do not have an existing national ICT in education plan or policy. All Group 1 countries and Vietnam are in the transforming stage where their national ICT in education plans and policies are integral to their overall education development or improvement plan and all aspects of ICT in education funding are integral to the overall education budget. In Vietnam, the latest national ICT in education directive (2008-2012) includes the following policies and plans: enhancing academic leadership understanding of ICT in education, setting up an ICT division in every education organisation, developing online education networks and services, strengthening the use of ICT in teaching, learning and management, fostering domestic and international partnerships, enhancing professional development for educators and building the capacity for evaluation and research in ICT in education. The key themes of these plans and policies are access to ICT infrastructure, tools and resources, curriculum and assessment, professional development of educators, evaluation and research, partnerships, and education leadership. These themes are also evident in the Group 1 countries where the funding is mostly by the federal government with financial and in-kind contributions from industry partners. In Singapore, schools have been given greater autonomy in the management of these financial resources since 2004 where ICT funds are devolved to schools based on their annual ICT plans that they submit annually to the Ministry of Education. This has brought about better utilisation of funds and deployment of resources, as well as greater ownership of ICT implementation in schools.

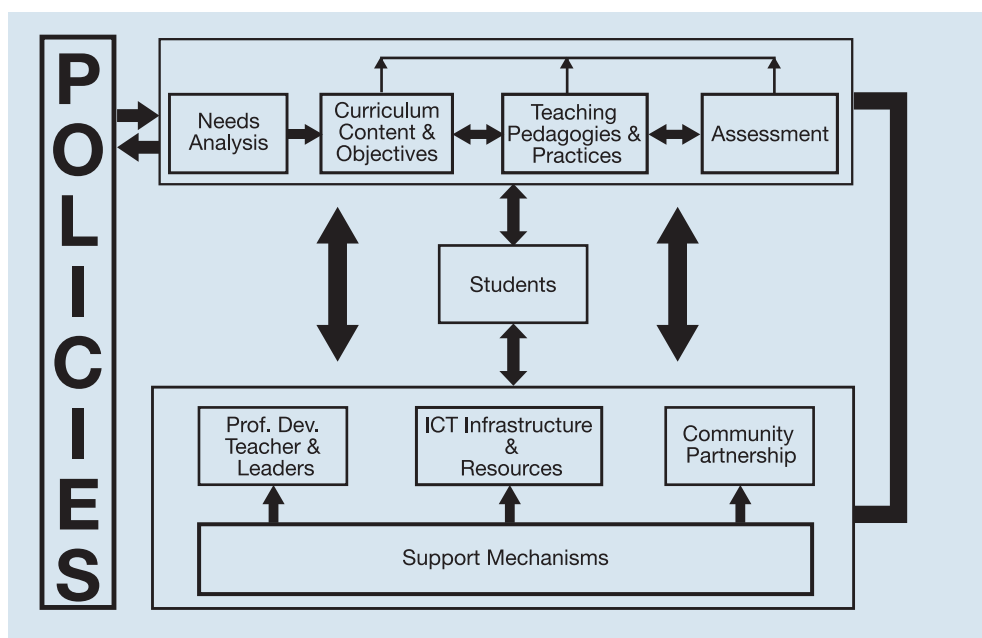


The rest of the Group 2 countries are in the infusing stage while the Group 3 countries are in the applying and emerging stage of this dimension. Thailand, one of the Group 2 countries, has a new Educational IT Master Plan (2007-2011) that is based around three key strands for ICT enabled transformations in education: quality of learning, educational management and quality of ICT graduates. Although many of the key themes discussed in the previous paragraph exist in Thailand's ICT in education plans and policies, the focus of these plans and policies are ICT-driven. For example, the development and distribution of e-learning resources to teachers; the development of ICT capacity to support Thailand's economic growth; and the expectation of graduates from education institutions to have a good standard of ICT knowledge and literacy.



There are two major differences between Group 2 and Group 3 countries within this dimension: (1) the national ICT in education plans and policies in Group 3 countries are more focused than Group 2 countries on providing schools and education institutions access to ICT infrastructure, tools and resource; and (2) the national ICT in education plans and policies in Group 3 countries are mainly managed by an ICT-specialist unit rather than an education unit. For example, Cambodia's ICT in education plans and policies are mainly managed by its National Communication Technology Development Authority while those in the Philippines are mainly managed by the Department of Education. At the same time, most of the efforts in Cambodia have been focused on providing access to ICT for all teachers and students in order to reduce the digital divide in Cambodia and between Cambodian schools and other schools in the region; while the efforts in the Philippines are more distributed among the professional development of teachers and leaders, access to ICT infrastructure and resources and development of community partnerships. A conceptual framework guides the formulation of the ICT in education policies under the ICT for Education (ICT4E) Strategic Plan for elementary schools in the Philippines. This framework is shown in Figure 1.

**Figure 1: Conceptual Framework of Philippines' ICT4E Strategic Plan for Elementary Schools**



Although Cambodia and Myanmar are categorised as Group 3 countries, they are well ahead of Lao PDR and Timor Leste with respect to the national ICT in education plans and policies dimension. Cambodia and Myanmar are in the applying stage of this dimension and have been working towards the infusing stage by adopting a more holistic approach towards their national ICT in education plans and policies. The Cambodian Ministry of Education, Youth and Sport, for example, has tapped its Open Schools Programme (OSP) to develop its Master Plan for ICT in Education. In this Master Plan, it has not only focused on the provision of access to ICT infrastructure and resources, but also the professional development of teachers and school leaders and partnerships with private and public organisations. OSP started as a joint initiative between the Ministry of Education, Youth and Sport and the NGO Open Institute to improve the quality of education through the use of ICT. Details of the Open Schools Programme and the Master Plan for ICT in Education of Cambodia are presented in **Appendix II**.

### 3. Complementary National ICT and Education Policies

The education system and policy support in the areas of budget, curriculum, professional development and research may facilitate or hinder the launching of a country's ICT in education policies or plans, as well as their sustainability and scalability in the future. The national ICT infrastructure (connectivity and accessibility) may also affect the implementation of ICT in education policies and plans. All these elements are within a larger environmental context that may include the need to develop a competitive workforce - regionally and globally, the economic cycle that a country or the world is undergoing, economic policies (budget cuts or expansionary fiscal policies), political and social stability, the bureaucracy of the system, and so on. The discussion in this section focuses on the dimension of complementary national ICT and education policies to the ICT in education policies and plans. A well-planned and responsive education and ICT system provides an appropriate enabling environment for the successful implementation of ICT in education policies and plans.

Group 1 countries and Vietnam are in the transforming stage of this dimension where the national ICT and education policies complement, support and are supported by the ICT in education policies and plans. In Malaysia, the national ICT master plan and Vision 2020 (which envisions the country's longer term development) acknowledge the transformation of its education system to be fundamental in achieving its objectives; and it is the government's belief that ICT can revolutionise education and learning. Based on the goals of Vision 2020, the national education policies are driven by the mission statement formalised by the Ministry of Education: "To develop a world class quality education system which will realise the full potential of the individual and fulfil the aspirations of the Malaysian nation". These education policies together with the establishment of the Multimedia Super Corridor and formulation of the National ICT Agenda have provided the necessary and sufficient conditions for effective integration of ICT in education; and the at same time, the ICT in education policies and plans are supporting the national education and ICT policies.



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The rest of the Group 2 countries are in the infusing stage and the Group 3 countries are in the emerging and applying stages of this dimension. Lao PDR and Timor Leste do not have an existing ICT in education plan and hence, are at the emerging stage. Cambodia and Myanmar are at the applying stage where there are some linkages between the ICT in education policies and plans, and the national ICT and education policies. However, most of these linkages are ICT-driven rather than education-driven. In Myanmar, computer universities and colleges have been established to run Bachelor, Diploma, Master and PhD programmes in ICT and efforts have been focused on improving ICT literacy. These ICT development efforts in education have been very driven by the two ICT Master Plans prepared by the Myanmar Computer Federation. The other Group 2 countries, Indonesia, Philippines and Thailand, have most of their ICT in education policies and plans complementing the national ICT and education policies. However, just like the Group 3 countries, many of the ICT in education policies and plans are ICT-driven. In Indonesia, E-Education is one of the flagships of the National ICT Council formed in 2006. Although the Centre of ICT for Education (or Pustekkom) was set up in the Ministry of National Education (MONE), its focus is to plan, provide and maintain the ICT infrastructure for the Ministry. This is evident in Pustekkom's ICT Master Plan in 2008 which describes the three functions of the plan as: "a reference for ICT governance; a reference for selecting priorities in ICT investments in MONE; a term of reference for ICT projects in MONE".

#### 4. ICT Infrastructure and Resources in Schools

Access to ICT infrastructure and resources in schools is a necessary condition to the integration of ICT in education (Plomp, Anderson, Law, & Quale, 2009). Setting up schools' ICT infrastructure requires consideration of available physical infrastructure (e.g., rooms for servers, computer rooms, placing of cables and network points, positioning of wireless hubs, electricity supply points), human resources to set up and maintain this infrastructure, and availability of financial resources to support the setting up and maintenance. The ICT infrastructure in schools has to be designed to allow for expansion and changes in response to ICT developments and educational needs. Moreover, schools need access to ICT resources to mediate teaching and learning, not just in the classroom and school environment, but anywhere and anytime. All Group 1 countries and two Group 2 countries, Thailand and Vietnam, are in the transforming stage of this dimension where there is whole school learning with ICT and access to a wide range of emerging ICT infrastructure and resources and a diverse set of learning environments. However, due to the differences in socio-economic development in different areas within a country, some areas in Malaysia, Thailand and Vietnam are in the infusing stage of access to ICT infrastructure and resources in their schools.



In Singapore, one of the Group 1 countries, all schools have computer laboratories and ICT resource rooms. All classrooms, special rooms and libraries in these schools are equipped with LCD projectors and visualisers with school-wide networking. The network allows internet access in all teaching and learning areas in the school, and also facilitates the sharing of teaching and learning resources within and between schools by teachers and students. The teachers share their self-created ICT resources with their peers through iSHARE, a content management system, and use these ICT resources in the learning management system for their students. There is also a central student data administration system, School Cockpit, which manages student data, stores and processes assessment results, facilitates administrative processes such as tracking students' attendance, and monitors teachers' submission of weekly lesson planning records. Schools in Singapore also have access to technical support that include a technology assistant, and in many cases, an ICT executive who oversees the ICT infrastructure of the school and manages its ICT-related projects.



The Group 2 and 3 countries are all in the emerging and applying stages of this dimension. Most of the Group 3 countries except for Myanmar are in the emerging stage. The school infrastructure in Timor Leste and Lao PDR is very basic with most schools having at least six classrooms, toilets and play areas. ICT resources are non-existent in the majority of these schools, especially those based in Timor Leste. Most parts of the country have no more than three hours access to electricity per day and most schools traditionally have been running on petrol-based generators. These generators are in the process of being replaced by solar power generators and may serve as a good starting point for using ICT in schools. Many schools in the more remote parts of Cambodia, Indonesia and Philippines also face similar challenge of accessing electricity.

Although Indonesia has an integrated system consisting of two big ICT infrastructures in the Ministry of National Education – JARDIKNAS (Indonesian Education Network) and INHERENT (Indonesian Higher Education Network) which is a sub-network of JARDIKNAS, the access to ICT infrastructure and resources in schools is still low; and hence, most Indonesian schools are either in the emerging or applying stage. Despite Indonesian schools being in these beginning stages, E-dukasi.net is a best practice programme to be highlighted in this dimension. e-dukasi.net was initiated in 2003 to provide students and teachers in Indonesia with rich and engaging learning resources. It was then integrated into JARDIKNAS when the latter was set up. Details of the programme are presented in

**Appendix III.** In the case of Timor Leste, although there is no or limited access to ICT infrastructure and resources in schools, it has made a very important first step towards ICT in education by developing its Education Management Information System (EMIS). Data is collected from schools and verified at the School Cluster Centres and District Offices before it is entered into a computer-based Education Management Information System in the Ministry of Education in Dili. The data are required for long-term planning, monitoring and evaluation, and operational management of the education system and, hence, it is imperative that the data are valid, reliable, comprehensive and timely. Details of the EMIS are presented in **Appendix IV.**



## 5. Professional Development for Teachers and School Leaders

Teachers in the ICT-mediated learning environments have to take on the more demanding role of mediator and knowledge broker: to provide guidance, strategic support, and assistance to help students at all levels to assume increasing responsibility for their own learning. At the same time, school leaders need to be acquainted with the art and science of ICT integration in order to support the teachers in their schools. The challenge then for professional development programmes is to prepare teachers and school leaders who are open to new ideas, new practices and ICT, to learn how to learn, unlearn and relearn, and to understand and accept the need for change. Professional development is “the sum total of formal and informal learning experiences throughout one’s career from pre-service teacher education to retirement” (Fullan & Steigelbauer, 1991, p.326) and includes the support for teachers and school leaders to examine and transform their own practice based on their evolving understanding of teaching and learning (Davies, Edwards, Gannon & Laws, 2007).

Only Brunei and Singapore assessed themselves to be in the transforming stage of this dimension where the focus of the professional development is learning and management of learning. In its newest Master Plan for ICT in Education, one of Singapore's strategies is to provide differentiated professional development that is more practice-based and needs-driven. The Ministry of Education has been offering customised professional development programmes to meet schools' needs since the implementation of the previous master plan in 2004. These programmes are in the form of school-based face-to-face workshops, attachment of ICT in education master teachers to schools, and collaborative problem-solving of ICT in education issues. To build the capacity of school leaders in ICT planning and integration, consultancy teams from the ministry conduct ICT planning sessions and train the leaders in the use of BY(i)TES, a self-assessment tool for monitoring ICT implementation in schools. More importantly, professional development is managed at three different levels: system, school and individual. Nationally, the learning framework for school leaders and teachers informs and guides their professional development journey. Milestone courses are conducted for school leaders and teachers at pre-service and in-service phases. At the school level, the school staff developer works with the school leaders to plan for ICT-related professional development for staff and ensure it is aligned with the school strategic and ICT Plan. At the individual level, a professional development guide is provided for teachers and school leaders to identify their learning needs in the area of ICT. An individual professional development roadmap is then constructed that may include attending courses and seminars, mentoring, and just-in-time learning. Teachers may also join Learning Circles or learning communities to further their professional learning.



Brunei's professional development of teachers and school leaders is under the human capacity building programme of the E-Education project launched in 2003. The programme has become more needs-driven over the years and many schools in Brunei have started to work with teachers to manage their own professional development trajectory and organise in-house training for the teachers. One best practice example of an in-house professional development programme is in Dato Marsal Primary School. The programme has been developed based on the ICT in education needs of the teachers and leaders in the school and organised by the school's ICT specialised teacher once a week. The programme started in 2004 with the development of basic ICT competencies and has been sustained to date with a greater focus on the development of competencies to integrate ICT in the individual subject and inter-disciplinary subject classrooms. Although the programme is still organised by the ICT specialised teacher, the sessions in the programme are run by different teachers in the school and sometimes by teachers from other schools and experts from industry, university or ministry.

**Appendix V** provides details of the in-house professional development programme of the school. The professional development programmes in Brunei and Singapore have many of the key characteristics of effective professional development programmes as highlighted by research studies: longer duration (often with follow-up activities), meaningful and relevant activities for teachers' own contexts, access to ICT in teaching and learning, and collaboration and community building (Lawless & Pellegrino, 2007).

The group 2 countries except for Indonesia are in the infusing stage together with Malaysia. Unlike Brunei and Singapore, the professional development programmes are less needs-driven and there is no or a lack of teachers' management of their own professional development. In the Philippines, more professional development workshops organised by the Department of Education are focusing on the integration of ICT in specific subject areas. Many of these workshops are co-organised with industry partners such as INTEL, Microsoft, British Council and Oracle Foundation. However, like Malaysia, Thailand and Vietnam, the teachers and school leaders are not empowered to manage their own professional development journey. For Cambodia, Indonesia and Myanmar, they are in the applying stage of this dimension where the focus of most of their professional development programmes is basic ICT competencies. In Myanmar, there have been efforts to shift these programmes towards the development of integrating ICT in education competencies. However, these programmes have not been integrated into mainstream professional development of teachers. For example, the Postgraduate Diploma in Multimedia Arts has been initiated at the two institutes of education in Myanmar to develop the competencies of basic education teachers to apply ICT in their teaching and manage the multimedia classrooms in their schools. This programme, however, is not part of the Postgraduate Diploma in Teaching. As a result, there may be a lower expectation of the graduate teachers from the latter programme to integrate ICT in their schools. In Lao PDR and Timor Leste, these programmes are still lacking or even non-existent in many parts of the country.



## 6. Community/Partnerships

Globalisation is a complex and multidimensional phenomenon that has become a part of everyday life that complicates local, national and global boundaries and creates tension between local and global dynamics (Davies, 2006; Torres, 2002). In light of such a phenomenon and its associated challenges, learning for engagement has to provide students with opportunities to critically examine local and global issues and act upon them. ICT affords such engagements by bringing the learning experiences of the students beyond the four walls of the classroom. Schools may then start engaging local and global communities, facilitated by ICT, and make such engagements integral parts of their curriculum and assessment. At the same time, there is growing belief that no one sector can effectively bring together the resources and capability to address or resolve the social and development issues we are facing (Googins & Rochlin, 2000; Tennyson, 2003). Public-private partnerships (PPP) as possible mechanisms for developing and sustaining public infrastructure and services have created growing interest from governments around the world (Moore, 2005). It focuses on the shared responsibility of both the public and private sectors towards the provision and maintenance of infrastructure and services for the general population.

Malaysia and Singapore are at the transforming stage of this dimension where schools actively engage the local and global communities virtually and face-to-face, and they develop partnerships with both public and private organisations. In Malaysia, the Ministry of Education has developed smart industry partnerships to enhance the impact of ICT in education. For example, it works with Oracle Corporation Think.com in 822 schools for four years from 2006 to 2010, Intel Corporation on Classmate PC in 300 schools in 2009, VDSL in Terengganu Cyber School Project, and Maxis Corporation's Cyberkids Camp in 1,270 schools for 2,436 teachers and 4,925 students in 2007. In 2009, the Ministry of Education also built the capacity of 39 community colleges to promote lifelong learning in their local community. In Singapore, community partnership is part of the School Excellence framework for all schools. Schools frequently enlist the support of their Parent Support Group and alumni for their school programmes such as setting up and maintaining school servers, learning portals, websites, and conducting training for students and other stakeholders in areas like ICT skills training and cyber safety. Schools also work with and in the community as part of their learning programme for students. For example, in Crescent Girls School, students use a virtual platform to provide online English tutoring to children from the Jamiyah Children's Home, and in Victoria School, students create an online Science portal to help primary students from needy households to prepare for their Primary School Leaving Examination.

Most of the Group 2 countries except for Indonesia are in the infusing stage. The main differences between the transforming and infusing stage in this dimension are the concept of the school as a learning resource for the community and the types of partnerships. The examples of Malaysia and Singapore have shown how schools serve as a learning resource for parents and families, and their local communities. Such a role for the school is less prevalent, and in some areas non-existent, in Philippines, Thailand and Vietnam. Many of the partnerships by the schools and Ministries of Education with public and private organisations in these three countries tend to be donor-beneficiary. For example, in Vietnam, the Internet broadband connection to all schools is donated by the Military Telecom Viettel indefinitely and Daulsoft (a Korean-based company) donates an eLearning management environment for all schools.



In Thailand, the Ministry of Education has been setting up partnerships with various private and public organisations – school-university, public-private, inter-ministerial and international partnerships. However, ICT-mediated engagement of schools with the local and global communities is still low as compared to Malaysia and Singapore which are in the transforming stage of this dimension. Brunei, Cambodia, Indonesia and Myanmar are in the applying stage of this dimension, and Lao PDR and Timor Leste in the emerging stage. The main differences between these three stages are the quality and quantity of partnerships and community engagements.



**Appendix VI** presents a best practice case study of a public-private partnership between Intel, the Department of Education and the Foundation for Information Technology Education in the Philippines, and its significant impacts on students' learning outcomes and classroom practices. **Appendix VII** presents another public-private partnership best practice in Thailand about the Distance Learning Foundation (DLF) project to broadcast education TV programmes via satellite and Internet ([www.dlf.ac.th](http://www.dlf.ac.th)) through 15 channels. The project started with an initial funding of 50 million baht by His Majesty the King and was established by DLF in cooperation with the Ministry of Education, the TOT Corporation Public Company Limited, the Ministry of Foreign Affairs and international organisations under the aegis of the United Nations. The project documents its teaching and learning tasks and activities, and their impacts on students' learning outcomes and classroom and school practices. There is now another project, eDLTV, an Information Technology Project under Her Royal Highness Princess Sirindhorn that brings the content, activities, worksheets, and presentation files online. They are being categorized according to subject and may also be accessed offline. **Appendix VIII** presents a different type of partnership from the previous two cases of best practices, one that involves government agencies and universities. It shows how the Ministry of Education in Myanmar involves other government agencies and universities to develop and implement its ICT in education plans and policies.

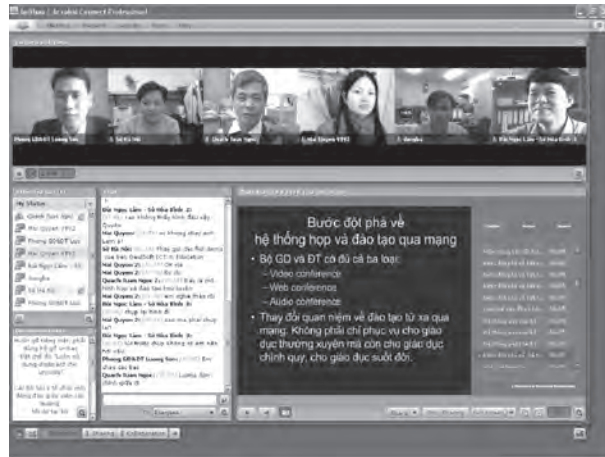
## 7. ICT in the National Curriculum

The discussion in this report so far has emphasised that the study of ICT in education cannot be isolated from the learning environment in which it is situated. ICT may trigger changes in the activities, curriculum and interpersonal relationships in the learning environment, and is reciprocally affected by the very changes it causes (Lim, 2007). Case studies from the 11 SEAMEO Member Countries suggest that ICT has not been radically incorporated in a systematic way into current curricular offerings. None of the 11 SEAMEO Member Countries assessed themselves in the transforming stage, although there is a growing trend to gradually introduce ICT in selected subjects, such as science, mathematics and languages. All Group 1 countries and Vietnam are in the infusing stage of this dimension. In these countries, ICT is integrated into all subject areas and is perceived as one of the key enablers to engage students in their learning. These countries are not at the transforming stage yet because ICT is still considered as a tool rather than a pedagogical agent. ICT has been used as a visualisation, data-gathering and analysis tool in problem-based learning at both elementary schools and high schools in these countries. ICT has also been used in inter-disciplinary project work as a productivity, presentation, research and collaboration tool. More schools are adopting learning management systems as platforms for independent and self-paced learning. In Vietnam, the localised version of Moodle is the most popular learning management system used in schools. Figure 2 is an example of a teaching and learning website constructed by a high school teacher to teach Mathematics. The Ministry of Education and Training (MOET) in Vietnam has also localised Adobe Connect Pro to facilitate professional development and meetings with schools via web-conferencing. Figure 3 is an example of an online meeting between the MOET and schools.

Figure 2: Learning and Teaching Mathematics using the Vietnamese Version of Moodle



**Figure 3: Online Meeting and Teaching through Education Network (Virtual Classroom)**



Indonesia, Myanmar, Philippines and Thailand are in the applying stage of this dimension where ICT is used only in discrete subjects and most of the use of ICT is within the ICT unit or course. For example, in Thailand, the use of ICT in schools is mainly in the Career and Technology course. This course is offered as an elective in primary schools but a core in secondary schools. The Career and Technology course includes developing the students ICT competencies in office applications, web design, and database programming. However, ICT-mediated teaching and learning of other courses is still low. In Indonesia and Myanmar, the situation is very similar where the ICT laboratories are often used to teach ICT competencies and very rarely used to teach other subjects. All Group 3 countries except for Myanmar are in the emerging stage where ICT literacy development may or may not be part of the national curriculum. In Timor Leste and Lao PDR, ICT literacy development is not part of the national curriculum. Only those schools in pilot projects have some basic ICT application training for both students and teachers. For example, in Lao PDR, three upper secondary schools (Santipab High School in Lauang Prabang province, Chanthabuly High School in the capital Vientiane, and Xonpao High School in Savannakhet province) are in the SchoolNet project overseen by UNESCO and three high schools (Vientiane, Savannakhet and Pakse High School) are involved in the World Links project. In Cambodia, the Ministry of Education, Youth and Sport is planning to introduce ICT literacy development as a core course in the national curriculum.

## 8. Teaching and Learning Pedagogies

ICT provides opportunities for teachers to support students in their own constructive thinking, allows them to transcend their cognitive limitations, and engages them in cognitive operations that they may not have been capable of otherwise (Chai & Lee, 2006). When such students' thinking processes are supported by ICT in a school, the school is considered to be at the transforming stage of ICT-mediated teaching and learning pedagogies. The pedagogies adopted by teachers at this stage are situated in the constructivist paradigm where learning is perceived as an active construction and reconstruction of knowledge, and teaching as a process of guiding and facilitating students in the process of knowledge construction individually and collaboratively. Constructivist pedagogical strategies include problem-based, project-based, collaborative-based and case-based learning.

For example, to support students in building their structural knowledge about a topic in a discipline through problem-based learning, a teacher may first task students with generating sub-problems from the main problem presented using a concept mapping ICT application. Such applications are revisable and students may create and link as many maps as they perceive necessary.

These ICT-mediated teaching and learning pedagogies are contrasted with the ones in the emerging or applying stage where the latter are situated in the traditional paradigm. In this paradigm, teaching is perceived as a didactic way of disseminating information to students and learning as a passive activity, with students doing minimal task management or holding little responsibility for their own learning. It should be noted that traditional and constructivist teaching and learning pedagogies are not to be treated as a dichotomy; the stance of this report is that the opportunities of supporting students in the process of knowledge construction provided by ICT are often not taken up in Southeast Asian schools. And hence, only a small number of these schools are in the transforming stage of this dimension.

Although Malaysia, Singapore and Vietnam are in the transforming stage for some of their schools, most of the schools in Singapore and Vietnam are in the infusing stage and in Malaysia, the applying and infusing stages. The spread across different stages may be due to the differences in the access to ICT infrastructure and resources (especially between urban and rural schools, and also among states or provinces), the school culture and leadership, and the teachers as main gatekeepers of the classrooms. For the schools in the transforming stage, ICT is used as a tool to enhance learning processes to meet both curricular and 21<sup>st</sup> century learning outcomes. 21<sup>st</sup> century learning outcomes include the ability to search for and analyse information, solve problems, communicate and collaborate (Bereiter & Scardamalia, 2006).

In Singapore, most of the ICT competencies are learnt just-in-time by the students in the context of researching for a curricular topic or inter-disciplinary project. In Malaysia, critical thinking, multiple intelligence and values will be integrated across all curriculum standards in 2011 with ICT playing a pivotal role. **Appendix IX** presents the best practice case study of the Malaysian i-Learn programme. The project was started in 2007 to support teachers in integrating ICT into active teaching and learning activities with appropriate pedagogical practices. **Appendix X** documents the best practice case study of an ICT-based Chinese language teaching project in Singapore. The project was initiated by its Ministry of Education based on an ICT-based Chinese language teaching model developed by a professor at Beijing Normal University. The focus is on student-centred ICT-mediated teaching and learning to complement the traditional teaching approach to support students in playing a more active role in their own learning. The case study also shows how such a project may be scaled up to other schools in Singapore.



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Schools in Brunei, some parts of Indonesia, Malaysia, Singapore, Thailand and Vietnam, and Philippines are in the infusing stage where ICT-mediated teaching and learning pedagogies are student-centred and may involve collaborative learning. Most of the schools in Brunei are still at the infusing stage of ICT-mediated teaching and learning pedagogies, but the move by its Ministry of Education towards the integration of 21<sup>st</sup> century skills for the holistic development of the students will see its schools moving towards the transforming stage. **Appendix XI** is a best practice example of such a shift in ICT-mediated teaching and learning pedagogies in a Bruneian School. It describes how Rimba Primary School integrates ICT in pre-school phonic teaching to improve students' reading and ICT competencies. Although the Philippines assessed some of its schools to be at the infusing stage of teaching and learning pedagogies, it observes that "only a meagre number of teachers have been observed to be competent in applying these methodologies" despite these "methodologies" being a strategic thrust of the ICT4E- SP.

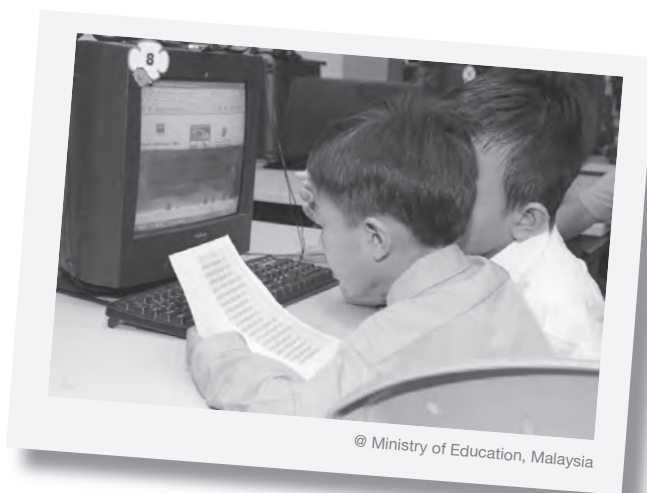


Indonesia observes that there is only some use of student-centred ICT-mediated teaching and learning pedagogies in the international standard schools. The schools in the rest of the countries and the rest of the areas in Indonesia, Malaysia, Thailand and Vietnam are in the emerging and applying stages where most of the ICT-mediated teaching and learning pedagogies are teacher-centred and didactic. The competencies developed are usually at the lower levels of the Bloom's taxonomy such as learning factual knowledge.



## 9. Assessment

Designing assessment is an integral part of curriculum development. Assessments that are not linked to the curriculum are not valid forms of assessment. Moreover, well-designed assessment tasks are pivotal in engaging students in the learning process. Although ICT-mediated learning environments provide opportunities for students' engagement, this engagement may be compromised when teachers, who are accountable for students' results, teach to high-stake national examinations (Hew & Brush, 2007). None of the 11 SEAMEO Member Countries are in the transforming stage of assessment where ICT-mediated learning outcomes are assessed both formatively and summatively, and based on the holistic development of students, including 21<sup>st</sup> century competencies. All Group 1 countries are in the infusing stage of assessment where ICT has been integrated into both national and school-based assessments, but most of the assessments are still dominated by traditional pen and paper assessments. ICT has played a bigger role in the administration of assessment through the management of the question bank to the automated marking of multiple choice questions through the optical mark sheet. However, Malaysia and Singapore are moving towards the transforming stage. The Malaysian Ministry of Education plans to implement school-based holistic assessment with students' digital portfolio in 2011. In Singapore, schools have started to integrate interdisciplinary ICT-mediated project work as a component in the continual assessment. Digital portfolio and peer evaluation are also becoming more common in both primary and secondary schools.



Thailand and Vietnam are in the applying stage of assessment. In Thailand, the main form of ICT-mediated assessment is ICT assessment at the school and national levels. At the school level, the assessment is administered by teachers as both ICT-mediated and paper-based tests for ICT competencies or literacy. For the national level, the Ministry of Education chooses and supports students to participate in the International Olympiad in Informatics Competition. All the group 3 countries, Indonesia and Philippines are in the emerging stage where there are no or very few ICT-mediated assessments. ICT-mediated assessments are almost non-existent among the schools in the Group 1 countries and Philippines except for some schools that are involved in pilot projects. In Indonesia, the competency-based curriculum of 2004 includes a set of ICT competencies for junior and senior high school students. This set of ICT competencies are summatively assessed and may or may not involve the use of ICT, depending on the ICT infrastructure and resources of the school.

## 10. Evaluation and Research

Existing ICT policies and practices need to be regularly audited and evaluated in order to identify areas for improvements and revisions. It is critical that all the key stakeholders of ICT in education are involved in the auditing, identification of gaps and areas for improvements, and revision (Plomp et. al, 2009). In addition, schools will benefit from regular evaluation of teaching and learning for potential relevance, suitability of curriculum content, and appropriateness in terms of dominant pedagogical practices and ICT uses. Regular evaluation of teaching and learning can be administered through processes such as students' evaluation of teaching, classroom observations, teaching staff performance appraisal, and engagements of external reviewers and examiners. Besides this summative evaluation, it may be appropriate and beneficial for formative evaluation of teaching and learning. Formative evaluation enables continuous improvements in teaching and learning as and when relevant areas for improvements are identified. In any case, data and outcomes of evaluation must be carefully considered, and discussions regarding possibilities for revision and improvements in teaching and learning should take place among the main stakeholders of ICT in education.

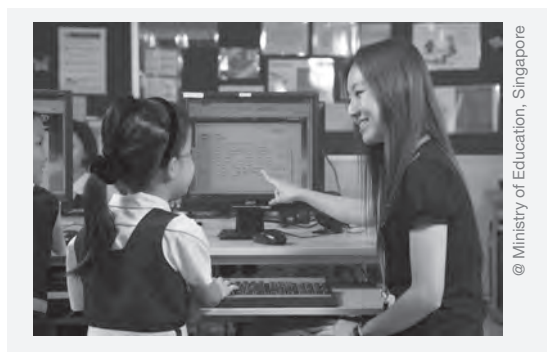
Evaluation is to be distinguished from research where research is best described as the systematic and objective approach to scholarly inquiry that is directed toward a solution of a problem and advancement of human knowledge through development of theories. It utilizes carefully designed procedures that apply rigorous analysis and builds on what is already known about an educational problem and how others have investigated it or similar problems in the field. Roblyer and Knezek (2003) explain that research involving ICT in education should: (a) have a commonly-held, theory-based agenda, (b) deliver findings that provide convincing evidence about how technologies enhance achievement and motivation; and (c) lead to shaping of practice in the field.

Despite the differences between research and evaluation, research activities should be closely linked to processes of auditing and evaluation of a country's ICT in education practices and policies. Research can provide useful data for evaluation, and suggest areas that require attention. Regular and appropriately organised evaluation, as well as subsequent follow-ups on its outcomes, is an important tool for moving the country towards the transforming stage of evaluation and research.



Only Singapore is in the transforming stage of evaluation and research where the evaluation of ICT in education practices and policies is both formative and summative in nature and the research ensure evidence-based policies and practices. The evaluation of ICT in education is carried out at both the school and system level. However, for research of ICT in education, it is carried out mainly at the system level with a third of Singaporean schools involved in practitioner or action research. In addition, the National Institute of Education (NIE) also collaborates with schools to conduct academic research to pilot-test the affordances of ICT in learning and teaching.

In Singapore, the evaluation of ICT in education at the systems level has been undertaken by the Educational Technology Division in the Ministry of Education and the NIE. This is supplemented with a review by an International Review Panel. At the school level, the evaluation of ICT in education is conducted based on the BY(i)TES (Benchmarking Your ICT Practices for Excellence in Schools) tool. This self-assessment tool is developed by the Ministry for schools to gauge the level of their ICT practices and strategise for improvements so as to achieve excellence in the use of ICT for teaching and learning. It focuses on 3 domains, namely: (a) School ICT Leadership, (b) Student Involvement, and (c) Teacher Use. There are four levels of attainment among each domain, which is similar in essence to the Stages of ICT in Education presented in Table 1. For research, there is a research unit in the Educational Technology Division and the Learning Science Lab in the National Institute of Education to conduct ICT in education research at the system level. The latter is engaged in state-of-the-art research studies with its partners to push the boundaries of existing policies and practices.

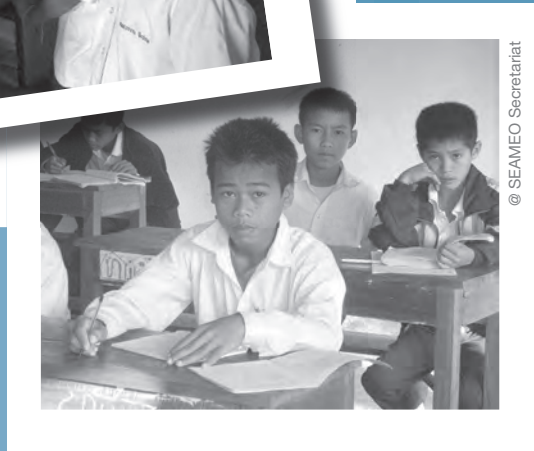


Besides the above mentioned research and evaluation activities, Singapore has recently embarked on the FutureSchools@Singapore Programme. It is situated in the “Learning of the Future” key programme area of the Interactive Digital Media (IDM) in Education funding initiative supported by the National Research Foundation. To date, six schools have been funded to support the learning of the future research theme identified by the Ministry of Education. **Appendix XII** provides a descriptive and interpretive account of this programme and examines its impacts on classroom and school practices and students’ learning outcomes. The account also shows how the intricate link between research and evaluation may be made. Brunei, Malaysia and Vietnam are at the infusing stage of evaluation and research. Although the evaluation of ICT in education is both summative and formative, its research does not serve to push the boundaries of existing policies and practices. Indonesia, Thailand and Myanmar are at the applying stage where the evaluation of ICT in education practices and policies is summative in nature and there is no or a lack of research studies to inform practices and policies. For Cambodia, Lao PDR, Philippines and Timor Leste, they are in the emerging stage with no evaluation and research plan at the system level to inform ICT in education practices and policies.



# Chapter 4

## Conclusion and Emerging Issues



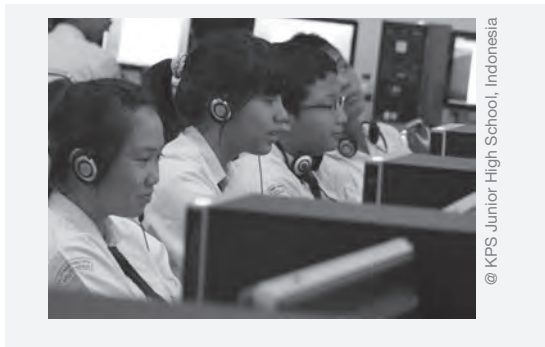
# Chapter 4

## Conclusion and Emerging Issues

The ten dimensions of ICT in education discussed in the previous section have allowed us to document and compare the stages of ICT in education among the 11 SEAMEO Member Countries based on their self-reported case studies. Such a comparative report will inform policymakers, school leaders, and teachers about how to take up the opportunities and address the limitations of ICT, and how to effectively integrate ICT in schools and their broader sociocultural contexts. By drawing upon the similarities and differences of the dimensions that facilitate or hinder the integration process among countries, the report will add to the body of research knowledge and theory about the contexts and factors that contribute to the effective integration of ICT in education.

Some schools among the Group 1 countries are in the transforming stage or moving towards the transforming stage of ICT-mediated teaching and learning pedagogies; these pedagogies are most likely to equip students with a set of competencies to be competitive in the 21<sup>st</sup> century marketplace. For these pedagogies to be implemented in the schools of a country, the other dimensions of ICT in education have to be in the infusing or transforming stage. Singapore is in the transforming stage for all of the dimensions except the ICT in the national curriculum and assessment dimensions. None of the 11 SEAMEO Member Countries have assessed themselves to be in the transforming stage for these two dimensions. Brunei and Malaysia are in the transforming stage for most of the other dimensions except the evaluation and research dimension.

Among the Group 2 countries, only some schools in Vietnam are in the transforming stage of ICT-mediated teaching and learning pedagogies. The rest of the schools in Vietnam and the three countries, Indonesia, Philippines and Thailand, are in the infusing and applying stages with the exception of Indonesia which has schools in the emerging stage. Vietnam has three dimensions of ICT in education in the transforming stage: national ICT in education plans and policies, complementary national ICT and education policies and ICT infrastructure and resources in schools; and these may have provided the necessary and sufficient conditions for some schools to transform their ICT-mediated teaching and learning practices.



For the Group 3 countries, there are some schools in Cambodia and Myanmar that are in the applying stage of ICT-mediated teaching and learning pedagogies; but for the rest of the schools in Cambodia and Myanmar, and all schools in Lao PDR and Timor Leste, they are in the emerging stage.

From the discussion in this comparative report, six issues have emerged for the Ministries of Education of the SEAMEO Member Countries to address as a group and as a country:

1. *Holistic approach towards the development of the national ICT in education plans and policies.*

Effective ICT integration in schools is only possible with policy support. Group 1 countries have demonstrated the importance of adopting a holistic approach towards the development of the national ICT in education plans and policies. Such an approach identifies key pillars that are most likely to support effective ICT integration; they include ICT infrastructure and resources, professional development, curriculum and assessment, and research and evaluation.

2. *Provision of professional development to staff at all levels in the education system with a greater emphasis on the pedagogical aspect of ICT integration.*

Although professional development for teachers exists in most of the SEAMEO Member Countries, there is a lack of professional development for policymakers, school leaders and support staff in the use of ICT for teaching, learning and administration. Moreover, there is a lack of emphasis on the pedagogical aspect of ICT integration in most existing professional development activities. Policymakers and school leaders need to have an intimate understanding of the opportunities provided by ICT for education, and how they can better support teachers in its use. Support staff members, such as the lab technicians, also need to be acquainted with ICT in education to better support teachers in the use of ICT in the classrooms and the school to enhance students' learning outcomes.

3. *Emphasis on ICT in national curriculum and assessment.*

Although all Group 1 and 2 countries are in the transforming and infusing stages of national ICT in education plans and policies and complementary national ICT and education policies, none of them are in the transforming stage of ICT in national curriculum and assessment. With the exception of Vietnam, all Group 2 countries are in the applying stage of ICT in the national curriculum. For the assessment dimension, all Group 2 countries are either in the emerging or applying stage. Highlighting the importance of ICT in national curriculum and assessment will ensure that ICT is a more integral part of the teaching and learning activities in schools.

4. *Sharing and transfer of ICT in education best practices and lessons learnt among SEAMEO Member Countries, and among schools and provinces/states in the country.*

This comparative report has provided an analysis of how the ten dimensions support ICT in education among the 11 SEAMEO Member Countries. It has also provided a set of best practices and lessons learnt that may be used for the development of tools and blueprints to guide ICT in education policy formulation and the implementation of activities to support ICT-mediated teaching, learning and administrative practices. The report may also serve an advocacy instrument to gain the support of policymakers and other stakeholders for the use of resources to ensure the effective integration of ICT in education. The challenge is how these best practices and lessons learnt by each country or group of countries may be shared and transferred to other countries and other parts of the country.

5. *Support of Group 3 countries' ICT in education efforts through partnerships.*

Group 3 countries, especially Lao PDR and Timor Leste, are lagging significantly behind for ICT in education among the SEAMEO Member Countries. Most of the existing ICT programmes in Lao PDR and Cambodia have not gone beyond the pilot phase; and those in Timor Leste are almost non-existent. The challenge is how this group of countries may be supported through partnerships with other countries in the region to improve upon their ICT in education policies and practices.

6. *Planning for evaluation and research of ICT in education.*

This is another dimension that has often been overlooked by some countries. Formative evaluation and research that serves to push the boundaries of existing policies and practices are two areas within the dimension that require more attention. Only Singapore is at the transforming stage of evaluation and research of ICT in education. The challenge then for the other countries, especially Indonesia, Thailand, Philippines and the Group 3 countries, is to plan for both summative and formative evaluation and research of ICT in education to transform ICT-mediated teaching, learning and administrative policies and practices.

As we move further into the 21<sup>st</sup> century, students in Southeast Asian countries must be prepared to meet the future needs of the knowledge-based economy. Students have to learn to seek out new information, think critically, and show initiative to meet the challenges of the fast-changing world. ICT in education offers such teaching and learning opportunities. This report has discussed how the ten dimensions of ICT in education support or fail to support the effective integration of ICT in schools among the 11 SEAMEO Member Countries. This account has emphasised what works and what appears right in a particular setting, and the problems encountered and addressed in a particular situation. The account provides a sample of pedagogical and policy issues that were discussed over the course of writing this report. Like a good guidebook, the account sensitises the audience to what is likely to happen within a particular stage of a dimension. Not only may we understand the various processes within and between dimensions, we may construct policy and pedagogical models of ICT in education based on that understanding.

# Chapter 5

## SEAMEO Centres' Initiatives and Capacities on ICT Integration in Education



## Chapter 5

# SEAMEO Centres' Initiatives and Capacities on ICT Integration in Education

One of the Southeast Asian Ministers of Education Organization (SEAMEO)'s strengths and unique characteristics is the 19 SEAMEO Regional Centres which are located across the Southeast Asian Region. These SEAMEO Regional Centres serve as 'Excellence Centres' in providing human resource development and expertise to enhance the mandate of SEAMEO to promote cooperation in education, science and culture among countries in Southeast Asia.

This chapter is a summary of the SEAMEO Regional Centres' initiatives and capacities which are provided to assist the Member Countries in ICT integration. The initiatives and capacities are explained in the form of ICT integration-related activities which pertain to each centre's mission, programme and training courses based on its area of expertise. The activities include providing infrastructure (computer and hardware), setting up networks, capacity building for education personnel and teachers, providing consultation, and assisting in materials development.



The activities are grouped based on whether they support each of the ten dimensions of ICT in Education which are mentioned in detail in Chapter 1 and included in the reference of this report. The ten dimensions of ICT in Education are 1) national ICT in education vision, 2) national ICT in education plans & policies, 3) complementary national ICT & education policies, 4) ICT infrastructure and resources in schools, 5) professional development for teachers and school leaders, 6) community/partnerships, 7) ICT in the national curriculum, 8) teaching and learning pedagogies, 9) assessment, and 10) evaluation and research.

Table 3 is a summary of the activities under the initiatives and capacities of the SEAMEO Regional Centres supporting the ten dimensions of ICT in Education.

**Table 3: Summary of SEAMEO Centres' Initiatives and Capacities that Support the Ten Dimensions of ICT in Education Integration.**

ICT in Education Dimensions	SEAMEO BIOTROP	SEAMEO CHAT	SEAMEO INNOTECH	SEAMEO RECSAM	SEAMEO RELC	SEAMEO RETRAC	SEAMEO RIHED	SEAMEO SEAMOLEC	SEAMEO SEARCA	SEAMEO TROPED Network	SEAMEO VOCTECH
1. National ICT in Education Vision	-	-	✓	-	-	-	-	-	-	-	✓
2. National ICT in Education Plans & Policies	-	-	✓	-	-	-	-	-	-	-	✓
3. Complementary National ICT & Education Policies	-	-	✓	-	-	-	-	-	-	-	✓
4. ICT Infrastructure & Resources in Schools	-	-	✓	✓	-	-	✓	✓	✓	✓	✓
5. Professional Development for Teachers & School Leaders	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓
6. Community/ Partnership	✓	-	✓	✓	✓	✓	-	✓	✓	✓	✓
7. ICT in the National Curriculum	-	-	-	✓	-	-	-	-	-	✓	✓
8. Teaching & Learning Pedagogies	✓	-	✓	✓	-	✓	✓	✓	✓	✓	✓
9. Assessment	-	-	✓	✓	-	-	-	-	-	-	✓
10. Evaluation & Research	✓	-	✓	✓	✓	✓	-	✓	-	-	✓



Table 4 explains details of SEAMEO Regional Centres' initiatives and capacities on integrating ICT in education in the ten ICT in Education dimensions. Appendix XIII provides details of the centres' initiatives and programmes on integrating ICT in Education.

**Table 4: Details of SEAMEO Centres' Initiatives and Capacities on ICT Integration in Education**

1) National ICT in Education Vision	
<i>SEAMEO Regional Centres</i>	<i>Initiatives and Capacities on ICT Integration in Education</i>
SEAMEO INNOTECH (SEAMEO Regional Centre for Educational Innovation and Technology)	1. Capacity building on developing ICT in Education policies and plans using the UNESCO ICT in Education Toolkit
SEAMEO VOCTECH (SEAMEO Regional Centre for Vocational and Technical Education)	1. Consultation on developing a National ICT Master Plan
2) National ICT in Education Plans & Policies	
<i>SEAMEO Regional Centres</i>	<i>Initiatives and Capacities on ICT Integration in Education</i>
SEAMEO INNOTECH (SEAMEO Regional Centre for Educational Innovation and Technology)	1. Capacity building on developing ICT-in-Education policies and plans using the UNESCO ICT-in-Education Toolkit
SEAMEO VOCTECH (SEAMEO Regional Centre for Vocational and Technical Education)	1. Consultation on planning and developing national policies on ICT in Education
3) Complementary National ICT & Education Policies	
<i>SEAMEO Regional Centres</i>	<i>Initiatives and Capacities on ICT Integration in Education</i>
SEAMEO INNOTECH (SEAMEO Regional Centre for Educational Innovation and Technology)	1. Capacity building on developing ICT-in-Education policies and plans using the UNESCO ICT-in-Education Toolkit
SEAMEO VOCTECH (SEAMEO Regional Centre for Vocational and Technical Education)	1. Consultation on developing guidelines for education providers in ICT Integration in Education
4) ICT Infrastructure & Resources in Schools	
<i>SEAMEO Regional Centres</i>	<i>Initiatives and Capacities on ICT Integration in Education</i>
SEAMEO INNOTECH (SEAMEO Regional Centre for Educational Innovation and Technology)	1. Capacity building on 'Managing Physical Facilities' and 'Managing Financial Resources' (Competency Framework for Southeast Asian School Heads: Blended-mode)
SEAMEO RECSAM (SEAMEO Regional Centre for Education in Science and Mathematics)	1. Consultation/advice specifically pertaining to ICT-related science and mathematics education resources
SEAMEO RIHED (SEAMEO Regional Centre for Higher Education and Development)	1. Higher Education Information and Documentation through SEAMEO RIHED Website



SEAMEO SEAMOLEC (SEAMEO Regional Open Learning Centre)	<ol style="list-style-type: none"> <li>1. SEA EduNet - Open Education Resources Repository and Portal</li> <li>2. Consultation on the Open Distance Learning System</li> </ol>
SEAMEO SEARCHA (SEAMEO Regional Centre for Graduate Study and Research in Agriculture)	<ol style="list-style-type: none"> <li>1. Use of Moodle as an online platform for knowledge on agriculture and natural resource management and solutions exchange among academics; development of multimedia learning materials; and development of relevant learning strategies capitalizing on the ICTs, including web-based platforms for networking; mobile telephony; and digitization of learning materials</li> <li>2. ICT-based science content for academics and other relevant (mostly graduate or policy level) audiences via Biotechnology Information Centre website, Knowledge Centre on Climate Change Adaptations in Agriculture and Natural Resource Management</li> </ol>
SEAMEO TROPMED Network (SEAMEO Regional Tropical Medicine and Public Health Network)	<ol style="list-style-type: none"> <li>1. Provision on basic ICT equipment and resources for HIV/AIDS preventive education in schools</li> <li>2. Development of ICT learning materials for HIV/AIDS preventive education in local languages; Cambodian, Laos, Thai and Vietnamese</li> </ol>
SEAMEO VOCTECH (SEAMEO Regional Centre for Vocational and Technical Education)	<ol style="list-style-type: none"> <li>1. Host and manage the Instructional Design Lab for e-learning system of Ministry of Education, Brunei Darussalam. The Lab is open to all educators in Brunei Darussalam for developing learning-related resources</li> </ol>
<b>5) Professional Development for Teachers &amp; School Leaders</b>	
<b>SEAMEO Regional Centres</b>	<b>Initiatives and Capacities on ICT Integration in Education</b>
SEAMEO BIOTROP (SEAMEO Regional Centre for Tropical Biology)	<p>Capacity building on:</p> <ol style="list-style-type: none"> <li>1. The Use of Geographic Information System (GIS) and Remote Sensing Technology for Natural Resources Management</li> <li>2. Retrieval of Digital Library Documents</li> </ol>
SEAMEO CHAT (SEAMEO Regional Centre for History and Tradition)	<ol style="list-style-type: none"> <li>1. Capacity building for library and information professionals</li> </ol>
SEAMEO INNOTECH (SEAMEO Regional Centre for Educational Innovation and Technology)	<ol style="list-style-type: none"> <li>1. Capacity building on curriculum and instructional leadership, supervision and technology leadership (Blended-mode)</li> <li>2. Capacity building on 'Integrating the Use of ICT in Teaching and Learning' (Competency Framework for Southeast Asian Teachers of the 21st Century: Blended-mode)</li> </ol>
SEAMEO RECSAM (SEAMEO Regional Centre for Education in Science and Mathematics)	<p>Capacity building on:</p> <ol style="list-style-type: none"> <li>1. ICT skills for teachers and school leaders</li> <li>2. Using ICT for science and mathematics education</li> <li>3. Post Graduate Diploma Programme in Science and Mathematics Education which leads to a Masters in Education from Deakin University</li> <li>4. International Computer Driving License (ICDL) Certification</li> </ol>
SEAMEO RELC (SEAMEO Regional Language Centre)	<ol style="list-style-type: none"> <li>1. Three-week Specialist Certificate Courses with a focus on the use of ICT in language teaching and testing</li> </ol>
SEAMEO RETRAC (SEAMEO Regional Training Centre)	<ol style="list-style-type: none"> <li>1. Training on developing interactive lessons with Flash and Power Point</li> <li>2. Training on applying low-cost Interactive Smart Boards for the teaching and learning process</li> </ol>

<b>SEAMEO SEAMOLEC</b> (SEAMEO Regional Open Learning Centre)	<ol style="list-style-type: none"> <li>1. In-service teacher training programme via open and distance learning mode for elementary school teachers (HYLITE Programme)</li> <li>2. Master Degree: Digital Media and Game Technology by Open Distance Learning in collaboration with Bandung Institute of Technology</li> <li>3. Other training programmes such as:             <ul style="list-style-type: none"> <li>- Basic ICT Skills for Teachers</li> <li>- ICT-based Learning Material Design</li> <li>- Web-based Courseware Development</li> <li>- Academic Information System</li> <li>- Digital Media and Game Technology</li> </ul> </li> </ol>
<b>SEAMEO SEARCA</b> (SEAMEO Regional Centre for Graduate Study and Research in Agriculture)	<ol style="list-style-type: none"> <li>1. Use of Moodle as an online platform for knowledge of agriculture and natural resource management and solutions exchange among academics; development of multimedia learning materials; and development of relevant learning strategies capitalizing on the ICTs, including web-based platforms for networking; mobile telephony; and digitization of learning materials</li> <li>2. ICT-based science content for academics and other relevant (mostly graduate or policy level) audiences via Biotechnology Information Centre website, Knowledge Centre on Climate Change Adaptations in Agriculture and Natural Resource Management</li> </ol>
<b>SEAMEO TROPED Network</b> (SEAMEO Regional Tropical Medicine and Public Health Network)	<ol style="list-style-type: none"> <li>1. Train the trainer for instructional design development and use of ICT tools and hands-on production of prototype ICT-based materials for HIV/AIDS preventive education</li> <li>2. Training of classroom teachers implementing preventive education on the use of ICT and development of learner-generated material at the school level</li> </ol>
<b>SEAMEO VOCTECH</b> (SEAMEO Regional Centre for Vocational and Technical Education)	<ol style="list-style-type: none"> <li>1. Provide ICT training and certification such as:             <ul style="list-style-type: none"> <li>- Internet and Computing Core Certification</li> <li>- International Computer Driving License</li> </ul> </li> <li>2. Provide regular and in-country, ICT-related training on:             <ul style="list-style-type: none"> <li>- Managing Teaching and Learning through ICT</li> <li>- Development of Teaching and Learning Materials through ICT</li> <li>- Preparing On-Line Teaching/Learning Materials</li> <li>- Theory and Learning on Online Teaching-Learning in Vocational and Technical Education</li> </ul> </li> </ol>
<b>6) Community/Partnerships</b>	
<b>SEAMEO Regional Centres</b>	<i>Initiatives and Capacities on ICT Integration in Education</i>
<b>SEAMEO BIOTROP</b> (SEAMEO Regional Centre for Tropical Biology)	<ol style="list-style-type: none"> <li>1. Capacity building on the use of basic ICT and information retrieval for community development in Karawang, West Java, Indonesia. The project is in collaboration with Karawang International Industrial City</li> </ol>
<b>SEAMEO INNOTECH</b> (SEAMEO Regional Centre for Educational Innovation and Technology)	<ol style="list-style-type: none"> <li>1. Capacity building on 'Developing School and Community Relations' (Competency Framework for Southeast Asian School Heads: Blended-mode)</li> </ol>
<b>SEAMEO RECSAM</b> (SEAMEO Regional Centre for Education in Science and	<ol style="list-style-type: none"> <li>1. SEAMEO RECSAM has been the Science Across the World (SAW) project coordinator for the Asia Pacific region since 1990 (off-line) and 1998 (on-line) 2004. The SAW programme plays a major role in promoting teaching and learning of science, and more recently, mathematics education via ICT integration. SEAMEO RECSAM can facilitate the use of SAW facilities for its members</li> </ol>

SEAMEO RELC (SEAMEO Regional Language Centre)	1. The centre is currently exploring collaboration with partners in the industry to conduct the necessary research work to develop an English language ICT-based test that will be sensitive to the language needs of learners in SEAMEO Member Countries
SEAMEO RETRAC (SEAMEO Regional Training Centre)	1. A training programme on implementation of low-cost Interactive Smart Boards in disadvantaged areas
SEAMEO SEAMOLEC (SEAMEO Regional Open Learning Centre)	Provide training to communities and schools such as: 1. Computers for Instruction 2. Using ICT and the Internet 3. Wiki for Instruction 4. Web-based Course Development 5. Self-access Study for Teachers
SEAMEO SEARCA (SEAMEO Regional Centre for Graduate Study and Research in Agriculture)	1. Establish networking of graduate fellows and agriculture leaders via online modalities
SEAMEO TROPED Network (SEAMEO Regional Tropical Medicine and Public Health Network)	1. School-community partnership for preventive education by developing a web-based project database
SEAMEO VOCTECH (SEAMEO Regional Centre for Vocational and Technical Education)	1. ICT for Youth Training Workshop on Web Design (This is to promote IT literacy among youth of Brunei)
<b>7) ICT in the National Curriculum</b>	
<b>SEAMEO Regional Centres</b>	<b><i>Initiatives and Capacities on ICT Integration in Education</i></b>
SEAMEO RECSAM (SEAMEO Regional Centre for Education in Science and Mathematics)	1. SEAMEO RECSAM can arrange for its specialists to provide consultancy especially on incorporating ICT into the science and mathematics curriculum
SEAMEO TROPED Network (SEAMEO Regional Tropical Medicine and Public Health Network)	1. Development of regional and national training curricula and manuals in the local language for the use of ICT in HIV/AIDS preventive education
SEAMEO VOCTECH (SEAMEO Regional Centre for Vocational and Technical Education)	The centre has specialists with the expertise in curriculum and ICT. VOCTECH has offered various trainings related to ICT curriculum as follows: 1. Curriculum Development in Vocational and Technical Education and Training (VTET) 2. Competency-based Curriculum in VTET 3. Curriculum Development to Match Industrial Needs and Workplace Requirements

8) Teaching and Learning Pedagogies	
SEAMEO Regional Centres	Initiatives and Capacities on ICT Integration in Education
SEAMEO BIOTROP (SEAMEO Regional Centre for Tropical Biology)	Training programmes on: 1. The Use of Geographic Information System (GIS) and Remote Sensing Technology for Natural Resources Management 2. Techniques for Retrieval of Digital Library Documents
SEAMEO INNOTECH (SEAMEO Regional Centre for Educational Innovation and Technology)	1. Text2teach: Instructional materials development and teacher capacity building in audio/video-enhanced learning in elementary-level mathematics and science 2. eIMPACT: Instructional materials development and teacher capacity building in elementary-level science, mathematics, language and civic education for big class sizes, multigrade classes or for schools with limited teachers 3. Capacity building for teacher education institutions to support the use of ICT for teaching, learning and administration in schools
SEAMEO RECSAM (SEAMEO Regional Centre for Education in Science and Mathematics)	1. SEAMEO RECSAM's training programmes are very focused on ICT-based teaching and learning pedagogies for science and mathematics
SEAMEO RETRAC (SEAMEO Regional Training Centre)	1. Training programmes on new technology-based strategies and techniques in teaching and learning
SEAMEO RIHED (SEAMEO Regional Centre for Higher Education and Development)	1. E-Learning and mobile learning for the M-I-T Student Mobility Programme
SEAMEO SEAMOLEC (SEAMEO Regional Open Learning Centre)	Training programmes on integrating ICT into classrooms to improve teaching and learning processes such as: 1. Computers for Instruction 2. Wiki for Instruction 3. Use of ICT and the Internet for Teaching 4. Learning Material Design 5. Printed/Video Learning Material Development 6. Web-based Courseware Development 7. Test Construction
SEAMEO SEARCA (SEAMEO Regional Centre for Graduate Study and Research in Agriculture)	1. Use of Moodle as an online platform for knowledge of agriculture and natural resource management and solutions exchange among academics; development of multimedia learning materials; and development of relevant learning strategies capitalizing on the ICTs, including web-based platforms for networking; mobile telephony; and digitization of learning materials
SEAMEO TROPED Network (SEAMEO Regional Tropical Medicine and Public Health Network)	1. Training on the use of ICT tools and ICT-based materials for HIV/AIDS preventive education
SEAMEO VOCTECH (SEAMEO Regional Centre for Vocational and Technical Education)	Training programmes on the use of ICT in enhancing teaching and learning pedagogies: 1. Essential ICT Tools for Vocational and Technical Teachers 2. Blended Teaching and Learning in Vocational and Technical Education and Training (VTET) 3. The Use of Open Source Technology in Teaching and Learning in VTET

9) Assessment	
<i>SEAMEO Regional Centres</i>	<i>Initiatives and Capacities on ICT Integration in Education</i>
SEAMEO RECSAM (SEAMEO Regional Centre for Education in Science and Mathematics)	1. Training on ICT-based Assessment for science and mathematics education
SEAMEO VOTTECH (SEAMEO Regional Centre for Vocational and Technical Education)	1. Assessing the use of ICT in education for assessment in vocational and technical education
10) Evaluation and Research	
<i>SEAMEO Regional Centres</i>	<i>Initiatives and Capacities on ICT Integration in Education</i>
SEAMEO BIOTROP (SEAMEO Regional Centre for Tropical Biology)	1. Research on Tropical Biology by implementing the Geographic Information System and remote sensing technology for natural resource management
SEAMEO INNOTECH (SEAMEO Regional Centre for Educational Innovation and Technology)	1. Policy research in ICT use in education 2. Capacity building on “Managing Research and Development (Competency Framework for Southeast Asian School Heads: Blended-mode)
SEAMEO RECSAM (SEAMEO Regional Centre for Education in Science and Mathematics)	1. The centre can arrange for its specialists to provide consultation/advice, specifically pertaining to ICT in science and mathematic education
SEAMEO RELC (SEAMEO Regional Language Centre)	1. Research project to develop a proficiency test through ICT for SEAMEO Member Countries 2. Host research fellows from SEAMEO Member Countries who have an interest in assessment. The participants can be English language specialists, computer intelligence specialists or test data analysts who are able to contribute to the development of the test
SEAMEO RETRAC (SEAMEO Regional Training Centre)	1. Research on the effective use of Interactive Smart Boards in teaching and learning
SEAMEO SEAMOLEC (SEAMEO Regional Open Learning Centre)	Research on exploring, developing evaluating and modifying ICT implementation on Open Distance Learning (ODL) programmes such as: 1. Evaluation of mobile technology-based educational game applications as teaching and learning media for mathematics and English 2. ICT-based ODL modeling implementation for various subjects such as mathematics, statistics, social sciences, applied sciences 3. Advanced development and a tryout model of ICT-based ODL language teaching consortium 4. Instrument development on readiness to study in the ODL system 5. Advanced development on the SEAMOLEC standard of the ODL system in Indonesia and Southeast Asia 6. Evaluation of utilizing comics for online teaching and learning integrated into the school partnership action programme
SEAMEO VOTTECH (SEAMEO Regional Centre for Vocational and Technical Education)	1. The use of ICT at the classroom level in VTET. (The centre is coordinating a study on ICT integration at the vocational and technical schools in SEAMEO Member Countries) 2. Training programmes on research in ICT: - Institutional Research in Vocational and Technical Education and Training (VTET) - Survey Research in VTET - Action Research for VTET Teachers - Quantitative Research in VTET - Qualitative Research in VTET - Applied Research for Decision-Making Policy in VTET System

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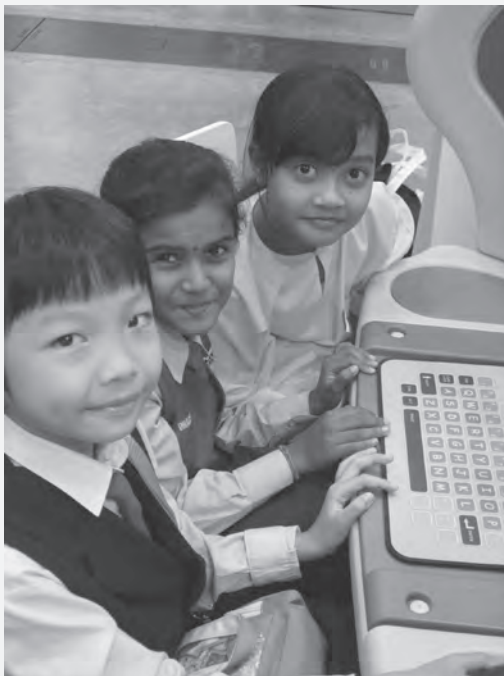
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# Appendices



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# Appendix I

## Guidelines for Case Study Developed by SEAMEO Secretariat and SEAMEO VOCTECH

### Introduction

As a result of the Policy Forum during the 42nd SEAMEO Council Conference in Bali, Indonesia in 2007, the SEAMEO Council tasked the SEAMEO Secretariat to conduct a survey on the state of ICT integration in education in the Southeast Asian region. The survey aims to identify the strengths and capacities of the Southeast Asian countries on integrating ICT in education. It also aims to identify policies on ICT in Education and document best practices. The result of the survey will give the Council opportunity to learn more about the situation on ICT integration in Education in each SEAMEO Member Country.

In response to the assigned task, the SEAMEO Secretariat, together with the SEAMEO Regional Centre for Vocational and Technical Education (SEAMEO VOCTECH) in Brunei Darussalam, has developed a set of guiding questions for each SEAMEO Member Country to prepare a case study to identify the state of ICT integration using the Four Levels of Integration developed by UNESCO. [Please refer to **Appendix I(A)**].

In this connection, the Secretariat requested the Ministry of Education in SEAMEO Member Countries to prepare a country case study for presentation at the Regional Workshop on Integrating ICT in Education in the SEAMEO Member Countries on 2-3 June 2009 in Bangkok Thailand.

### Objectives of Compiling the Case Studies

1. To provide information on the state of ICT in Education, especially in integrating ICT in teaching and learning process
2. To identify the status of ICT integration in Education
3. To point out countries' strengths and capacity in integrating ICT in Education
4. To provide Ministries with updated information on ICT usage in order to assist in future planning for integrating ICT in Education

### Definition

The term '**Information and Communications Technologies (ICT)**' refers to the various technologies, tools and devices that are used to transmit, process, store, create, display, share or exchange information by electronic means. This broad definition of ICT includes technologies such as computers, radio, television, video, CD, DVC, telephone (both fixed line and mobile phones), PDAs, satellite systems, network hardware and software, as well as the equipment and services associated with these technologies, such as video conferencing, e-mail, and blogs.

The term '**Integration of ICT in Education**' refers to the use of various forms of ICT as tools to assist the teaching and learning process. ICT is also used to engage the students in higher order thinking skills such as analytical skill, problem solving skill, inquiry skill, communication skill and collaborative skill.

As a result, students are able to construct the knowledge through the process. For example, teachers use ICT to present information, demonstrate complicated concept and encourage student-centered approach. Students use ICT to search for information, help solve problems, communicate and facilitate the development of in-depth thinking.

## Guidelines in Preparing the Country Case Study

### **Topic:**

The case study should be specific examples from your country policy on ICT in Education, integration of ICT in teaching and learning process, and best practices.

### **Scope of Case Study:**

The case study covers primary, secondary, and vocational and technical education in both public and private schools.

### **Components for Paper and Presentation:**

The case study must include each of the components listed below.

1. Introduction
  - Brief information about country's socio, economic, and demographic information
  - Provide background information about the situation of ICT integration in your country
2. Policy, regulation, and strategies in ICT in Education
  - Does your country have ICT in Education Policy?
  - If so, provide details about the policy on ICT in Education, including strategies, regulations and plan for implementing ICT in Education
  - Is the ICT policy at the national level, institutional level or school level?
  - Which Ministries are involved in implementing the ICT policy in your country?
  - Who implements the ICT policy?
  - To what extent has the policy been implemented?
  - Are there any policies for professional development of education personnel in the use of ICT in Education?
  - Other information as necessary
3. ICT infrastructure
  - Provide information about infrastructure which the related Ministries in your country give to schools
  - Other information as necessary
4. Stage of ICT integration
  - Based on the four levels of UNESCO ICT integration (Appendix 1), please identify the current status of the ICT integration among the schools in your country.
  - Due to the diversity and disparity within the country, please provide the percentage of each school in each level.

- Provide examples of projects, activities which support the level you indicate.
  - How do you assess your country's level of ICT Integration in Education
  - How do school administrators use ICT for their work?
  - How do students use ICT in their learning?
  - How do teachers use ICT in their teaching
  - How is ICT taught in school (as a subject or embedded in the teaching and learning process)?
  - What are the approaches in teaching and learning (teacher-centred or student-centred)?  
Please provide examples.
  - Are there any assessment methods done using ICT?
  - Other information as necessary
5. Conclusion
- Please list issues and challenges in integrating ICT in education in your country.
  - Describe the lessons learned
  - Based on your country experiences in implementing ICT in Education, what are the strengths and weaknesses?
  - Provide specific recommendations for future plans.

### **Scope of Case Study:**

The case study covers primary, secondary, and vocational and technical education in both public and private schools.

### **References:**

1. Please refer to the following documents for further information
  - UNESCO Regional Guidelines on Teacher Development for Pedagogy-Technology Integration
  - The documents can be downloaded at [www.unescobkk.org/education/ict](http://www.unescobkk.org/education/ict) under the "Online Resources".
2. Please include references for your case study.

### **Language:**

The case study must be written in English.

### **Length:**

The case study should be between 10 and 15 pages long.

### **Timeline:**

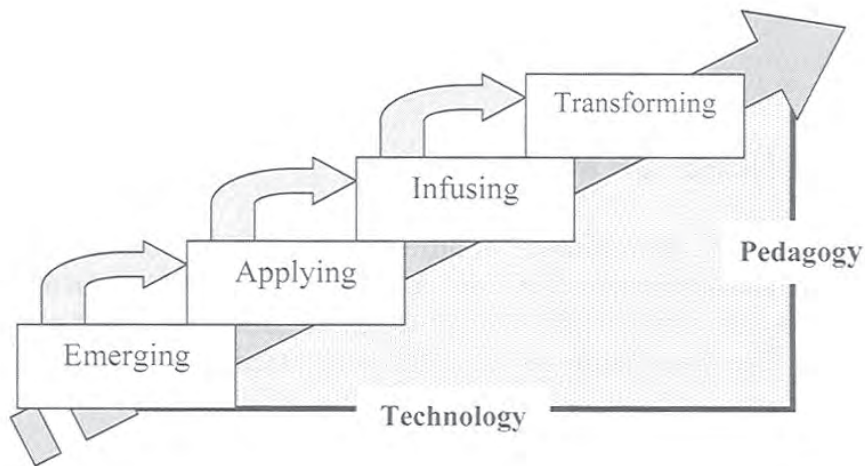
Please submit the case study paper to SEAMEO Secretariat by Tuesday, 26 May 2009.  
(Email: [secretariat@seameo.org](mailto:secretariat@seameo.org))

### **Power Point Presentation at the Workshop:**

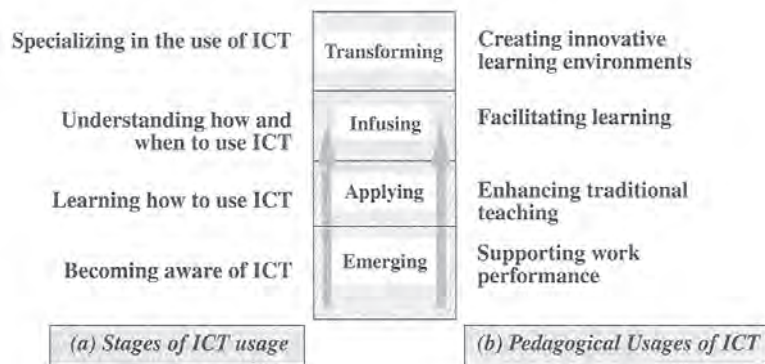
The representative of each country will be given 20 minutes to present the paper using PowerPoint. Your presentation file should be submitted to the SEAMEO Secretariat not later than Friday, 29 May 2009.

# Appendix I(A)

## Stages of ICT Integration in Education



Stage of ICT Development



Mapping the Model

### Reference

Regional Guidelines on Teacher Development for Pedagogy-Technology Integration, UNESCO and Asia-Pacific Programme of Educational Innovation for Development, 2005

# Appendix II

## Best Practice in Cambodia

### Open Schools Programme and the National ICT in Education

#### Plans and Policies

by Im Chhayhieng

Ministry of Education Youth and Sport, Cambodia

## 1. Introduction

Starting in 2007, the Open Schools Programme (OSP) has changed the map of Information and Communication Technology (ICT) in Education in Cambodia. Through this Programme, the Ministry of Education, Youth and Sport has developed a Master Plan for ICT in Education that will ensure efficient, harmonized and equitable development of the use of ICT in Education in Cambodia for the coming five years.

While working on the policy side, OSP has not waited for the approval of the policy to start preparing the ground for future development. It has developed curricula and training materials to teach the use of Khmer language computer programmes in schools, and it has trained the necessary ICT teachers in all upper secondary schools and teacher training centres that have computers for education. It has also started training upper secondary school subject teachers on how to use ICT to improve the quality of the education that they deliver.

Majority of the population does not have sufficient knowledge of a foreign language to use computers that are not in Khmer, the Ministry has given instructions to teach only Khmer language software in its schools, in order to accomplish meaningful learning that can be turned into professional competences. Free software is currently preferred, as it is the only software that is fully translated to Khmer at this time.

On the curriculum side, the Ministry is developing an ICT-based professional Skills curriculum – centered on developing critical-thinking and understanding of the work environment while teaching technical skill – which will replace the pure ICT literacy curriculum presently being used.

The Low Cost Computing Lab for Education of OSP has done research on the type of equipment that is best adapted for schools in Cambodia, with special consideration for running costs that must be funded by the Ministry (electricity and maintenance).

The Open Schools programme started as a joint initiative between the Cambodian Ministry of Education Youth and Sport and the NGO Open Institute for using ICT to improve the quality of Education, while providing ICT-based professional skills for upper secondary school students.

## 2. Context

This section attempts to give a view of the situations of ICT and of Education in Cambodia in 2004, when the project was started. It also gives a quick overview of the state of Free and Open Source at the time. This contextual information is the base for understanding the need for change and the changes that later took place.

## **2.1. ICT Context in Cambodia**

In 2007 Cambodia was consolidating the transformation from a market with few computer users and some small computer shops into a country where the use of computers was starting to become common, creating the opportunity for the establishment of large distributors of computer equipment, some of them addressing only the professional market (high-end servers, etc.). Several ISPs shared the Internet connection market, which did not grow as fast as expected, due to the exorbitant price of international connectivity.

Most of the software being used was proprietary (Microsoft, Adobe, etc.) and in English, easily acquired in markets for a few dollars, without paying any licenses. Nevertheless, Free and Open Source office and Internet applications in Khmer language were already available since 2005, and were quickly becoming popular, with support from the National ICT Development Authority of the Cambodian Government and of a strong local NGO (Open Institute).

Most computers were infected by viruses, as users were not aware of how they could protect their computers and did not have access (did not want to pay for) proprietary anti-virus protection. This led to computer becoming unusable quickly, specifically in government offices.

The government had defined a National ICT policy in 2004, but still was undergoing changes and had not yet been approved. The state of policy and other factors that affected the development of ICT in Cambodia in 2004 are analyzed below.

### **2.1.1 National ICT Policy**

In 2003 the National ICT Development Authority of the Royal government of Cambodia (NiDA) started to develop - with the technical and financial support of the UNDP Asia-Pacific Development Information Programme (UNDP-APDIP)<sup>1</sup> - a National ICT policy. In 2007 the document still was undergoing changes and had not yet been approved. As Education is concerned, the policy insisted on incrementing the use of ICT in Education, preparing the future workforce for jobs that required the use of computers, standardization, the use of Khmer language and the use of Free and Open Source software (FOSS). In particular, it insisted on training teachers on the use of ICT.

UNDP-APDIP (UNDP Asia-Pacific Development Information Programme), was an initiative developed and funded by the United Nations Development Programme (UNDP) covering 42 countries in the region through 24 UNDP country offices. In collaboration with National Governments, APDIP sought to assist national and regional institutions in Asia-Pacific to improve access, knowledge-sharing, networking, and management and application of ICTs for social and economic development. APDIP also helped to target and focus regional ICT initiatives to achieve relevant development goals by making ICT an integral part of development cooperation and solutions, developing countries and their partners in the Asia-Pacific region could work to address economic, social and digital divides in more innovative and effective ways. APDIP focused on the following strategies: mobilizing awareness and support, developing a strategic vision, and assisting on implementation plans. UNDP-APDIP finished its operations at the end of 2007. [www.apdip.net](http://www.apdip.net)

## **2.2 Education Context**

It is important to understand that the present Cambodian Education system was restarted in 1979, after the Khmer Rouge were ousted from Cambodia. By that time, 80% of those who have been teachers before 1975 had been assassinated by a regime that considered them as intellectuals, and therefore unfit for agricultural work. The system was restarted by those who survived, and the first teachers were those who knew how to write.

By 2007 Cambodia had almost 9.000 schools and over 70.000 teachers all over the country. New teachers were coming out of the teacher training colleges, with some more training, but the system still has a lot of teachers that never finished high school, and who were never trained as teachers.

### **2.2.1 Education System**

Cambodia has a general education system with over 3,000,000 students that includes six year of primary education, three years of lower secondary and three years of upper secondary. An exam on the 9th year allows entrance to upper secondary school, and a second one, after 12th grade, establishes if a student receives an upper secondary school certificate and is given access to university.

In spite of the efforts of the Ministry of Education, Youth and Sport, a global rule about education applies in Cambodia: a country gets the education that it can pay for, and Cambodia and all its partners just cannot provide enough means to have a good education system yet, in spite of all efforts by its government.

In accordance with the Second phase of the Royal Government of Cambodia's Rectangular Strategy, improving the quality and efficiency of Education and teachers development is a major concern as teachers reproduce in their work the behaviour that they learned from their teachers, giving to their students the same education that they received, without providing them any problem-solving or critical-thinking skills that will allow them to face life or a job market with. The Ministry is fully aware of this need, and is working hard to try to provide correction mechanisms, through teacher training and by trying to increase salaries and teacher motivation whenever possible.

80% of the population of Cambodia lives in rural areas. Rural schools have little resources and in most cases, no electricity. Only 30% of upper secondary schools have electricity, but this number is reduced to 3% for primary schools.

### **2.2.2 Computers in Schools**

Computers only existed in Cambodian schools when donations had been made. Few of the installed computers were new, they were mainly refurbished computers donated by other countries, and installed and maintained by local low-budget organizations (such as Initiate). As computers were not new and the environment is very hard (dust, heat), computers were – and still are - difficult to maintain.



Problems range from heat or humidity to animal invasions inside the computers (ants, roaches, mice), Viruses are also a big problem, as computers get infected quickly and there is no way to maintain them. Most computers have had their software reinstalled many times, losing the original licenses, so all software would be considered illegal by the manufacturer.

### **2.2.3 Computers at the Ministry**

The Ministry of Education had automated - out of need – three main departments, Personnel, Finance and Planning (Education Management Information System). These three departments, had their own systems working satisfactorily and maintained, but they were not connected to each other.

A number of computers existed in the offices of the Ministry, but they were mostly obsolete, full of virus and difficult to use. The main building of the Ministry had been cabled, but the network was only used to access the Internet, no data was ever shared among computers of the Ministry.

### **2.2.4 Other ICT Applications**

At the end of the 90s, a programme funded by the European Union, developed a number of videos to be used as teacher training support materials. Televisions and VHS video players were bought for the teacher training centres, and used for some time. Unfortunately, the life of VHS tapes is limited, and the materials are no longer available.

### **2.2.5 Responsibility for ICT Management**

The Ministry of Education, Youth and Sport (MoEYS) have a specific unit namely ICT in Education Office for handling ICT related in Education.

A number of friendly governments and donors have created pilot projects in Cambodian schools. The World link project and the Malaysian Smart schools projects have been among them. With the pilot they have tried to help bring methodology for ICT management in schools. None of those projects has passed from the pilot stage.

### **2.2.6 Education Policy**

ICT was highlighted as a tool of development in education sector policies and statements.

The Education for All National Plan 2003-2015 stated that:

“ICT policies will include: a) expansion of ICT as a teaching and learning tool; b) as a means of improving education service productivity and management through improved information sharing, communication and knowledge management and; c) expansion of distance learning opportunities especially for disadvantaged groups in remote areas. The overarching goal will be to ensure Cambodia’s international competitiveness in an increasingly global and interconnected knowledge-based economy.

The Education Strategic Plan 2006-2010 and the Education Sector Support Programme 2006-2010 also specify the need of providing ICT training for teacher trainers, teachers and students, the use of ICT to improve the quality of teaching, and the automation of school management and finance, using ICT to enhance school efficiency. A substantial budget is allocated in both documents to ICT development.

### **2.2.6.1 Specific ICT Policy for Education**

The document Policy and Strategies on Information and Communication Technology in Education in Cambodia, developed during 2004, and approved in January 2005, provides a clear vision of guiding principles and social goals to be reached through the use of ICT in education. In particular, we should mention its vision, goals and guidelines:

**Vision:** The long term vision of Education for All in Cambodia is to ensure equal access to quality basic education for all citizens and to prepare its citizens to play an active role in reconstructing the country as well as integrating Cambodia on the knowledge-based global community. The Ministry of Education, Youth and Sport (MoEYS) is introducing various initiatives to facilitate greater integration of information and communication technology (ICT) to improve the effectiveness of education at all levels and to produce the technologically literate, productive and critical thinking workforce for the country.

#### **Goals (Educational):**

- To increase access to basic education for all, both formal and non-formal, using ICT as one of the major tools for learning, teaching, searching and sharing information.
- To improve quality of basic education.
- To promote independent and lifelong learning, specifically for post-primary education.
- Availability of workforce with the ICT skills needed for employment and use in a knowledge-based society; to ensure that Cambodia can complete and cooperate in an increasingly interconnected world.

#### **Objectives (Technical):**

- To provide access to ICT for all teachers and students.
- To emphasize the role of ICT as a tool for teaching and learning.
- To increase access to information.
- To promote Education For All (EFA) through usage of all types of electronic media.
- To use ICT to increase efficiency and effectiveness of the school system (for both education and school management).

#### **Guidelines:**

The policy emphasizes the important of standardization of encodings and format, leaning towards use of Unicode. It also recommends the use of Khmer language and Free and Open Source software in computers, mentioning specifically the work of the KhmerOS project.

## 2.3 State of Open Source

While since the 1980s Free and Open Source software (FOSS) had been widely used in servers (more than 60% of the servers in the Internet used FOSS operating systems and applications), this had not yet happened with desktops. Before 2005 the friendliness of FOSS desktops could not yet rival that of Apple or Microsoft products. While the usability was not too different, many problems remained with installations of peripherals and of new software, problems that Apple had solved long time ago and Microsoft was also quite advanced on with Windows XP.

In 2005 OpenOffice came out with its version 2.0 which - while not reaching its quality - could easily replace MS Office 2003, and in many cases could be even more useful, given the possibilities of adaptation that FOSS offers to its users. Other FOSS products - such as the Firefox browser - actually surpassed its Microsoft counterparts in quality and usability. Desktops and installations were getting easier and easier, with Linux distributions - such as Ubuntu - that were specially conceived for new inexperienced users.

The KhmerOS project of the Open Institute (a local NGO) had by 2005 translated and localized all this software to Khmer, producing applications that could deal with Khmer language much better than Microsoft products, including even a spell-checker for Khmer. In 2005 the KhmerOS project would become a joint project with the National ICT Development Authority of the Royal Government of Cambodia (NiDA), starting its expansion to government offices, education and the private sector.

## 3. The Open Schools Programme

### 3.1 The Memorandum of Understanding

Until 2007 all training related to Khmer language software that had taken place at the Ministry of Education, Youth and Sport (MoEYS) had been offered through NiDA. In 2007 the Open Institute established direct contact with the Ministry at the highest level, and started cooperation.

Then Undersecretary of State -and Chairman of the ICT in Education committee H E Dr Nath Bunrouen (now Secretary of State) stressed the need of developing a Master Plan for ICT in Education. The Open Institute accepted the challenge of working on it together with the Ministry, and of helping develop ICT in Education in general. Open Institute contacted InWEnt2 - one of its partners - to ensure support in the area of FOSS capacity-building. InWEnt gave wholehearted assistance for the project to bolster the training of multipliers within and through the Ministry of Education, Youth and Sport, as this approach was in line with its training project it@foss3, which had as one of the objectives “Enabling FOSS multipliers and trainers in providing high-quality low-cost training to national key groups of users of FOSS-software such as administrations and educational institutions.” The funding from Spanish cooperation - the largest donor of the KhmerOS project was also flexible enough to assume easily the change of activities.

In August 2007 the MoEYS and the Open Institute signed a MoU through which the Open Schools Programme was created, as a joint initiative to improve the quality of Education through the use of ICT. The main goals of the Open Schools Programme (OSP) were:

- To complete and implement a Master Plan and an Action Plan for ICT in Education.
- To ensure that the necessary computer tools for improving the quality of education through ICT were identified and translated to Khmer, together with their documentation and training materials.
- To create, train and support, within MoEYS, a solid and well connected internal network of ICT practitioners who will technologically lead the MoEYS to the effective and sustainable use of ICT in education.
- To define curricula for students and teacher-trainees that will result in the reinforcing of the education system through ICT and in the delivery of students who are well adapted to participate and work in a knowledge-based society.
- To create the necessary know-how on ICT-based Open and Distance Learning (ODL), including supporting tools, curricula, training materials and trained content developers; all of it aiming at the development of high-quality content for the chosen teaching-learning methodology.

InWEnt – Capacity Building International, Germany, is a non-profit organisation with worldwide operations dedicated to human resource development, advanced training, and dialogue. Its capacity building programmes are directed at experts and executives from politics, administration, the business community, and civil society. InWEnt is commissioned by the German federal government to assist with the implementation of the Millennium Development Goals of the United Nations. In addition, we provide the German business sector with support for public private partnership projects. Through exchange programmes, InWEnt also offers young people from Germany the opportunity to gain professional experience abroad.

InWEnt's it@foss programme supports the development and application of local innovative software solutions and business models based on free and open source software (FOSS) in the ASEAN region. For more information on it@foss, see <http://www.it-foss.org>, for "FOSS-Bridge EU-Vietnam see <http://www.fossbridge.org>

- To create a network of teaching-learning ODL content developers in Khmer language that will share experiences and materials, creating a culture of sharing between teachers, students and scholars that will accelerate development.
- Find and test the technologies that are best adapted to education in Cambodia, and which might lead to sustainable facilities.

## **3.2 Activities**

### **3.2.1 The National Institute of Education**

The activities of OSP began in June 2007, while the Memorandum of Understanding with the MoEYS was still being processed for approval. A first contract with the National Institute of Education (NIE, in charge of training all pre-service upper secondary school teachers in Cambodia) led to four months of accelerated activities. During this period the following activities took place:

- Improving the facilities of NIE by repairing a large number of computers that were not working, installing a new batch of low-power consumption computers donated by Intel and the Open Institute, and installing new computers that had been bought by the Ministry. The number of operational computers available for Education increased from 10 to 100, turning it into the only large training facility for ICT in Education in the country.
- Training of ICT teacher educators at NIE. ICT educators were trained on how to teach Khmer language FOSS applications, and on to teach computer maintenance and networking following a new curriculum developed by the project. They were also trained on Linux administration.
- All ICT teacher-trainees were trained on Linux administration and on computer maintenance and networking. They also participated in the training of their colleagues and other students, in order to receive the necessary experience on teaching the use of ICT in Khmer.
- Modifying the curriculum for ICT teacher trainees. A new curriculum was developed for ICT teacher trainees, and it would be adjusted the year after. The curriculum included the teaching of Khmer language productivity and Internet tools, the use and administration of the Linux operating system in Khmer, Computer maintenance and networking, Web 2.0 tools, instructional design for e-learning. The new curriculum started being used for the 2007-2008 academic year.
- Training of all the staff and teacher-trainees of NIE. All of NIE's teacher educators and non-teaching staff (120) and all of its teacher-trainees (550) were trained on the use of Khmer language computer applications for productivity (word processing, spreadsheets, Internet, e-mail, etc.).
- All pre-service upper secondary school teachers started being systematically trained on Khmer applications, as part of the standard teacher training curriculum.

### ***3.2.2 Training of all ICT Trainers in Upper Secondary Schools and Teacher Training Centres***

Still working at the new facilities developed at NIE, the starting effort also included training of ICT teachers in all teaching facilities that had computers for Education, and in particular upper secondary schools and teacher training centres. At the time we did not yet have a clear idea of how many schools really had computers that could be used for Education, so we trained also teachers in schools that - while they had computers - they did not yet have enough to set up a classroom. The same thing applied to teacher training centres.

Training of ICT teachers from upper secondary school. Teachers from all upper secondary schools in Cambodia that had computers for pedagogical use (270 teachers in 70 schools) were trained on the use and teaching of Khmer language computer applications for productivity (word processing, spreadsheets, Internet, e-mail, etc.) and on computer maintenance and networking.

Training of all the ICT Master Trainers of the Teacher Training Department. All the ICT Master Trainers from the 18 Provincial Teacher Training Colleges (for training of primary school teachers) and the 6 Regional Teacher Training Centres (for lower secondary school teachers) were trained to the use of Khmer language computer applications for productivity (word processing, spreadsheets, Internet, e-mail, etc.) and to computer maintenance and networking (60 teachers).

### 3.2.3 The Master Plan for ICT in Education

After this first rush period was over, at the start of the new academic year, OSP concentrated on the most important goal of the agreement: drafting a five-year Master Plan for ICT in Education for the structured deployment of ICT in Cambodia's Education system. After defining the goals, fields of application and scope, the process of writing the Master Plan involved drafting first a complete Action Plan, providing specific actions, milestones and budgeting, and then extracting from it the Master Plan, after ensuring that actions were clear and possible.

In order to ensure that the necessary information and methodology for the preparation of the Master Plan was available, several actions took place:

- UNESCO has developed two years earlier – together with InfoDev – an online Toolkit to support the development of ICT policy. Workshops on how to use the Toolkit had already been offered in 18 different countries, to create awareness of the need of developing ICT policy, of its complexity, and of the methodology necessary to develop it correctly. MoEYS – with the support of UNESCO and the Open Institute – decided to hold such workshop as the starting point of the work on the Master Plan, ensuring that all departments were involved and well tuned to the work that had to be done.
- Preparing an Assessment of the present use of ICT in the Education sector in Cambodia. The joint study started by preparing a questionnaire based on the indicators for ICT in Education prepared by UNESCO, adapting and incrementing them to serve specific needs of Cambodia and the Master Plan. The questionnaire was sent to all upper secondary schools, teacher training centres and universities. The final results became available in 2009, after a long delay produced by the elections and by the lack of human resources to enforce the filling and return of questionnaires.
- Creation of a Low Cost Computing Lab for Education with the specific mission of doing extensive research, evaluating and testing of low-power consumption and low maintenance hardware, reaching conclusions on the types of hardware that should be installed in schools, as well as the software that was compatible with it. The research took place during 2008, reaching conclusions on the present and the future of the equipment that was best adapted to usage in schools.
- Research on the necessary training for teachers and students, and prepare the required curricula and preliminary training materials for teaching and learning ICT and for using ICT for the delivery of education. Contacts with UNESCO Asia and Pacific Regional Bureau for Education specialists, as well as with some private industry education specialist from companies such as Intel, led to defining the type of teacher training that was necessary.
- Senior leaders of the Ministry visited ICT in Education strategists and facilities in the Spanish regions of Andalucía and Extremadura, where all Education is done with Free and Open Source Software in Spanish, with one computer for every two students in many of the schools. They also visited the Ministry of Education in Madrid, to see how ICT-based training materials are stored in an advanced clearing house.

By June 2009 the first drafts of the Master Plan for ICT in Education and the accompanying Action Plan have been finished. The Action Plan is detailed down to milestones of activities, and it is fully budgeted. Participant for each action, as well as and potential donors, are identified. At the beginning of June the Ministry held a “writeshop” (a two day retreat for the top leaders of the Ministry) in which they fine-tuned the first draft of the Master Plan to what they want for the future of the Ministry, making changes and improvements that have been integrated in a second draft that has been finished at the beginning of July. After distributing this draft to the different departments implicated, to ensure that the changes introduced correspond to the wishes and interests expressed during the write-shop, this second draft will be distributed for public consultation. A third and final draft will be result of the public consultation and a final meeting of the Ministry’s Committee for ICT in Education, now personally headed by H E Dr Im Sethy, Minister of Education, Youth and Sport. The Plan is expected to become official before the end of the year, but operational immediately, in its second draft.

The time span of the Master Plan (2009-2013) is the same as that of the new Education Strategic Plan and Education Sector Support Plan, and its content will be integrated into these two plans.

### **3.2.4 Integrating the Teaching of ICT in the Education System**

At the same time that the policy work was taking place, it was important not to stop the advances that had been started, proceeding with the plans for training and research. In January 2008 a first comprehensive ICT textbook for schools was finished and accepted by the Ministry. It was presented by H E Dr Im Sethy (then Secretary of State, now Minister of Education, Youth and Sport) in a specific public event with 900 guests. 8,000 copies of the book were distributed to schools and teacher training centres. Besides writing an introduction to the book, the Secretary of State wrote a letter to all public educational institutions presenting the new book, asking them to start using it from this moment on. During the school holidays of 2008 a new training campaign was started, ensuring that all schools and teacher training centres were prepared to teach using the new book:

- Training of ICT teachers. 234 in-service upper secondary school ICT teachers (from 86 schools), 17 in-service lower secondary school teachers (from 7 schools), 51 ICT Master trainers (from 24 Regional and Provincial Teacher Training Centres), and 26 higher education ICT teachers (from 9 universities) were trained or retrained on the teaching of computers in Khmer language and Unicode (using the next textbook), as well as on computer maintenance. A number of the teachers were trained to teach using Linux as a base, for the upcoming pilot projects.
- ICT Textbooks. 8,000 additional books were printed in October, most of them to be distributed in 2009. While the first 8,000 had been for the use of FOSS tools on Windows, in this case only 6,000 of them use Windows platform, while 2,000 teach using Linux as a base.
- Some pilot projects start teaching ICT to students in schools using the Linux operating system in Khmer as a base, instead of using Windows XP in English, as other schools were doing. This is done in collaboration with the NGO Room to Read, which has provided and maintains over 30 computer training rooms in upper secondary schools.

In 2009 the Pedagogical Research Department of the Ministry - together with the Office for ICT in Education and the Open Institute - is developing the new ICT curriculum that will be used in schools. This new curriculum is centered on developing professional skills that are supported by computers. The emphasis is on putting together technical and critical thinking skills that will jointly prepare students for better understanding of the professional world, while giving prospective employers much better trained employees, with soft skills that make them confident and efficient. The new curriculum will be ready by September 2009, together, if possible, with pilot training materials that can be used in a few selected pilot schools during the 2009-2010 academic year.

During the 2009 school holidays one more round of training for principals and ICT teachers is planned:

- All ICT teachers in schools that have computers for education – as well as in teacher training centres - will be trained to teach ICT using Linux (in Khmer) as a base, preparing them to teach under both platforms, making it easier for the Ministry to make quick decision of which platform to use for teaching, as the pressure for the use of legal software will soon lead to a “pay or change” decision.
- Also, in a workshop for upper secondary school principals, directors of teacher training centres and senior leaders of the Ministry to be held in August 2009, the Minister of Education and other officials will communicate the plans of the Ministry, and ask for their support to ensure that the change takes place.
- Selected teachers from at most 16 schools will be trained on how to deliver the new ICT curriculum based on professional competence development, to start pilot projects during the 2009-2010 school year.
- University ICT teachers will be trained on how to teach the use of Khmer language software, as well as on computer maintenance and networking.

### **3.2.5 Teacher Training to the Use of ICT**

In order to setup the foundation of specific ICT training for all teachers, the Ministry signs a Memorandum of Understanding with Intel Corporation and the Open Institute through which the Ministry will train senior trainers and will pilot Intel’s “Intel Teach Getting Started” highly pedagogical training methodology. Pilots are planned for NIE and several upper secondary schools. Cambodia is the first country in which the Intel Teach materials are adapted to OpenOffice and other FOSS applications, instead of the proprietary equivalent.

In April 2009 a set of 25 Senior trainers have been prepared to train Master Trainers (ICT and pedagogy teachers from the schools and teacher training centres) on the delivery of the Intel Teach getting Started curriculum. A group of these Senior trainers (from NIE and the Open Institute) have already trained Master Trainers from all 6 Regional Teacher Training Centres, as well as from the pre-school teacher training centre. These Master Trainers will train their 250 peer teacher educators during the coming months. 21 teachers from 7 upper secondary schools have also been trained, to train 350 teachers in their schools during the same period.



Another 42 Intel Teach Master Trainers from 21 upper secondary schools will be trained in August-September. They will be expected to train over 700 teachers in their schools during 2009.

Meanwhile, the NextGen project, managed by the UNESCO Asia and Pacific Regional Bureau for Education (in Bangkok) will be supporting – with the help of UNESCO and under funding from JFIT - the local development of specific ICT curricula for teachers, taking into account the needs of each type of teacher education. Intel will act as a partner in the programme.

Meanwhile, some sporadic training of teachers other than ICT teachers took place during 2008 (about 200 teachers in 5 schools), using a traditional technical curriculum.

### ***3.2.6 Open and Distance Education (e-Learning)***

In 2007, Ministry and Open Institute started the Open Learning Programme, whose goal was to ensure that e-learning tools and know-how were available in Khmer, and to train and advise universities and Ministry, ensuring that they were ready to implement e-learning.

The Programme localized the Moodle Course Management System and other FOSS content creation programmes. They also localized to Khmer (through an agreement with the Department of e-learning, international learning, communities and documentation of InWEnt) a battery of modules for the training to the different tasks necessary for undertaking e-learning programmes.

After an awareness campaign on the benefits of e-learning from July to November 2008, which included visits to the deans of almost all the universities in Cambodia, in December 2008 the Open Learning Programme started courses on e-learning know-how for universities and Ministry departments. The courses will last until December 2010. 80 participants from 25 universities and 2 Ministry departments are following the courses.

### ***3.2.7 Using Video for Teacher Training***

While preparing the Master Plan for ICT in Education, Ministry and Open Institute realized that very important teacher training objectives of the Ministry could not be supported with computers, as they involved teachers in rural areas without good access to electricity or to computers. Nevertheless, video was considered as a good tool for teacher training, creating video clips of good pedagogical practices that other teachers could see and copy. This idea gave birth to the River of Knowledge project, an initiative that would study all the teacher training needs for which video would be the best solutions. A study on the areas that the project could cover was started in 2008, looking at all levels of general education, and mainly to the training of pre-service teachers, but also considering materials for training of in-service teachers. Ministry and Open Institute teamed with two other NGOs with large amounts of experience on education: World Education and Save the Children Norway. All partners believe that this association can help produce strong results. World Education had already been considering the idea of video as a tool for training in early childhood education, and had even done some recording. Save the Children Norway was working on examples of good pedagogy, which could be recorded to share with other teachers.

After a wide survey, questioning directors, educators and students of teacher training centres, and also teachers and principals in schools, the River of Knowledge project came out with a first survey, which included a prior study done by World Education.

Once the priorities and the types of materials to create became clear, the project has gone to understand the size of the task, and to analyze who can be the actors, create a plan, and identify possible sources of funding. The result of all this work has gone into the Master Plan for ICT in Education. The project will continue to ensure that the recording activities are started in October 2009 at NIE and Regional teacher training centres (for lower secondary school materials), converging with the Enhancing Education Quality Project funded by ADB.

### **3.2.8 Training of Ministry Officials**

In 2008 114 staff members from all 26 departments of MoEYS, as well as 96 staff members from the Provincial Offices of Education were trained on the use of Khmer Unicode and Khmer language software. Specific pilot training at the Kampot Provincial Office of Education leads to cascading training to district offices of Education in the province (with the support of a VSO volunteer). In the coming year at least 500 more staff members will be trained.

### **3.2.9 Improvements in Infrastructure**

In 2007 Intel Corporation pledges and starts delivering 250 low-power consumption computers for schools, teacher training centres and for training facilities for the newly created Office for ICT in Education. All other equipment for these centres is provided by the Open Institute with funds from AECID.

The Master Plan includes the growth of the number of schools that have computers for Education from 50 to over 100 in 4 years, the number of upper secondary schools that have good access to electricity (1/3 of the schools, covering about 50% of the students). A number of schools without access to electricity will also be considered, even if funding will be harder to come by, and the running expenses for these much higher.

A good number of these schools, and all the teacher training centres that are not yet equipped, will be equipped by the Enhancing Education Quality Project, supported by a 27 million dollar grant of the Asia development Bank. A part of this grant is earmarked for the equipment of teacher training centres and resource centres in upper secondary schools in all 24 provinces of Cambodia. The ADB grant will also cover substantial teacher training, as well as the training and support of teacher training centres on the production of multimedia materials.

Internet will be available in all the teacher training centres and in all the schools that have computers for training, thanks to the Agreement signed between MoEYS and Viettel, a Vietnamese communications company with ample infrastructure in Cambodia, which has pledged to give free access forever for 1,000 schools and teacher training centres in Cambodia.

### **3.2.10 Tools for School Management**

The research on existing FOSS applications that can be used for school management came out with several possibilities, one of them was even translated to Khmer by the Open Schools Programme, but further analysis of the complexity of installation and management forced the project to discard the possibility, and wait for new tools that seem to be under development. New tools under development are being tracked by the Open Schools Programme.

## **3.3 Present State of ICT in Education in Cambodia**

### **3.3.1 Strategic Situation**

By adopting Khmer language software in Education, Cambodia has opened the door to enriching the education of its upper secondary students with professional competencies that can be taught in the time period that is possible to allocate to ICT. By learning them in their own language, students retain the knowledge and the skills, being able to use them when necessary. The use of the local language in ICT has eliminated an added barrier that no developed country has, as these nations always have software in their own language.

By teaching the use of Free and Open Source software, the Ministry has not only reduced its own financial liability, being able to use legal software in its offices and in schools without having to actually pay for it, but also the cost that the country will have to incur in the future, as its students, when they reach their professional life, will not require their businesses to buy expensive software, or to use illegal software, they will continue using the Khmer language high quality free software that they learned to use in their schools. ICT teachers are trained to teach under any operating system, giving the Ministry the flexibility to change anytime its wants, not depending on the demands on any foreign software company.

The present infrastructure and resources in schools are known, teachers are trained and the schools have the necessary training materials for the teaching of ICT. Infrastructure is planned for the coming years. The potential of the use of ICT to improve the administration of the Ministry, to improve the quality of education delivered, and to increasingly train students is fully understood and planned for the next five years in the Master and Action Plans for ICT in Education, which are agreed by the leaders of the Ministry, who engage themselves to make it happen. The plan is fully developed and budgeted.

The planning and budgeting processes help the Ministry communicate with donors, and search for the resources that are necessary to undertake the whole plan. The Ministry has started the creation of the necessary internal structures that are required to manage the growth in the use of ICT. It has first of all created the Office of ICT in Education in the Department of Information and ASEAN, appointed Mr Sok Tha as Office Chief, and assigned to the Department the new resource centre of the Ministry, with sufficient space for the growth of the team of people who will be required for this project, and with training space for all the training needs that are expected in the future. The Minister himself is personally ensuring that all the necessary resources are secured for the project, and that the Office for ICT in Education is part of the Ministry budget for the coming year.

By doing all this, the Ministry has placed itself in a position in which it can fulfill its present Education Strategic Plan's goals, and include clear and viable ICT goals for the 2009-2013 Education Strategic Plan.

### **3.3.2 Key Success Factors**

The success of the project is due to several factors:

Full engagement of the leadership of the Ministry with the project. The basic policy was already in place and the Ministry had engaged itself, through its Education Strategic Plan, to the integration of ICT in Education and in teacher training.

Very close cooperation between the Ministry and its partners, assuming the challenges together and reducing to a minimum the red tape, to ensure smooth communication.

Flexible donors/development partners (Spanish Cooperation and InWEnt) who permitted fast change and improvement in the lines of work, by focusing on objectives and indicators, without asking the grantee to stick to pre-contracted action plans. Integration of the ideas and projects of several partners into one single plan that took all of them into account, as well as their relationships with the Ministry. Full support from UNESCO, at a local level as well as from its Asia and Pacific Regional Bureau for Education.

### **3.3.3 Challenges**

Even with full support from the leadership, the Ministry of Education, Youth and Sport is still a Ministry, and this involves procedures and protocols that be sometimes accelerated, but not changed for a specific issue. This is the case with assigning staff to the ICT for Education Office. It is important that the assigned staff are computer scientists with a minimum of training, but this is a scarce resource in the Ministry, and the future staff must be found and transferred to the Office, which is a slow process.

Another challenge will be retaining staff for the Office of ICT in Education. Well trained computer scientists can easily find much better paid jobs in the employment market, and they are difficult to retain at the level of salary that the Ministry can offer.

The Ministry will need to secure funding for the continuation of the project. The InWEnt it@foss programme will finish at the end of 2009, funding training in 2009 as its last activity. The Spanish Cooperation funding will finish at the end of 2010. New donors are coming in, such as ADB, but they will not cover 100% of the needs for growth in ICT. Other donors will have to be found, either for project-specific budget support or for funding directly specific parts of the activities that need to take place.

The Ministry will need to move towards standardization of how it does ICT, changing from legacy fonts to Unicode, to Khmer software, to new formats, and to new ways of doing things and communicating. It will have to ensure that a culture of maintaining computers operational takes hold in the Ministry. All this means change, and change is the most difficult part of this project, but it will be possible with strong determination from the Ministry's leadership, and with training of as many members of the staff as possible, as contemplated in the Master Plan.

Also, during the coming three years, the Ministry will need to dedicate more and more funding to ICT, ensuring that no external financial support is necessary by 2013.

### **3.4 Lessons Learned from Open Schools Programme**

The main lesson learned is that for ICT in Education to develop in a homogeneous and systematic way, major change on methodologies and structures is necessary, and this is only possible with the full engagement of the Ministry leadership. Also, the Ministry most probably does not have all the resources that are needed for the change, and its structure sometimes is too rigid to produce internal change without external help. It is therefore positive to have engaged international organizations and development partners that not only help on the technological side, but also support the development of the policy. The participation of international organizations (such as UNESCO and SEAMEO) is fundamental, as they have sufficient experience and prestige to create the necessary environment of trust for Ministry leaders to engage themselves without reserve.

The results of change are clear: Cambodia has been the first country to mandate that all its schools should teach Free and Open Source applications. The main reasons for this important step were trust in its partners and that the added value of using FOSS was overwhelming (it was in Khmer, well adapted to Khmer culture, with a spell-checker for Khmer, good textbooks were available, and it could be used without paying for licenses).

It has been crucial to start operations at the same time that the policy was being written. Now that the Master Plan is almost finished, important parts of it have already been undertaken, placing the country in a good position to continue. It has also been important to use the funding when it was available. Funding from Spanish Cooperation (available from 2007 to 2010) and from BMZ through InWEnt (from 2007 to 2009) have been and are being successfully used while they are available.

It has become clear that FOSS can be perfectly used for teaching in the school system, as well as in the administration of the Ministry of Education. It has also been confirmed that the added value of localization is sufficient for eliminating the reticence of teachers (who were comfortable with what they taught, and who had to learn the new software), opening the possibility of effective change.

# Appendix III

## Best Practice in Indonesia

### e-dukasi.net and its ICT Learning Resources

By Gatot Pramono  
Ministry of National Education, Indonesia

## Objectives of the Programme

The main goal of the programme is to provide students and teachers with rich and various learning contents. E-dukasi.net had been initiated in 2003, long before JARDIKNAS was formed. As JARDIKNAS become a formal and the only network to serve schools, e-dukasi.net is integrated into JARDIKNAS. Thus, a by-product benefit from the existence of e-dukasi.net is to enrich the content of JARDIKNAS.

## Teaching and Learning Tasks and Activities in the Programme

e-dukasi.net has several contents namely : main material (materi pokok), popular science, on-line module, on-line national exam try-out (Bank Soal), video on demand, telecollaboration, on-line learning tutorial. Other minor contents include educational game and some writings from members. The main materials may be used as an enrichment component besides contents taught in class; in this regard they explain some parts of teaching that might not be explained in the class easily or effectively. In term of computer, it means that the contents enable users to learn interactively. As a mean to enable users use ICT in learning, some contents in edukasi.net may promote students at level 2. Figure 3.1 shows some interactivities to measure the length of an object using caliper.

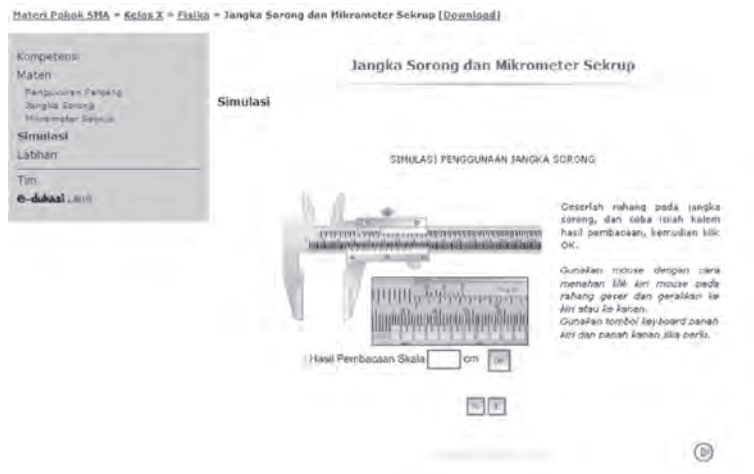


Figure 3.1. An example of learning materials in www.e-dukasi.net

Both teachers and students might take the benefit of using the contents of e-dukasi.net. By using the contents in e-dukasi.net, teachers might explain some aspects of learning materials that can not be taught effectively in class. For instance, with some animations or simulations embedded in the contents, teachers could clearly show how an image is built if an object is placed in front of a lens. Designed to enable students to learn independently (with few guidance from teacher), the contents give to the students some benefits: Students are motivated to explore the contents, students are attracted by animation or simulation, and students can test themselves to see how they have acquired the knowledge. On-line National Exam Try-out (Bank Soal) is a compilation of the national exams that has been done in previous years. On-line exam is equipped with correct answers and feedbacks. By trying the on-line exams, students may try-out the national exam before they undertake the real exam.

## Impact on Students' Learning Outcomes

A direct outcome, meaning that students get high score after utilizing the contents in JARDIKNAS, is not clear. However, an indirect outcome (students find the contents beneficial to them or students are highly motivated and have fun in using the contents) is quite clear. A report written by the Pustekkom team shows that there are 184,078 members of e-dukasi.net. While non-member could only see the contents through a browser, a member of e-dukasi.net has privilege to download the contents. With the contents saved in their computer, students could learn the contents over and over again without connecting to the internet.

Around April students visit the web more frequently than other months. National exam is done in May; it is not surprising that in April students make a try-out in preparing the national exam.

A survey done by LP3ES shows that of students from 26,064 schools 16.4 % utilising e-dukasi.net. Figure 3.2 and 3.3 below show the frequency and duration of utilization of e-dukasi.net.

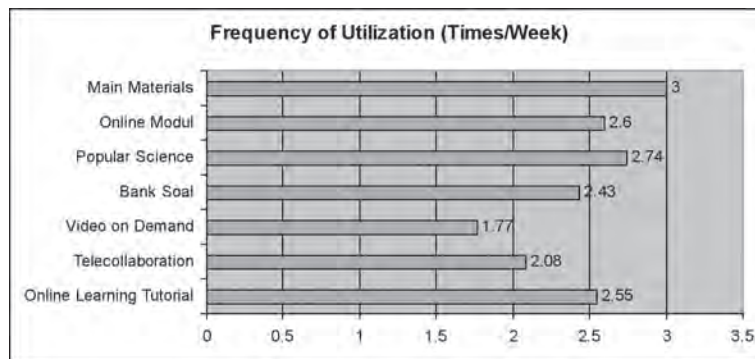


Figure 3.2. Frequency of Utilisation(Times/Week)

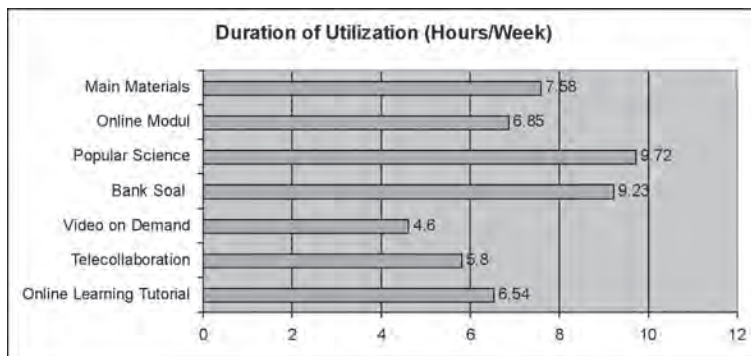


Figure 3.3. Duration of Utilisation (Hours/Week)

## Transformation of School and Classroom Practices

By giving access to the internet Pustekkom promotes on-line learning for schools. We set up on-line discussion in which students and teachers could undertake discussion and share knowledge and experiences. The other important thing that we pursue is to give some experience of distance learning to the members. There are three types of discussion: discussion forum, tele-collaboration, and MGMP (Musyawarah Guru Mata Pelajaran). MGMP is a discussion group among teachers who teach same subject matter such mathematics, biology, physics, chemistry, English, and so on. Discussion forum is a place where a member who has difficulties concerning some subject matters (such as mathematics, physics, biology etc) can post a question, then other members will respond and give answers. There are about 12 subject matters to be discussed. While discussion forum looks like mailing list, Telecollaboration is more specific in which some rooms are created according to the topic posed. The topics in tele-collaboration span from general issues (but still relevant with educational issues) to specifics (like subject matters) issues. MGMP forum is a special forum for teachers who teach same subject matters (like mathematics or English). The purpose of MGMP is to provide a mean for teachers to share their knowledge and solve the problems in teaching.

## Implications and Lessons Learnt

In the era of internet on-line learning give promise as an alternative way of learning. The technology to make it happens is more than ready, but human needs time and effort to get used to it. On the other hand visual world gives some flexibilities (people can discuss anytime they need and want to), but on the other hand people lose human touch. Discussion may subside when written words are not strong enough to give motivation and emphasis. Even worse the moderators of discussion are those who lose motivation to initiate conversation.

This is quite common in many on-line discussions. The specific problem in JARDIKNAS is that we do not have strong motivators to make discussion flows smoothly. The other thing is that on-line discussion is not important needs for most members. If we are able to incorporate on-line discussion into learning in class, then we are very optimistic that on-line learning becomes a need for members. And it is our dream that our huge network (JARDIKNAS) will be very busy transferring knowledge and experience to every node. But before it happens some hard work awaits: promoting JARDIKNAS itself, promoting on-line learning, designing a new model of learning, and last but not least promoting a new of life (or learning).



# Appendix IV

## Best Practice in Timor Leste Education Management Information System as Part of its ICT Infrastructure

By Afonso Soares  
Ministry of Education, Timor Leste

The purpose of this document is to provide a brief description of the Timor Leste Education Management Information System (EMIS).

The data is collected at schools and verified in School Cluster Centres and District Offices is entered into a computer-based Education Management Information System in the Ministry of Education in Dili. The data are required for long-term planning, monitoring and evaluation, and operational management of the education system and, hence, it is imperative that the data are valid, reliable, comprehensive and timely. Although there are validation checks built into the computer system, the main responsibility for ensuring high levels of data quality rests with school directors, teachers and DEO staff.

### Background

#### The EMIS is being implemented in five phases:

- In 2003 Phase 1 was commenced with the holding of numerous workshops with District Education Officers (DEOs) and Ministry of Education staff to develop a list of requirements for an EMIS. Design and building of the database was carried out followed by workshops to reach a final agreement on the design and content of the EMIS. Phase 1 covered collection of data for all primary schools and all functionality except learning achievement, final examination data, and for student and teacher attendance and transfers. Data collection for all primary schools, students and teachers commenced in October 2003 and data entry in December 2003. Phase 1 did not provide graphical or GIS output. All data entry took place in the EMIS Centre in the Ministry of Education in Dili.
- In 2004/05 Phase 2 consolidated the collection of primary school data and data entry. Phase 2 also included the design of forms and building of the database for Pre Secondary and Secondary Schools, student and teacher attendance and transfers, and for promotions, repeaters and dropouts, bringing the total of data collection forms to 18, however data was not collected for these new forms until later years. Updating the database with primary school data continued.
- In 2005/06 Phase 3 consolidated collection of primary school data and data entry. Database management included the identification and removal of duplicate student and teacher entries.
- In 2006/07 Phase 4 covered data collection of all Pre-Secondary and Secondary schools, Students and Teachers, and was commenced in September 2006. Data was also collected for Internally Displaced Persons (IDP students and teachers). Data entry for Pre-Secondary and Secondary and IDP students and teachers and transfers of students and teachers commenced in January 2007. This brought to 23 the number of data collection forms in use. Updating the database with primary school data continued. Population data received from the 2004 census was introduced to the EMIS.

- In 2008/09 Phase 5 EMIS improved the whole process by simplifying the data collection forms and removing redundancy in data collection which resulted in adding more items in data collection while reducing the number of data collection forms.

**Initial Data Collection and Entry Workload:** The initial implementation of the system involved a very large data pick-up exercise, because descriptive data for approximately 750 primary schools, enrolment data for about 200,000 primary school students and personnel data for some 5000 teachers was collected and entered into the system. Moreover, this data collection and data entry exercise had to be carried out within a reasonable time frame and could be not spread out over many months. Training workshops were held for District Superintendents and other staff directed at assisting them to train school principals in how to fill out the forms correctly and to apprise them of the whole data collection process. Thus a cascade, or “train the trainer”, approach was used. Additionally, training workshops were held for Ministry of Education staff and contractors who are responsible for data entry work in Dili. It is planned that data entry will eventually be given to District Office staff.

The EMIS uses the same names and numbers for districts, sub-districts, sucos, villages and schools as those used in the School Mapping Study carried out in 2001. These identifiers have been imported directly into the EMIS. These identifiers must be used on the data collection forms.

## Data Collection

During its evolution, currently EMIS is collecting information on:

- Student Enrolment
- Teacher Form
- Annual School Survey
- Student Grade Class Assignment
- Teacher Grade Class Assignment

The student enrolment forms collect information at the time of every student’s enrolment such as name, date of birth, parent’s names, parent’s qualification, and to what grade and class the student had been assigned. In addition to that information related to special children is also collected in the student enrolment forms in order to help out in planning for inclusive education.

The teacher forms collect information on teacher. This included information such as qualifications, years of experience, and, and the grade, class and subject to which they have been assigned.

The Annual School Survey form collects every year school’s information: such as, physical structure of the buildings; including number and type, purpose (for example, classrooms, and administration rooms) and condition of the rooms in addition facilities like water, furniture.

Each and every student’s (Grade 1 to 12) progress to next grades/levels, mortality, repetition, dropout or re-entry to the school information is collected every year on Student Grade Class Assignment forms. This information is very useful in calculation of different Educational Indicators.

Like Student, EMIS also collects yearly information of every teacher on the grade, class and subject they are teaching during the school year.

## EMIS Data Collection Procedure

1. EMIS District Officers collect forms from EMIS Centre MoE
2. EMIS District Officers take forms to District Office
3. EMIS District Officers invite head teachers to travel to Sub-District Cluster Schools to collect forms
4. EMIS District Officers travel to each Cluster Centre School to distribute forms to head teachers
5. EMIS District Officers arrange with head teachers for delivery of completed forms every two weeks to Cluster Centre
6. Schools that are located close to District Office return forms to EMIS District Officers at the District Office
7. EMIS District Officers check forms for accuracy and validity
8. Incorrect forms returned to schools
9. Correctly completed forms are returned to EMIS Centre, MoE
10. EMIS District Officers have been requested to complete recording sheets that specify to what schools they have distributed forms – what forms were distributed – and the date of distribution. Also they are required to record what schools have returned their forms.
11. EMIS District Officers are to return the completed and checked forms to EMIS Centre in MoE every two weeks together with their recording sheets.
12. The forms are spot checked for accuracy and validity.
13. Incorrect forms returned for correction.
14. Correct forms recorded in EMIS Centre as being received and then filed ready for data entry.

Steps 5 to 14 are repeated until all forms are received and seen to be correct.

## EMIS Data Entry Procedure

On collection the district data collection officers bring those forms to the central EMIS office. Where data collection supervisor scrutinizes those forms for completion & forms still found incomplete/incorrect are advised to be sent back to the schools.

The data collection supervisor handover those complete in all respect forms to the data entry supervisor. Who then distribute the forms into the 16 data entry operators and afterwards supervises the whole process of data entry.

In addition to data entry of the forms, EMIS software also facilitates data collection and entry supervisors to record for the forms received from districts and entered into system respectively. While Head of EMIS, have his own interfaces to oversee the progress of both the collection and entry activities.

Under direct supervision of their supervisor, 16 data entry operators enters all data from collected forms into the EMIS system using the respective electronic forms.

Having all the update data entered. Ministry of Education is using its EMIS as a tool for better management of their educational system using following reports:

Basically there are two types of reports produced by the EMIS

- Lists of information (general reports) covering schools, students and teachers at all levels
- Statistical reports at all levels

General Reports :

- \* School Management, Pedagogy and Buildings
- \* Condition of School Toilets
- \* School Report on Students Enrolled
- \* District Report on Teachers Employed
- \* Gender Parity Report
- \* Teachers' Age Distribution Report
- \* Teachers' Experience Distribution Report
- \* Student/ Teacher Ratios by District Report

Statistical Reports like

- \* Gross Enrolment Ratio (GER)
- \* Net Enrolment Ratio (NER)
- \* Gross Intake Rate (GIR)
- \* Net Intake Rate (NIR)
- \* Repetition Rate
- \* Dropout Rate
- \* Transition Rate
- \* Survival Rate
- \* Completion Rate

In summary EMIS is as very useful tool for the Ministry's planners and policy analysts as well as for reporting to international agencies.

## Future EMIS Planning

Following improvements are under progress during its evolution:

- Provide remote access of user friendly system generated EMIS reports to all within Ministry of Education by setting up a secure LAN network throughout the Ministry. So that anybody can access the required data without requesting to EMIS team.
- Enhancing the scope of EMIS by developing integrated data entry/reporting interfaces for other directorates like Teacher Training, School Accreditation, Higher Education & AFLA etc.
- Integration of EMIS data with the other external & internal systems. Therefore, EMIS can share data with Bureau of Census, Literacy, PMIS, etc. It would also enable Ministry to generate reports where in addition to EMIS external data is also required.
- Development of GIS based reports to plot all EMIS data including educational indicators on the Maps.

# Appendix V

## Best Practice in Brunei Darussalam Professional Development at Dato Marsal Primary School

*By Md Yussof Metassim*

*Ministry of Education, Brunei Darussalam*

### Background of the school

Dato Marsal Primary School is located in the residential area in Kampong Lambak Kanan, Berakas. It is one of the biggest schools with the enrolment of almost 800 students from Preschool, aged 5 years to elementary school Year 6 - aged 11 years. There are 22 classes, each level comprises of three classes except for Year 6 which has 4. The school has 4 computer labs with only one specialist ICT teacher. There are 43 teachers in the school including headmistress and two assistants. And there are 12 non teaching staffs in the school. The new headmistress has just started her administration at this school in April 2003.

### ICT Background

ICT started in the early year of 2000. The school is included in the 1st phase of the project. There are 3 Computer Labs with 60 PCs and 1 set of mobile computers [MobiTeL] consists of 20 Macbook. Therefore the students' ratio of using computers in our school at one time is 1:2. Whereas time spent for teaching and learning ICT across curriculum is about 40 periods a week [4 hours a day]. ICT lesson is given to all classes including the Preschool. The classes are arranged according to the weekly timetable prioritizing the core curriculum subjects. The teachers are also provided with booking system timetable for their own integration teaching of the other subjects. Apart from these, modular subjects are introduced in Technology, Arts & Culture where 3 modules offered. ICT is one of the modules (1 period per week throughout the year) offered to Year 1 and Year 4 in the new SPN-21 curriculum [National Education System] this year.

Most of the teachers are computer literate. They used to have their own laptop for their school work in the staffroom. Some of them are competent using computer in teaching. However, there are still few teachers who need more ICT development on the usage of ICT teaching and learning. Therefore ICT professional staff development is an on-going programme and has been organised once a week throughout the year. It is more on using ICT in teaching and learning in every subject areas chosen. Apart from that, our teachers are also offered with the ICT professional development initiated by the Human Resource Development Department, Primary Section Unit, Department of School, ICT Department, Ministry of Education, Curriculum Development Department and other related agencies.

Some of the students are confident in using computers. Most of them come from the average family background. They are also confident in ICT presentation amongst other schools. With all ICT facilities given to our school, as mentioned above, students and teachers have great opportunities to use ICT in teaching and learning activities. Our school also took the initiatives of having ICT Club for the students. This club is included in our co-curricular activities.

The schools planned and designed some initiatives and ICT action plan to assist their use of technologies [ICT] in teaching and learning, also in administrative work which is focused and manageable. The plan and initiatives involved school community i.e. staff [Teaching and Non teaching staff], students, families and the wider community. This will enable them to gain a common understanding of what is working well and what dimensions need improvement. The school can also track its progress and how to focus on them. One of the manageable and best practices of ICT in Educational Lesson Series in our school comprised is the in-house training programme for the teachers and school leaders.

## In-house Training of Teachers and School Leaders

Professional in-house training is organised by our ICT specialised teacher once a week. In the beginning, the teachers were given ICT training on the basic use of computer. When they were equipped with all the internal basic knowledge and now with the use of innovative interactive whiteboard, the training done is more on teaching and learning process. Below is the scheduled in-house training given to our teachers since 2004:

YEAR	TIME	ICT PROFESSIONAL DEVELOPMENT
2004	2.00 – 4.30pm [Every Tuesday and Thursday]	<p><b>*The specialised ICT teacher attended the training for almost a year in 2003.</b> *Then the ICT teacher did the multiplier effect in 2004, October and November because in the beginning of the year, she had planned the basic courses for the teachers</p> <p><b>Training on Integrating ICT Across The School Curriculum:-</b></p> <p><b>Module 1</b> ICT Integration in the Development of a knowledge Construction Curricula</p> <p><b>Module 2</b> Initiation and Deployment of ICT Selecting. Evaluating and Managing IT Resources Lesson Planning Fundamentals ICT Lesson Planning</p> <p><b>Module 3</b> Infusion of Thinking Skills into ICT Based Lessons Use of Word Processor as Open Tool Use of Spreadsheet as Open Tool Use of Presentation Tool</p> <p><b>Handholding Session 2</b> Design ICT Based Lessons Sharing of ICT Based Lessons</p>
<b>REMARKS</b>		<p><b>Objective of the programme/training</b></p> <ul style="list-style-type: none"> <li>- To give awareness and reinforce teachers on the importance of using ICT in teaching and learning</li> <li>- To provide ICT skill on integrating ICT across the school curriculum</li> <li>- To provide varieties of teaching strategies using ICT in the application of classroom teaching and lesson preparation e.g. using PowerPoint, Word Processors, Websites, On-line learning etc.</li> </ul>

YEAR	TIME	ICT PROFESSIONAL DEVELOPMENT
2005	2.00 – 4.30pm [Every Monday]	<p><b>February - May 2005</b> <i>Integrating ICT Across The School Curriculum (Part II) – 50 Hours</i></p> <p><b>Module 4</b> <i>Use of Internet Resources</i> <i>Principles Pertaining to use Internet</i> <i>Design Internet –Based Lessons</i></p> <p><b>Handholding Session 3</b> <i>Design Internet Based Lessons</i> <i>Sharing of Internet Based Lessons</i></p> <p><b>Module 5</b> <i>Getting Started with Creativity Tool</i> <i>Application of Creativity Tool</i> <i>ICT Based Lessons Using Creativity Tool</i></p> <p><b>Handholding Session 4</b> <i>Design ICT Based Lessons Using Creativity Tool</i> <i>Sharing of ICT Based Lessons</i></p> <p><b>Module 6</b> <i>Concepts of ICT Based Project</i> <i>Monitoring and Assessing ICT Based Project</i></p> <p><b>Handholding Session 4</b> <i>Design an ICT Based Project</i> <i>Rubrics for Assessment</i></p> <p><b>JUNE</b> <i>Hot Potatoes</i> <i>Teaching English Using the Internet</i></p> <p><b>JULY</b> <i>Microsoft Access</i> <i>Microsoft Publisher</i> <i>Adobe Photoshop</i></p> <p><b>August</b> <i>Microsoft Excel</i></p> <p><b>September</b> <i>Advanced Microsoft Word</i></p> <p><b>October</b> <i>Microsoft FrontPage</i></p>
<b>REMARKS</b>		<p><i>The training on “Integrating ICT Across The School Curriculum” is successfully done for 80 hours in 7 months. (Oct &amp; Nov 2004 and Jan to May 2005)</i></p> <p><i>The rest of the training is continued with other ICT tools to enrich teaching and learning in the classroom.</i></p>

YEAR	TIME	ICT PROFESSIONAL DEVELOPMENT																																			
2006		<ul style="list-style-type: none"> <li>- Training teachers using Interactive Whiteboard / Activ Studio1</li> <li>- Features of Interactive White Board</li> </ul>																																			
<b>REMARKS</b>		<p><i>*Interactive whiteboards enable anything that can be seen or done on a computer screen to be projected onto a whiteboard. Text and Images can be hidden, revealed or highlighted to stimulate discussion. Active participation is encouraged through measuring tools, such as interactive rulers or protractors. Students' senses are engaged with sounds, colours and videos.</i></p> <p><i>The IWB was designed for teachers to transform the classroom into a truly interactive learning environment.</i></p>																																			
2007		<p>Professional Development on Micro-Teaching using IWB</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Month</th> <th colspan="2">LOWER PRIMARY YR 1 - 3</th> <th colspan="2">UPPER PRIMARY YR 4 - 6</th> </tr> <tr> <th></th> <th>Subject</th> <th>Topic</th> <th>Subject</th> <th>Topic</th> </tr> </thead> <tbody> <tr> <td><b>Jan</b></td> <td>Eng – Yr 1 Mal- Yr 2 GP- Yr 3 Maths – Yr 1</td> <td>Colours My Self Districts in Brunei Darussalam Numbers</td> <td>Eng – Yr 4 Sci-Yr 5 Maths-Yr 6 Mal-Yr 4</td> <td>People who help us Animals Around Us The Four Operations Teachers' Day</td> </tr> <tr> <td><b>Feb</b></td> <td>Civic – Yr 2 Mal – Yr 3 GP –Yr 1 Maths – Yr 2</td> <td>My School Antonym Our Body Numbers 1 – 99</td> <td>Eng-Yr 5 Sci– Yr6 Maths– Yr4 Geog-Yr5</td> <td>My Family Electricity Mental Operation Oil and Gas in Brunei</td> </tr> <tr> <td><b>Mac</b></td> <td>Eng- Yr 3 Malay – Yr 1 GP – Yr 2 Maths Yr 3</td> <td>The Present Continuous Tense A Ball My Country Addition of ..... Digit Numbers</td> <td>Eng-Yr 6 Sci-Yr 4 Maths Yr 5 Mal-Yr 6</td> <td>Eating Healthy Variety of Materials Sets Reading –Jawi</td> </tr> <tr> <td><b>Apr</b></td> <td>Religious –Yr 1 Malay- Yr 2 GP – Yr 3 Maths – Yr 1</td> <td>Arabic Reading Places of Interests in Brunei Units and Tens</td> <td>Eng-Yr 4 Sci-Yr 5 Math – Yr6 Religious – Yr 4</td> <td>Process Writing Variety of Adaptation Indices Sunat Wudhu</td> </tr> <tr> <td><b>May</b></td> <td>Eng – Yr 2 Malay – Yr 3 GP – Yr 1 Maths – Yr 2</td> <td>My Family Synonym Houses Number Value</td> <td>Eng- Yr 5 Sci- Yr 6 Maths– Yr4</td> <td>Art &amp; Craft Planets &amp; Cycles in the Solar System Tables &amp; Bar Graph</td> </tr> </tbody> </table>	Month	LOWER PRIMARY YR 1 - 3		UPPER PRIMARY YR 4 - 6			Subject	Topic	Subject	Topic	<b>Jan</b>	Eng – Yr 1 Mal- Yr 2 GP- Yr 3 Maths – Yr 1	Colours My Self Districts in Brunei Darussalam Numbers	Eng – Yr 4 Sci-Yr 5 Maths-Yr 6 Mal-Yr 4	People who help us Animals Around Us The Four Operations Teachers' Day	<b>Feb</b>	Civic – Yr 2 Mal – Yr 3 GP –Yr 1 Maths – Yr 2	My School Antonym Our Body Numbers 1 – 99	Eng-Yr 5 Sci– Yr6 Maths– Yr4 Geog-Yr5	My Family Electricity Mental Operation Oil and Gas in Brunei	<b>Mac</b>	Eng- Yr 3 Malay – Yr 1 GP – Yr 2 Maths Yr 3	The Present Continuous Tense A Ball My Country Addition of ..... Digit Numbers	Eng-Yr 6 Sci-Yr 4 Maths Yr 5 Mal-Yr 6	Eating Healthy Variety of Materials Sets Reading –Jawi	<b>Apr</b>	Religious –Yr 1 Malay- Yr 2 GP – Yr 3 Maths – Yr 1	Arabic Reading Places of Interests in Brunei Units and Tens	Eng-Yr 4 Sci-Yr 5 Math – Yr6 Religious – Yr 4	Process Writing Variety of Adaptation Indices Sunat Wudhu	<b>May</b>	Eng – Yr 2 Malay – Yr 3 GP – Yr 1 Maths – Yr 2	My Family Synonym Houses Number Value	Eng- Yr 5 Sci- Yr 6 Maths– Yr4	Art & Craft Planets & Cycles in the Solar System Tables & Bar Graph
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		<b>June</b> <i>Civic – Yr 3</i> <i>GP – Yr 2</i> <i>Maths – Yr 3</i>	<i>Respect</i> <i>Animals with</i> <i>legs</i> <i>Subtraction</i>	<i>Eng- Yr 6</i> <i>Sci- Yr 4</i> <i>Maths– Yr5</i> <i>Geog- Yr6</i>	<i>Armed Forces Day</i> <i>Water Cycle</i> <i>Fraction</i> <i>Brunei Darussalam</i> <i>Neighbours &amp; World</i>	
		<b>July</b> <i>Eng – Yr 1</i> <i>Malay – Yr 2</i> <i>GP – Yr 3</i> <i>Maths – Yr 1</i>	<i>Numbers</i> <i>Auxillary Verbs</i> <i>Water</i> <i>Mental/Tables</i>	<i>Eng-Yr4</i> <i>Sci-Yr 5</i> <i>Maths Yr 6</i> <i>Mal-Yr 4</i>	<i>In the Jungle</i> <i>Magnets</i> <i>Symmetry</i> <i>Reading – Jawi</i>	
		<b>Aug</b> <i>Religious</i> <i>– Yr 2</i> <i>GP – Yr 1</i> <i>Maths – Yr 2</i>	<i>Sembahyang</i> <i>/Prayer</i> <i>Things/Objects</i> <i>in the Kitchen</i> <i>2 Dimensional</i> <i>Shapes</i>	<i>Eng-Yr5</i> <i>Sci – Yr6</i> <i>Maths–Yr 4</i> <i>Religious-Yr5</i>	<i>Sport</i> <i>Conservation of water</i> <i>Length, Weight, Volume</i> <i>Prayer</i>	
		<b>Sept</b> <i>Eng – Yr 3</i> <i>Malay Yr 1</i> <i>GP – Yr 2</i> <i>Maths – Yr 3</i>	<i>The Simple Past</i> <i>Tense</i> <i>Bicycle</i> <i>Food</i> <i>Area</i>	<i>Eng- Yr 6</i> <i>Sci – Yr 4</i> <i>Maths–Yr 5</i> <i>Mal-Yr 6</i>	<i>Transport Inventions</i> <i>Personal Health</i> <i>Geometry</i> <i>Picture Composition</i>	
		<b>Oct</b> <i>Malay – Yr 2</i> <i>GP – Yr 3</i> <i>Maths – Yr 1</i>	<i>Reading – Jawi</i> <i>Sound</i> <i>Mental Operation</i>	<i>Eng- Yr 4</i> <i>Sci – Yr 5</i> <i>Maths– Yr6</i> <i>Geog – Yr4</i>	<i>The Bike Race</i> <i>Life cycle of animals</i> <i>Graphs</i> <i>The weather</i>	
		<b>Nov</b> <i>GP – Yr 1</i> <i>Maths – Yr 2</i>	<i>Heavy and Light</i> <i>Money : Addition</i> <i>&amp; Subtraction</i>	<i>Sci- Yr6</i> <i>Maths–Yr 4</i>  <i>Mal-Yr5</i>	<i>Drugs</i> <i>Mathematical Thinking</i> <i>&amp; Problem Solving</i> <i>Antonym</i>	
	<b>REMARKS</b>	<p><b><i>‘ICT Professional Development using IWB’ has been successfully done for 88 hours this year’.</i></b></p> <p><b><i>Objective of Teachers’ Professional Development in 2007:</i></b></p> <p><i>i. It is an on-going ICT Professional Development for our teachers to upgrade their knowledge in teaching and learning using IWB</i></p> <p><i>ii. To increase their confidence and competency level in teaching and learning of their subject/selected topics in our curriculum</i></p> <p><i>iii. To share ideas, teaching pedagogy, information using internet access/educational website amongst their colleagues in the school.</i></p>				
2008	<p><b><i>ICT Professional Development on MobiTeL [Mobile Teaching &amp; Learning] using Macbook PD Schedule:</i></b></p> <p><b><i>(2nd Week) Jan- Inforama and Robotic Camp</i></b></p> <p><b><i>(3rd Week) Jan to (2nd Week) April : MobiTeL Training/Workshop</i></b></p> <ul style="list-style-type: none"> <li><i>✓ iSight</i></li> <li><i>✓ System Preferences</i></li> <li><i>✓ Application Preferences</i></li> <li><i>✓ Podcast</i></li> <li><i>✓ iTunes</i></li> <li><i>✓ iphoto</i></li> </ul> <p><b><i>(3rd Week) April to (3rd Week) October: ICT Micro Teaching [Mainly on Language – Malay and English Language and Religious Knowledge]</i></b></p>					

YEAR	TIME	ICT PROFESSIONAL DEVELOPMENT																		
	<b>REMARKS</b>	<p>“MobiTeL” known as “Mobile Teaching and Learning” Programme using “Macbook” is another way of promoting ICT in teaching and learning. Our school has been provided with 20 “Macbook” in a complete set with its trolley, projector and laser printer. We also set another “MobiTeL” station for the teachers. Other alternative to encourage teachers to use “Macbook” in teaching and learning is allowing them using or having ‘Macbook’ in group of five in their class. This will give at least four teachers to use ‘Macbook’ at one time.</p> <p>The training on using Macbook [MobiTeL] has been done this year [2008]. “MobiTeL” is another project of ICT Technology and Communication Department, Ministry of Education.</p> <p>This year, our ICT Professional Development is very limited due to several reasons as stated:</p> <ul style="list-style-type: none"> <li>• The school is under renovation including classrooms and computer labs.</li> <li>• Our ICT and Academic Unit have to organised their Professional Development on the same day i.e. every Wednesday afternoon alternately because most of our teachers are involved in other Academic Professional Development initiated by Human Resource Development, Department of School, Curriculum Development Department, Co-Curriculum Education Department and other related agencies.</li> <li>• Most of Year 1 and Year 4 teachers attended the SPN-21 Curriculum Workshop i.e. New subjects offered for 2009.</li> </ul> <p>The training has been successfully done to equipped teachers with varieties of strategies and ICT tools in teaching and learning.</p>																		
2009		<p>i. Training on Interactive Teaching and Learning using Smart ActiVote – pilot project/ trial ii. Empowering the use of Live@edu culture in teaching and learning</p> <table border="1"> <thead> <tr> <th>Month</th> <th>Subject Integration</th> <th>Topic</th> </tr> </thead> <tbody> <tr> <td>Jan</td> <td>All Teachers</td> <td>MobiTeL [Refresh &amp; Review]</td> </tr> <tr> <td>Feb</td> <td>All Teachers</td> <td>ActivStudio Promethean Website Blog</td> </tr> <tr> <td>Mac</td> <td>All Teachers Mal – Yr 6 Mal-Yr 4, 5 &amp; 6</td> <td>Activote Penjodoh Bilangan Reading &amp; Spelling - Jawi</td> </tr> <tr> <td>Apr</td> <td>Sci – Yr 6 Maths – Yr 5 Maths – Yr 4</td> <td>Electricity Finding Angles on a straight line Geometry</td> </tr> <tr> <td>May</td> <td>Maths – Yr 3 Maths – Yr 1 Sci – Yr 5 Maths – Yr 2</td> <td>Mathematical Games Fractions “Predict-Observe-Explain” Teaching Strategy Statistic - Pictogram</td> </tr> </tbody> </table>	Month	Subject Integration	Topic	Jan	All Teachers	MobiTeL [Refresh & Review]	Feb	All Teachers	ActivStudio Promethean Website Blog	Mac	All Teachers Mal – Yr 6 Mal-Yr 4, 5 & 6	Activote Penjodoh Bilangan Reading & Spelling - Jawi	Apr	Sci – Yr 6 Maths – Yr 5 Maths – Yr 4	Electricity Finding Angles on a straight line Geometry	May	Maths – Yr 3 Maths – Yr 1 Sci – Yr 5 Maths – Yr 2	Mathematical Games Fractions “Predict-Observe-Explain” Teaching Strategy Statistic - Pictogram
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Apr	Sci – Yr 6 Maths – Yr 5 Maths – Yr 4	Electricity Finding Angles on a straight line Geometry																		
May	Maths – Yr 3 Maths – Yr 1 Sci – Yr 5 Maths – Yr 2	Mathematical Games Fractions “Predict-Observe-Explain” Teaching Strategy Statistic - Pictogram																		
	<b>REMARKS</b>	<p>Focus on assessment for learning the ActiVote empowers students to take an active role in their own learning and enables teachers to connect with an entire class, while teaching based on the needs of individuals. Students click to respond and answers are instantly viewed, shared and analyzed on the interactive whiteboard is easy to understand formats such as bar graphs and pie charts. With ActiVote, the answer to the most challenging and important question for a teacher - do they understand the lesson - is provided by the students.</p>																		

Our staff's professional development on ICT has proved that most of our teachers have done ICT integration across the curriculum in their lesson. The ICT teacher shows her commitment to ICT and always accountable to teachers who really need help in designing and preparing ICT lesson. Both the ICT and the class teacher work together in integrating ICT across curriculum during the lesson. The professional development programmes have also bring our teachers up to speed on using word processing software, internet access and other ICT tools to enrich learning in the classroom. The use of Interactive White Board and Mac Computer in ICT lesson has always been practised in our school. The challenge of all these is to see how ICT can make lessons better.

ICT also make school administration and communication more efficient, and enable educational management to be more effective. The call for ICT integration across the curriculum certainly requires teachers and students to keep abreast with the advances of ICT, and to equip them with ICT skills for more meaningful and creative learning.

# Appendix VI

## Best Practice in the Philippines

### A Public-Private Partnership of the Intel Classmate PC in Teaching Mathematics at Alabang Elementary School

By Lolita Andrada, Angelita Esdicul, Elmer M Guizano  
Department of Education, Philippines

#### Intel Classmate PC Project in the Philippines

Intel® Teach Programme of the Intel Philippines is a worldwide effort to help both experienced teachers and pre-service teachers integrate technology with instruction to develop the students' higher-order thinking skills and enhance learning. By promoting the creation of 21st century skills, the programme develops the building blocks of technical innovation, preparing today's students for tomorrow's workforce. With a focus on integrating e-learning into the curriculum, this programme promotes a project-based, inquiry-oriented approach to teaching and learning.

Alabang Elementary School along with Muntinlupa Elementary School were the only pilot schools all over the country chosen by Intel Philippines in coordination with the Department of Education and Foundation for Information Technology Education (FITED) to implement this e-learning programme. The two pilot schools were given forty five (45) CMPC Notebooks each to find out the effectiveness of this technology in classroom teaching. Mathematics was assigned in Alabang Elementary School.

#### Objectives of the Project

The project primary goal is to augment learning through the use of Classmate PC Notebook that is wi-fi tapped into global resources such as in different web-based activities in Mathematics. It also aims to develop students' higher-level thinking skills. Improve the learning, research, communications, productivity strategies, and working in teams to solve problems.

#### Teaching and Learning Tasks and Activities in the Project

In July of 2007, Intel Philippines handed over to the school 45 CMPC notebooks. Basic training and familiarization on the use of the technology was given to all pilot teachers. On the following month, readiness trainings to the new technology and adjustments were conducted to the pilot class. Followed by a one week schooling at University of the Philippines National Institute of Science and Mathematics Education (UP-NISMED) which aims to provide the teachers the knowledge of integrating technology use in their lesson plans. More than 20 teachers were trained in this workshop. In addition to these trainings administrative and technical workshops were conducted for the teachers so that they can support the learning with technology. Alabang Elementary School started the programme in the third quarter of 2007. Pupils had their trial utilization of the CMPC, pilot teachers familiarize themselves in different computer operations, proper internet surfing, creating their own e-mail addresses and the vital knowledge of the Microsoft Windows such as Word, Excel and the PowerPoint.

The school administered pre and post survey to pupils and teachers as well as pre and post - test in Mathematics to determine its effectiveness in terms of pupils' performance and its effect on the attitude of both the teacher and pupil respondents of Alabang Elementary School. The pre-test and post-test results of the Experimental Group in Math in terms of Mean Percentage Scores (MPS) are 51.25 and 78.50, respectively.

While the pre-test and post-test results of the Control Group are 48.36 and 76.63, respectively. Pretest result of the experimental group falls on the nearing-mastery level while for the control group falls on non-nearing mastery level. Post-test results of the two groups fall on mastery level. Experimental Group posted mean gain of 27.25 while the control group, 28.27. This signifies that there is a significant difference between the pre-test and post-test results. Test for significance of gain computation yielded 0.2769, which is higher than the tabular value at  $df = 44$  and significant at .05 level of confidence.

## Findings on the Assessment of Pupils

Indicators	Post Survey Results	Interpretation
Technology Literacy Skills	2.00	They can use CMPC or application independently.
Technology Supported Classroom Practices	2.46	They are exposed to the technology once or twice a week.
Using the Classroom Computer	3.37	They used technology for academic improvement once or twice a week.
Student Engagement	3.46	They strongly agree that this technology helps them improve the quality of school work.

In general, the exposure of pupils to this technology enhanced their comprehension of concepts, developed their higher order thinking skills and ability to articulate views, increased pupil achievement and productivity, sustained their attention and interest in class, and provided opportunity for collaboration among them. Pupils learned not only by using textbooks and other printed materials but also through the use of technology.

## Findings on Teacher Self-Assessment

Indicators	Post Survey Results	Interpretation
Its Introduction in the Classroom	4.67	They uphold its importance for personal & professional dev't.
His Professional Development	3.00	They agree that this provides adequate professional dev't needed.
His Knowledge of Pedagogy & Technology Integration	1.00	They ascertain that this technology influenced how they teach
They ascertain that this technology influenced how they teach	3.46	They ascertain that this technology influenced how they teach
His Attitudes Toward Technology	5.00	They were very enthusiastic thus making them create innovative and collaborative learning environment.
His Comfort/Skill with Technology	2.48	They have access to ICT at school & at home, can use these independently & always use these.
His Pupils Outcomes	2.71	They perceived that CMPC influenced a lot to their pupil's performance.

## Pre and Post-Test Results

Group	Pre-test	Post-test	Gain
Experimental Group	51.25	78.50	27.25
Control Group	48.36	76.63	28.27

## Impacts on Students' Learning Outcomes

Exposure of pupils to this technology impacted their study habits, their being attentive to class and their attendance to school, thus, this technology is a promising tool which can also be applied to other subjects in the curriculum.

The use of Intel Classmate PC has also a favourable impact on the teacher's efficiency and effectiveness. This technology shows potential and is an acceptable tool for the teachers which are suitable for use in other elementary schools of the Division.

In general, the exposure of pupils to this technology enhanced their comprehension of concepts, developed their higher order thinking skills and ability to articulate views, increased pupil achievement and productivity, sustained their attention and interest in class, and provided opportunity for collaboration among them. Pupils learned not only by using textbooks and other printed materials but also through the use of technology.

## Transformation of School and Classroom Practices

In an Intel-powered classmate PC environment, the school curriculum has improved in a multitude of ways. Here are few examples of how our classmate PC tools and applications enhanced lessons today: Lessons are conducted more efficiently allowing students to spend less time copying and writing data, and more time analyzing and thinking critically. Classroom activities are enhanced by utilizing up-to-the-minute Internet research and communication. It involves more creativity as classmate PCs let students develop not only written documents, but also multimedia presentations with graphics and videos. Math lessons become more fun as students tackle problems through game-like software. Multiple choice quizzes and tests can be administered via computer, making assessments more efficient. Additionally, classroom management software enables teachers to monitor, communicate, and collaborate with students, individually or as a group, to keep them focused and engaged in learning.



Classmate PCs have transformed student attitudes and motivation for learning. Students were more attentive and participative. Whereas they were quiet before, they are now offering answers and asking questions in class.

Students are learning more as a result of one-to-one classmate PC use in their classrooms. Students are more motivated in classes, because of increased engagement; many students are staying late, even during their breaks, to continue working on their classmate PCs. Additionally, students often take their explorations of a subject beyond what has been presented in class. This technology is such as motivator. They become more driven to find out their own information that way. To guarantee the steadfastness and effectiveness of this educational project, continuous training is expectant to all pilot teachers and administrators of this programme. Technology maintenance is also encouraged.

# Appendix VII

## Best Practice in Thailand

### A Public-Private Partnership of the Distant Learning Foundation Project at Wang Klaikangwon School

By Sathien Usaha

Ministry of Education, Thailand

#### **Wang Klaikangwon School (Hua Hin, Prachuab Khirikhan)**

#### **Model: Distance Education via Satellite Broadcast and Flexible Learning**



The DLF project started in 1995 with an initial fund of 50 million baht granted by His Majesty the King and was established by Distant Learning Foundation in cooperation with Ministry of Education, the TOT Corporation Public Company Limited, the Ministry of Foreign Affairs, and international organizations under the aegis of the United Nations. The DLF presently broadcasts educational TV programmes via satellite and Internet ([www.dlf.ac.th](http://www.dlf.ac.th)) through 15 channels.

#### Objectives

- Solve the problem of teacher shortage in the rural areas that lack teaching staffs in many subjects, particularly Math, Science and English.
- Expand education opportunities to reach all students.
- Promote equal access to quality education.

#### Teaching and Learning Tasks and Activities

For broadcasting educational programmes, of all 15 channels, 12 channels are devoted for the direct teaching programmes at basic education levels and the other channels are broadcasted with vocational and higher education, and international programmes respectively.

To provide teaching and learning, filming locations are the live normal classrooms setup with students present. The instruments used in the classrooms are carefully chosen and positioned to serve students' visibility and protect filming equipment. Another distinctive point about teaching and learning environment of the setup classroom is the fact that it is arranged with the concern of low cost and simplicity.

Besides, to encourage students in remote schools to receive the same quality of education standards as those in the source school, at the classroom studio there is a telephone and facsimile as well as document station for facilitating students and teachers in the destination schools in case they have any question. This allows the destination schools to have full interaction with the teacher in the source schools.

Although most of the broadcasted programmes focus on providing the basic education to students from grade 1-12 based on the required curriculums, there are also the programmes that teach about local wisdom, art as well as history. For instance, with the initiative of H M King Bhumibol Adulyadej, the programme named “Quest for Knowledge” has been arisen. In this programme, it will broadcast the event that the king or teachers from Wang Klaikangwon School take the students to the local landmarks or the sites of the royal projects, teach and help them get information. This will inspire remote students with outdoor extra-curriculums while the actual outdoor activities are hard to conduct in the remote areas due to lack of transportation, staffs and funds.

## Impact on Students' Learning Outcomes

Firstly, as stated in the objectives, this project brings more educational access and opportunities for the students in rural areas. Via satellite, the students will have the same teachers and equal quality education as those in the source school. This also results in positive psychological effects to the rural poor children who might previously felt they were left behind.

Also, when looking at the educational achievements of the students joining the DLF programme, it has been found that many of them could pursue their higher education in universities and graduated with satisfactory learning results. For example, in 2006, there were 37 students, who used to study in DFL schools, graduating from universities with the honours.

In addition to the benefits this project bring to the disadvantaged group of students, through the Internet connection, the DFL programme also helps Thai and foreign citizens living abroad learn Thai language and tradition.

## Transformation of Classroom and School Practices by Teachers/School Leaders

After the project has started, there has been much transformation of classrooms and school practices by teachers and school leaders. For teachers, many of them have mentioned that participating in this project is very challenging in that they have more responsibilities of teaching a large number of students from various locations and handle much more issues regarding technology adoption and the appropriate lessons supporting learning environment. The teachers at Wang Klaikangwon School have to spend more time carefully choosing learning activities that also suit the students in a destination school, and they also develop their lessons including those in electronic formats by themselves.

In order to help the teachers adapt to new teaching and learning environment, the teachers have received the trainings in core subjects at universities. For example, to improve teaching of Science, the teachers will learn not only modern scientific content but also new ways of working on lab. Besides the training at the universities in the country, the teachers also get the support from abroad.



For example, with the support from University of Oregon Eugene and East Side Union High School District (San Jose) cooperating with DLF, the VDO conference was set up in 2001 so as to provide the trainings for Thai teachers. The trainings were related to Thai Learning, Resource Utilization, and English Language Teaching and Computer-Based Tools for English Language Teaching.

For school leaders, they are a group that has to adapt significantly in the transformation of Long-distance learning project. They have to shift their focus attention to preparing the equipment and environment to fit the new way of teaching and learning, and managing a school's Fiscal and Physical Resources. New skill sets of the staffs have to be considered when training and recruiting. For example, teaching staffs have to possess some basic ICT skills in order to be able to support students during satellite class.

## Implications and Lesson Learnt

Since 1995, it has been more than 14 years that many Thai citizens have received the benefit of broadcasted television programmes, and there are more than 15 thousand schools now participating in the project. Long-distance learning project is also believed to be a long-term resolution for sensitive areas such as the southern-part in order to solve the problem of inadequate teaching staffs. Besides, the project also encourages the citizens, regardless races or religions, to learn to communicate in Thai and adopt more Thai culture. The learning opportunity is not only limited to Thai people but also neighbour countries such as Lao People's Democratic Republic and Vietnam whose people can watch the satellite TV broadcasted from Thailand.

To summarize, the project outcome has so far been much better than expected. The teacher shortage rate decreases, and the school as well as collaborators can concentrate more on improving teacher quality. For schools which are ready in terms of teaching and learning facilities and quality, they are still willing to join the project so as to get free services e.g. electronic courseware, cable TV connection, etc.

However, after a long and laborious implementing stage, it has been found that most of the schools still face a problem due to a lack of personnel who maintains equipments which are used in receiving the broadcasted signal. Besides, teacher also requires continuing support from both public and private sectors in training for new contents and techniques together with ICT skills to enable them to integrate successfully into a new way of teaching and learning.

## Appendix VIII

# Best Practice in Myanmar – ICT in Educational Plans and Policies that Involve Partnerships among Government Agencies and Universities

By Myint Myint Thein

Dagon University, Myanmar

### Objectives of the Programme

The main aim of the programme was to provide schools in Myanmar with sustainable solutions for mobilizing ICT, training and educational resources to improve learning outcomes. Participating schools and institutions were provided with global best practice in training, ICT, educational resources, and evaluation tools to build their capacity to better prepare their students for the new global economy.[1]

### Teaching and Learning Tasks and Activities in the Projects

Myanmar introduced ICT quite early. The first computer centre, Universities Computer Centre (UCC), was established in 1971. In the mid-1980s there were efforts to introduce e- government mainly for administrative purposes via the Computing Development Project (CDP), a UNDP project. But there was no national ICT development policy.[2]

The Government of Myanmar has developed a 30-year long-term education development plan .There were six phases of planning. As part of the Special Four-Year Plan for Education, the ICT infrastructure consisting of e-learning centres, computer training centres, e-resource centres to aid in the application of ICT in teaching and learning has been established in all the higher education institutions under the Ministry of Education. In particular, the setting up of computer centres in higher education institutions has enabled the teaching of computing as a compulsory subject and the enhancing of ICT skills of students. The long-term plan aims to consolidate on the gains made by the four-year plan.[3]

Education has been built for the production and transmission of learning materials. The Ministry of Education launched 203 e-Education learning centres that utilize Satellite Data Broadcasting System in collaboration with the Ministry of Information in fiscal year 2000-01 to improve access to technology-enabling distance modalities, open learning and other flexible systems to facilitate life-long education opportunities. The number of learning centres was increased step by step as shown in the following table.[3]

**Table 1: Number of Learning Centres Established between Fiscal Years 2000-01 to 2007-08**

Fiscal Year	High Schools	Department of Education Planning and Training	Higher Education Institutions
2000-2001	144	19	40
2001-2002	94	-	7
2002-2003	148	1	2
2003-2004	162	-	2
2004-2005	4	-	-
2005-2006	1	-	-
2006-2007	117	-	-
2007-2008	-	-	-
<b>Total</b>	<b>670</b>	<b>20</b>	<b>51</b>
<b>Grand Total</b>	<b>741</b>		

Source: Department of Higher Education (Lower Myanmar), MOE

The two Universities of Distance Education utilize the e-Education learning centres for students to follow lectures transmitted via the University of Distance Education (Yangon) studio using the Satellite Data Broadcasting System. The centres also act as reference and study facilities where distance education students are given opportunity to consult their teachers.[3]

Three studios for transmission to learning centres – the Video Studio of Myanmar Education Research Department, the GlobeCaster Studio of University of Distance Education (Yangon), and the Audio Studio of Yangon University of Distance.[3]

**Table 2: Number of Programmes Transmitted to Learning Centres According to Fiscal Year**

Sr. No.	Fiscal Year	No. of Talks, Lectures & Discussions Transmitted	No. of Times Transmitted
1	2000-2001	374	3323
2	2001-2002	429	2663
3	2002-2003	746	3688
4	2003-2004	878	3275
5	2004-2005	688	2767
6	2005-2006	1751	2579
7	2006-2007	1834	2508
8	2007-2008	1627	2838
9	2008-2009	708	1327
<b>Total</b>		<b>9035</b>	<b>24513</b>

Source: Department of Higher Education (Lower Myanmar)

The WAN system was introduced in the Ministry of Education using the VSAT system in fiscal year 2000-01 and management tasks were carried out. It is being used for the exchange of information, e-mailing, the Internet, etc. among departments, education institutions and the Minister's Office under the Ministry of Education.[3]

Internet facilities have been provided to all higher education institutions to be accessed at any time for study and research purposes by students, teachers and researchers, and the Internet uses the broadband system based on the VSAT system. Hence data, pictures and sound can be received.[3]

The Wide Area Network (WAN) and Electronic Data Broadcasting System under the Ministry of Education electronically connect all the 44 institutions of higher education, all the 20 Education Colleges, 100 basic education secondary schools, all the 10 departments under the Ministry of Education. Some higher education institutions also have access to wireless video conferencing facilities.[3]

In addition to these phases of training, many administrative, technical, and managerial workshops were conducted for the teachers so that they could support the learning with technology. ICT support for schools in Myanmar was provided.

80 teachers from universities and 40 teachers from 20 Education colleges under MOE are participated in all the different phases of training at the Department of Computer Studies, University of Yangon.

On returning to their schools and universities, these teachers conducted echo training for their colleagues. Both core- and echo-trained teachers commented that they have gained knowledge and skills in basic ICT as most of them had no prior knowledge of ICT.

**Table 3: Type and Number of ICT Facilities Provided to Schools in 2008-09 AY[3]**

Facility	No. of Schools
Schools equipped with multimedia classrooms	1200
Schools equipped with 3 platforms –computer, video & audio	609
Schools equipped with 2 platforms – video & audio	1348
Schools equipped with 1 platform – audio	30790
Total	33947

They are now able to operate the computer, type using a word processing programme, access the Internet to search for resources, and use e-mail. However, most of them are not familiar with using spreadsheet and presentation software. Students too have expressed that they have learnt how to use the computers.

The frequency of use of ICT for teaching and learning was low as most teachers were not familiar, had no time to prepare teaching materials, and had difficulty accessing computers to work on their lesson preparation. There were very few tele-collaboration projects being done and hardly any use of the Internet for teaching and learning. Teachers and students had difficulty finding relevant Internet sites as there are few sites written in their national language.

Teachers typed out notes and worksheets for students using the word processor software. Some of these notes contained materials that were downloaded from the internet. These notes were printed out and distributed to the students. Teachers mentioned that they did not use the lab for any content teaching as the labs were fully used for teaching of ICT skills. Students were able to access the lab after school hours or used cyber cafes to access the Internet. Students and teachers reported that they had been involved in collaborative work and have enjoyed their collaborative work. A few groups of students mentioned that they have to use the Internet for research. . They mentioned that teaching with ICT was still very rare because of many reasons. They also expressed that the ICT facilities were not sufficient as they were planning to conduct school-wide ICT programmes for most of the students.[1]

The Department of India- Myanmar Centre for Enhancement of IT Skills (IMCEITS) was established on 16th October 2008 at University of Computer Studies (Hlaing Campus) and other 10 Information Centres are opened at Computer Universities and colleges. The centres are collaborated with Centre for Development of Advanced Computing.

Department of Computer Studies, University Of Yangon has initiated the online MSc (Computer Science) and Diploma (Computer Science) programme using the web-based teaching system in 2005. Students can use their own computers to learn, answer, and discuss from anywhere they wish to follow the course. Another institution, Yangon Institute of Economics launched an MBA programme using the online system in January 2008.[3]

Online library system (i.e. Myanmar e-library) was launched on 11th March 2007 and the web-site is <http://www.elibrary.com.mm>. Myanmar e-Library features all rare books, newspapers, journals, historic pay and parabike, international books, school syllabus, text books and encyclopaedia from the libraries of 38 Colleges and Universities around Myanmar, in digital format.[4]

## Impact on Students' Learning Outcomes

Transformation of the learning environment of higher education sub-sector into a technologically pervasive environment to be in tandem with advances in ICT began in the FY 2000-01 with the initiation of the Special Four-Year Plan.

Under the plan, Computer Training Centres, e-Education Resource Centres, e-Education Learning Centres, Audio Type Language Labs, Computer-Aided Language Labs, Multimedia Lecture Rooms and Conference Rooms were established at all the higher education institutions under the Ministry of Education. The establishment of such centres with ICT facilities has brought about fundamental transformations to higher education institutions enabling learners to use ICT in their learning and the faculty to provide improved instruction to their students.

At the higher education level, the two distance education universities, Yangon University of Distance Education and Mandalay University of Distance Education provide part of their instruction at the 741 learning centres utilizing e-learning.[3]

Yangon Institute of Economics offers the Diploma in Education Management, which is a one-year tri-semester programme to enhance management skills of senior faculty and administrators. Part of the programme is spent at the respective home institutions and instruction is provided through e-learning. The English Department of Yangon University has also launched the Young Faculty Development Programme to upgrade the teaching skills of young faculty of English Departments of higher education institutions located all over Myanmar. The innovative programme is based on materials available on the Internet and conducted using the Satellite Data Broadcasting System and viewable at the learning centres of higher education institutions. The Diploma in Library and Information Management Programme initiated with the aim of upgrading the quality of the staff of libraries of higher education institutions utilizes computer aided Web-based e-Exam to test course participants.[3]

The Ministry of Education is increasingly using e-learning to provide short term training and educative programmes relevant to a wide audience as it has proved to be a cost effective means of disseminating knowledge and skills. The Ministry of Education has initiated online training programmes at learning centres using the Satellite Data Broadcasting System. The online Non-formal Education training programme held in November 2003 was in the form of lectures, demonstrations, quizzes, plays and tele-conferencing. Over 7200 persons participated in the training programme. The introduction of the on-line training programmes has enabled the reduction of training cost and at the same time has made it possible to increase the number of trainees.[3]

As a result of the establishment of the ICT infrastructure, more than 1.25 million students in the basic education sub-sector, nearly 10000 teacher trainees at education colleges and about 700000 students in the higher education sub-sector are being provided knowledge and skills including regular academic programmes through e-learning centres throughout Myanmar.[3]

## Transformation of School and Classroom Practices

Since 1999, the Ministry of Education has been giving careful consideration to the nurturing of teachers for e-instruction. Postgraduate Diploma in Multimedia Arts (PGDMA) has been initiated at the Institutes of Education. The courses focus on the development of ICT knowledge and skills of basic education teachers for application of ICT in their teaching and the management of the multimedia classrooms in schools. The curricula for the courses have been revised to make them more in tune with current and future needs.[3]

Similarly at the higher education level, courses such as e-Government Course, DHEs Computerization Course, Photo database Course, MYAN1\_EDU Portal Application Course, the MSc Computer Science Course for Faculty and Administrative Staff, the Post Graduate Diploma in Computer Science Course, BSc (Engg) Information Technology and Electrical Engineering were launched with the aim of building a pool of ICT specialists to develop, teach and manage ICT and e-education programmes at institutions and departments under the ministry. Technicians, faculty and high school teachers have also been provided with training in the operation and maintenance of ICT appliances, production of ICT-based learning materials and the administration of learning centres.[3]

Expansion of accessibility can also be seen in the education sector. Although there were only 32 colleges, degree colleges and universities in 1988, at present there are 158 colleges, degree colleges and universities, with an increase of 126 higher education institutions. As regards the number of teachers, there is a total of 5368 teachers in 1988 and at present 10718 academic staffs in the higher education sector. The total number of undergraduate and postgraduate students at universities and degree colleges is 419341 at present and only 134325 students in 1988. Doctoral courses have been offered in universities under the ministry of Education since 1994-1995 AY and in 2008 there are altogether 2650 candidates and who have received their doctoral degree in their respective disciplines. University teachers have been carrying out research work in their respective fields. The higher education sector promotes collaborations with regional organizations, international research centres and foreign universities. In 1998, Myanmar became a member of the SEAMEO, in 2000, SEAMEO CHAT was established and in 1997, Yangon University and Yangon Institute of Economics became members of ASEAN University Network (AUN). International seminars and conferences are held in the education sectors.[5]

Regarding three Pilot Schools are chosen for the Project, namely No.(2) Basic Education High School, Dagon; No.(1) Basic Education High School, Kyauktan and No.(3) Basic Education High School, Bago. The teachers from these schools were trained for computer skills and English speaking. According to the needs of the respective schools renovation and installation of computers is to be continued on. With the assistance of technicians, courseware for curriculum of grades 5,6,7 and 8 are to be produced in Myanmar Language. Some courses are to be translated into English Language and link with other School Net countries. Beneficiary Schools will be not only the three Pilot Schools but also the 100 schools internettted by the Bagan Cybertech. The utilization of Multi-media classrooms has been started since 1998.[6]

## Implications and Lessons Learnt

The Ministry of Education has set itself the goal that every child leaving school should be familiar with the computer and scientifically literate. The government is strongly encouraging the use of ICT in education and has collaborated with the private sector and local communities and established multimedia classrooms and computer laboratories in basic education schools. In addition, specially designed software for basic education has been made available. The harnessing of ICT in education in Myanmar will have a great impact on the provision of quality education to every part of the country and will lead to the development of better-qualified human resource in the country.[3]

As the first phase, 100 basic education schools all over Myanmar have been provided access to the Internet using dial-up communication system. With the provision of Internet access, Myanmar schools now have access not only to the Internet but also to e-education programmes.[3]

e-Learning has also been utilized for teacher upgrading programmes. A refresher course on English Language Teaching Methodology for secondary school teachers of English has also been conducted in the form of e-learning.

Information and Communication Technology (ICT) Courses for university students are introduction to Computer System, introduction to Internet and email, Operating System, Word Processing, Presentation, Spread Sheet for first year, Internet and Internet Services, Database for second year and Visual Basic Programming, Web Development for third year.

For higher education, the students from the Universities, Degree Colleges and Colleges are learned ICT courses at Computer Training Centre of their institutions. They are trained by their teachers 50 hours per academic year. After three years, they have learned ICT courses about 150 hours.

## Conclusion

The main findings in this paper suggest that the programme in Myanmar met only some of aims that it has set out to achieve. To be developed ICT in Education, the training courses for trainer should be opened continuously and the students should be in touch with ICT all the time. By harnessing ICT and the Internet, the education sector has acquired the ability to carry out its activities on a more extensive basis while at the same time providing services that are becoming more efficient, flexible, and convenient for knowledge seekers.

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# Appendix IX

## Best Practice in Malaysia

### iLearn Programme to Support Teachers' ICT-Mediated Teaching and Learning Pedagogies

By Shamsuddin Hassan  
Ministry of Education, Malaysia

#### Introduction

Certain conditions need to be satisfied before any innovation can be diffused successfully to the users. In the case of integrating ICT in the classrooms, two main conditions as identified by Wan Zah, Hajar et. al.<sup>19</sup> are the availability of ICT resources and acquisition of knowledge. In the case of this project, resources were the ICT infrastructure and the digital teaching and learning materials. ICT infrastructure is readily available in the schools as explained earlier. As for the materials, until 2008, the Educational Technology Division of the Ministry of Education, had produced and made available a total of 3,778 titles of materials in the form of CDs, learning course wares, interactive CD ROM, audio and video CDs, and web based materials of various subjects for pre-school, primary and secondary school levels (See Table 1). On top of that, learning materials are also available via the Ministry of Education's web-based educational television, [www.eduwebtv.com](http://www.eduwebtv.com), which came on board in 2008.

**Table 1: Teaching and Learning Materials produced by Educational Technology Division (1999-2008)**

Type of Materials/Project	Pre-school	Primary	Secondary	Total
Education courseware for Smart School Pilot Project (1999-2002)		494	1000	1494
Education courseware for Teaching of Maths and Science in English programme (2003-2005)		193	437	630
Educational courseware CDRI (1999-2007)	12	131	157	300
Audio/Video CD		27	34	61
e-materials (web based)(2004-2008)		324	959	1293
Total				<b>3778</b>

(Source: Senarai Judul Bahan Pelbagai Media 2008, Sektor Pembangunan Pelbagai Media Educational Technology Division, Ministry of Education, 2007).

In order to provide the other condition, i.e. knowledge to utilise the resources, the project was started in 2007 as an intervention programme to encourage teacher to use active learning, especially involving the use of ICT as teaching and learning tools. It was an extension of an earlier pilot programme on integrating ICT into teaching and learning involving 1042 teachers<sup>20</sup>. Active learning is a learning method where students actively participate in the learning processes. The programme, called i-Learn, aids teachers in preparing various students-centred activities especially involving ICT in preparing their lessons. Hence the programme is built based on age old adage "What I hear, I forget; what I see, I know; what I do, I understand" and Edgar Dale's Learning Cone<sup>21</sup> (see Figure 1).



**Figure1: The Learning Cone.**

The programme is also in line with the Malaysian Smart School initiative in building the ICT culture amongst the school fraternity with a long term aim of providing the nation's future work force with the necessary information age knowledge and skills.

Furthermore, Rahim Bakar and Shamsiah Mohamed 22. said that teachers need to achieve a certain level of technological competence to enable them to understand how and be able to meaningfully integrate ICT into teaching. The project intends to provide them with some semblance of competency to enable them to utilise the available resources in their teaching and learning.

### What is i-Learn?

i-Learn is an intervention programme where teachers were exposed to cousewares and digital teaching and learning materials and learn how to integrate them into active teaching and learning activities with appropriate pedagogical practices. Various techniques such as demonstration, discussion, project work were employed to engage the teachers. Continuous evaluation were incorporated into all the sessions to gauge the effectiveness of the programme.

## Programme's Aim and Objectives

The main aim of the programme is to optimise the ICT in the school in providing active learning environment.

The overall objectives are:

- Providing meaningful and effective learning;
- Providing student-centred active learning activities;
- Integrating learning resources (especially digital learning resources) into the learning process; and
- Inculcating higher order thinking skills amongst students.

Specifically, the programme empowers teachers to:

- Identify characteristics of electronic teaching learning materials (known as e-materials);
- Applying e-materials in the teaching and learning method;
- Providing active teaching and learning environment using e-materials and various coursewares;
- Choosing “shareable content object” (SCO) that is appropriate to the learning objectives; and
- Obtaining useful feedbacks from users regarding the e-materials employed in the activities.

## Participants

A total of 794 participants were involved in the programme. They were selected from various schools, district education office, state education office and the Ministry of Education's officers to represent a stratified sampling of the countries teaching population. They were divided according to the country's geographical zones. Taking into account similar programme done in 2006 where 1042 participants were involved, a total of 1836 persons were involved in this programme.

## Activities

The integration of teaching learning materials into teaching and learning were carried out via three types of activities, namely class activities, post class activities and project based activities. These activities were carried out via demonstrations, discussions, micro teaching practices, individual and group project works. Participants were guided to prepare lesson plans for the three groups of teaching activities with particular focus on student-centred adaptational and innovational use of the various available e-learning materials.

Lesson plans were created based on appropriate and practical pedagogical practices in integrating ICT in teaching learning. These plans were later presented to other participants in micro teaching groups. To enhance their ICT knowledge and skills, basic lessons on creating electronic presentations and hyperlinking were also included. Formative evaluations were conducted progressively throughout the sessions and summative evaluations were done based on the output of the group project at the end of the session. Sample activity is attached.

## Analysis and Conclusions

Pre and post evaluation were conducted to evaluate the effectiveness of the programme. Participants were asked to gauge their level of knowledge on the characteristics of the digital teaching and learning materials, skills on using computers as teaching and learning tools; and skills in using digital teaching and learning materials; before and after the programme. Participants were also asked to rate their level of confidence in training other teachers after undergoing such a programme. Analyses of the responses were given in Figure 2, 3, 4, and 5.

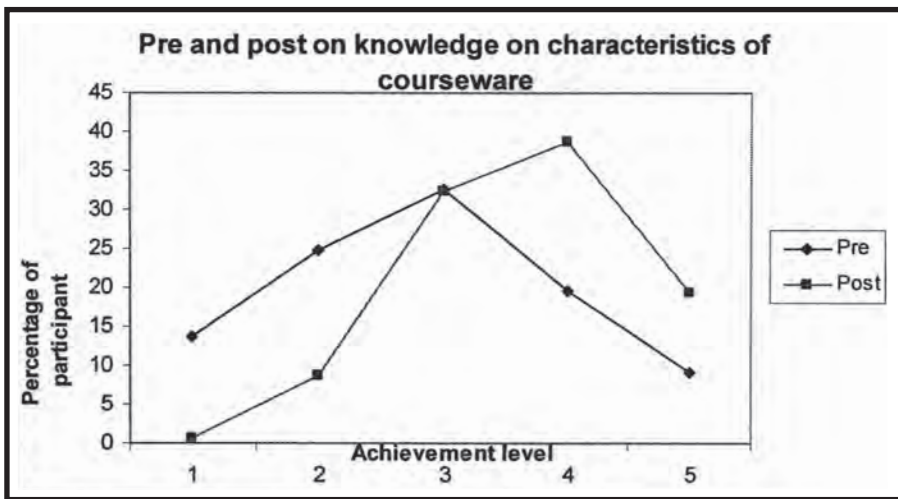


Figure 2: Pre and post evaluation of the knowledge of participants on courseware characteristics.

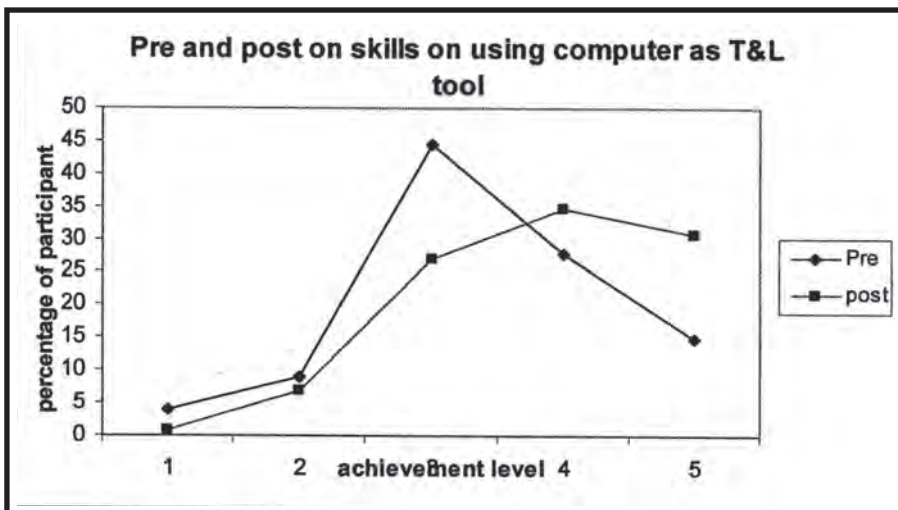


Figure 3: Pre and post evaluation on skills on using computer as teaching and learning tool

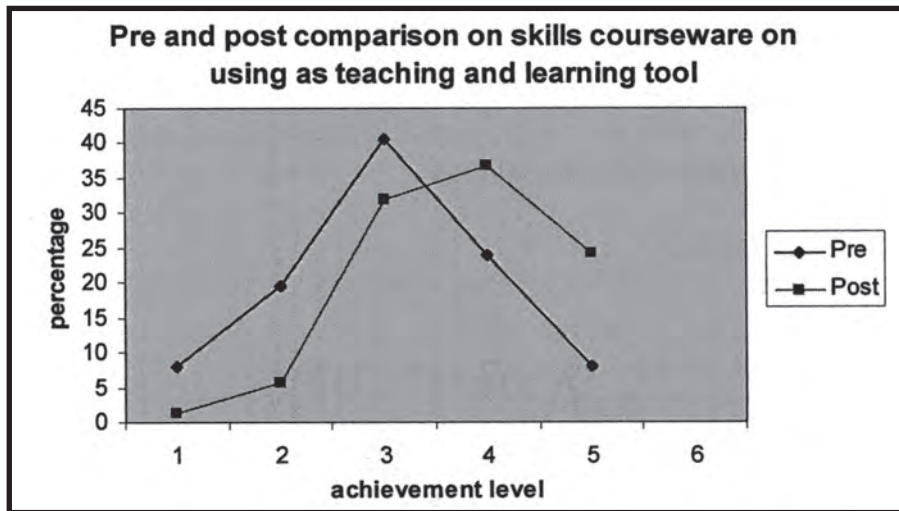


Figure 4: Pre and post evaluation on skills on using courseware as teaching and learning tool.

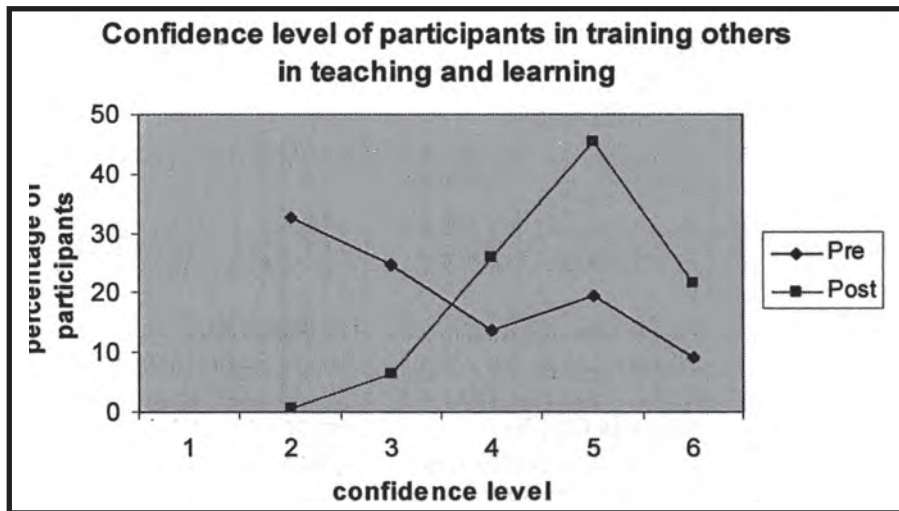


Figure 5: Confidence level of participants in training others in using computers in teaching and learning.

The i-Learn project had resounding positive responses from the participants. Below are some of the findings:

- i. The exposure on the variety of teaching learning materials available were extremely useful and 90% of them did not have prior knowledge the characteristics of the materials provided let alone using them in the classrooms.
- ii. The duration of the project for each zone should be extended longer and expanded to other regions for wider coverage.
- iii. The knowledge level on using the materials in the classrooms were raised from about 10% to 90% after participating in the project.
- iv. Their generic, critical, mathematical, analytical, critical, innovative, explorative, experimentative, and scientific thinking skills were aroused and honed by designing variety of student-centred teaching learning activities

The results of the analysis of the programme concurs with the findings of Wan Zah, Hajar and Alwi 19 which concluded that teachers lacked knowledge and skills on integrating ICT in the classroom. The programme illustrated the notion proposed by Gimbert and Zembal-Saul (2002) 23. that teachers need to be taught about technology before they can infuse technology into their teaching. Implementation of innovation needs to be introduced with proper training for the teachers so that they can be confident and comfortable with the technology. Their confident level would be tremendously improved given a proper exposure and guidance as evidently shown in this project.

## i-Learn Sample Activities

ENGLISH YEAR 3	
CLASS ACTIVITY	
<b>Subject</b>	: English
<b>Year</b>	: 3
<b>Title</b>	: Making Bread
<b>Theme</b>	: World of Self, Family and Friends
<b>Time</b>	: 60 minutes
<b>Learning Outcome</b>	: Listen to and discriminate similar and different sounds of the English Language.
<b>Specifications</b>	<ul style="list-style-type: none"> <li>• Listen to and repeat initial blends</li> <li>• Listen to and identify different types of letter sounds</li> <li>• Listen to and group words according to the same sounds</li> </ul>

Teacher's Activity	Student's Activity	Student's Skills	Resources
<b>Before session:</b> <ul style="list-style-type: none"> <li>• Prepare teaching aids</li> </ul>	<ul style="list-style-type: none"> <li>• Pupils use the Y307 – Making Bread from e-BahanYear 3 English Language Courseware</li> </ul>	Listening and speaking	e-Bahan Y307 – Making Bread  LCD Projector  Laptop/ Computers
<b>During session: Tasks:</b> <ul style="list-style-type: none"> <li>• Play/sing the song 'The Big Brown Cat'.</li> <li>• Ask the class to sing along.</li> <li>• In groups, pupils present the song to the whole class with appropriate actions.</li> <li>• Videotape the performance</li> </ul>	<ul style="list-style-type: none"> <li>• Work as a whole class</li> <li>• Practice the task</li> <li>• Perform the task</li> </ul>	Listening and speaking	Power point slides  LCD Projector  Laptop/ Desktop  Video Camera
<b>After session:</b> <ul style="list-style-type: none"> <li>• Edit the performance</li> <li>• Show the performance to the students</li> <li>• Upload the performance on the school website if available</li> </ul>	<ul style="list-style-type: none"> <li>• The best group performs in the school assembly</li> </ul>	Speaking	Software related to video editing  Laptop/ Desktop  Materials from internet

### POST CLASS ACTIVITY


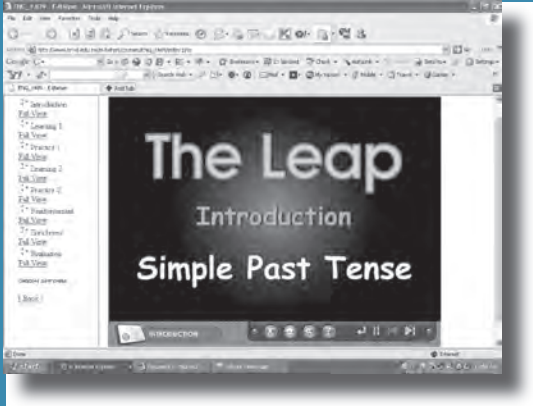

<b>Subject</b>	: English
<b>Year</b>	: 3
<b>Title</b>	: Making Bread
<b>Theme</b>	: World of Self, Family and Friends
<b>Time</b>	: 60 minutes
<b>Learning Outcome</b>	: Listen to and discriminate similar and different sounds of the English Language.
<b>Specifications</b>	<ul style="list-style-type: none"> <li>• Listen to and repeat initial blends</li> <li>• Listen to and identify different types of letter sounds</li> <li>• Listen to and group words according to the same sounds</li> </ul>

Teacher's Activity	Student's Activity	Student's Skills	Resources
<b>Before session:</b> <ul style="list-style-type: none"> <li>• Prepare teaching aids</li> </ul>	<ul style="list-style-type: none"> <li>• Use the e-Bahan</li> </ul>	Listening and speaking	e-Bahan Y307 – Making Bread LCD Projector Laptop / Computers
<b>During session: Tasks:</b> <ul style="list-style-type: none"> <li>• Get pupils to be in pairs.</li> <li>• Pupils are shown a powerpoint presentation of a crossword puzzle.</li> <li>• Provided with the printed copies of the same crossword puzzle.</li> <li>• Present the material in front of the class</li> </ul>	<ul style="list-style-type: none"> <li>• Get into pairs</li> <li>• Look at the powerpoint presentation and get an idea on how to solve it with his/her partner.</li> <li>• Solve the puzzle in pairs</li> <li>• Present the task</li> </ul>	Listening and speaking	LCD Projector Laptop/ Desktop Worksheet
<b>After session:</b> <ul style="list-style-type: none"> <li>• Discuss the answers of the crossword puzzle with the class.</li> <li>• Upload the product on the school website</li> </ul>	<ul style="list-style-type: none"> <li>• Print the power point presentation</li> <li>• Compile the whole class presentation</li> <li>• Display the product at the English Corner/Self Access Learning Center</li> </ul>	Listening and speaking	Printer  Laptop/ Desktop  Materials from the internet



PROJECT BASED ACTIVITY	
<b>Subject</b>	: English
<b>Year</b>	: 3
<b>Title</b>	: Making Bread
<b>Theme</b>	: World of Self, Family and Friends
<b>Time</b>	: 60 minutes
<b>Learning Outcome</b>	: Listen to and discriminate similar and different sounds of the English Language.
<b>Specifications</b>	<ul style="list-style-type: none"> <li>• Listen to and repeat initial blends</li> <li>• Listen to and identify different types of letter sounds</li> <li>• Listen to and group words according to the same sounds</li> </ul>

Teacher's Activity	Student's Activity	Student's Skills	Resources
<b>Before session:</b> <ul style="list-style-type: none"> <li>• Prepare teaching aids</li> </ul>	<ul style="list-style-type: none"> <li>• Pupils use the Y307 – Making Bread from e-Bahan Year 3 English Language Courseware</li> </ul>	Listening and speaking	e-Bahan Y307 – Making Bread LCD Projector Laptop/ Computer
<b>During session:</b> <b>Tasks:</b> <ul style="list-style-type: none"> <li>• Show a digital booklet of a compilation of simple recipes.</li> <li>• Divide pupils in groups of 3-4.</li> <li>• Ask pupils to collect simple recipes from internet and other sources.</li> <li>• Guide pupils on the compilation of recipes into a booklet.</li> <li>• Get pupils to present their digital booklet to the class.</li> </ul>	<ul style="list-style-type: none"> <li>• Observe the powerpoint presentation of the digital booklet.</li> <li>• Get into groups of 3-4.</li> <li>• Collect simple recipes from different sources.</li> <li>• Learn the process of preparing the digital booklet.</li> <li>• In groups, prepare the digital booklet</li> </ul>	Reading, writing and speaking	Sample booklets Laptop/ Desktop Materials from the internet Library Printer
<b>After session:</b> <ul style="list-style-type: none"> <li>• Collect the digital booklets and upload them on the school website</li> </ul>	<ul style="list-style-type: none"> <li>• Submit the digital booklet to teacher.</li> </ul>	Reading	Printer Laptop/ Desktop Materials from the internet

Bil	Tajuk / Tujuan	Print Screen
1	<p>URL <a href="http://www.on-sl.edu.my/e-bahan/courses/ENG_Y307/index.php">http://www.on-sl.edu.my/e-bahan/courses/ENG_Y307/index.php</a></p>	
2	<p>URL <a href="http://www.on-sl.edu.my/e-bahan/courses/ENG_Y409/index.php">http://www.on-sl.edu.my/e-bahan/courses/ENG_Y409/index.php</a></p>	
3	<p>URL <a href="http://www.on-sl.edu.my/e-bahan/courses/ENG_Y409/index.php">http://www.on-sl.edu.my/e-bahan/courses/ENG_Y409/index.php</a></p>	

# Appendix X

## Best Practice in Singapore

### Transforming ICT-Mediated Teaching and Learning Pedagogies in Chinese Language Classrooms

By Chai Boon Yen

Ministry of Education, Singapore

The example given documents the impact, best practices and lessons learnt, as well as discusses the scalability of the 10°C ICT-based Chinese Language Teaching and Learning Programme (or 10°C for short). The programme was initiated by the Ministry of Education of Singapore, and is based on the work of Professor He Kekang from the School of Educational Technology, Beijing Normal University, which proposes an ICT-based Chinese Language (CL) teaching model that enables pupils to play an active role in their own learning. Conducted in China, Professor He's programme leverages pupils' prior knowledge and skills to help optimise lesson time set for the teaching of the core curriculum. Time saved is then allocated for computer-based extended reading and writing activities that are directly related to the corresponding lesson objectives. The methodology has been successfully replicated in more than 200 primary and secondary schools in different provinces across China. The programme has since been adapted and implemented in some schools in Singapore where the Chinese Language (CL) is learnt as a second language.

#### Objectives of the Programme

The aim of the 10°C programme is to harness ICT to promote pupils' interest in CL and to improve their reading and writing skills through authentic language use in a web-based interactive environment. Pupils are given ample opportunities during curriculum time to be engaged in self-paced, differentiated learning and peer interaction, focusing on extensive reading and writing activities that help consolidate and expand learning.

With a focus on language use, 10°C explores the applications of ICT to provide more opportunities for pupils to consolidate and expand their learning, as well as experience incremental successes in writing in every lesson. The use of computer-assisted writing enables pupils to leverage their knowledge of hanyu pinyin to express themselves via text input. This is especially helpful to pupils who may have passive competency in the target language but not the ability to manage the written Chinese text on their own. Such a facility helps unleash pupils' potential in writing, especially amongst those at the lower primary levels and encourages pupils to learn and create in a non-threatening environment.

10°C is in concert with the Singapore Ministry of Education's "Teach Less, Learn More" initiative, given that a substantial portion of the lesson time is allocated for pupils' self-learning on a regular basis. It advocates differentiated learning, where pupils learn according to their own pace and are assigned learning content and activities based on their needs and capabilities. It is also in concert with the vision of the 3rd Masterplan for ICT in Education, which seeks to equip pupils with 21st century skills even as it encourages peer communication and interaction using web2.0 tools.

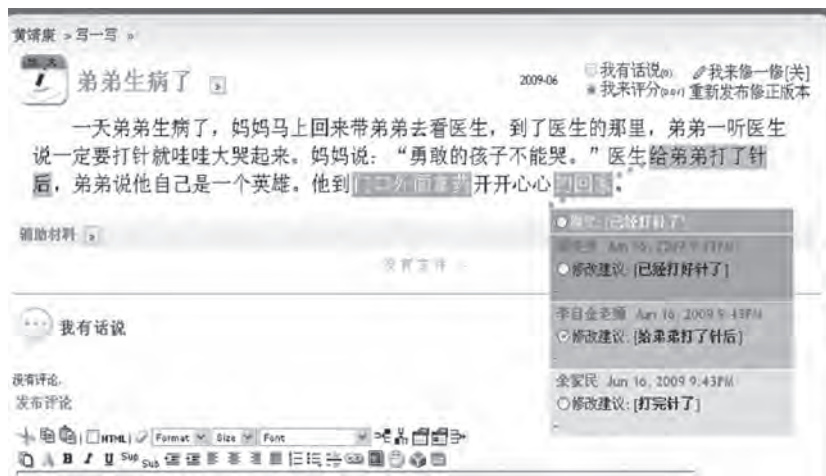
The programme started in January 2008 with 22 classes in 6 primary schools and 4 secondary schools. It has since been extended to more schools, levels and classes. In 2010, 96 classes from 24 schools adopted the 10'C pedagogical model.

10'C has the following features:

- full coverage of the syllabus and curriculum within lesson time;
- allocation of a portion of curriculum time for extended reading and writing activities which are specially designed to reinforce the respective lesson objectives; and
- integration of the word recognition, reading and writing components of CL learning to create conducive conditions and opportunities for self-paced learning

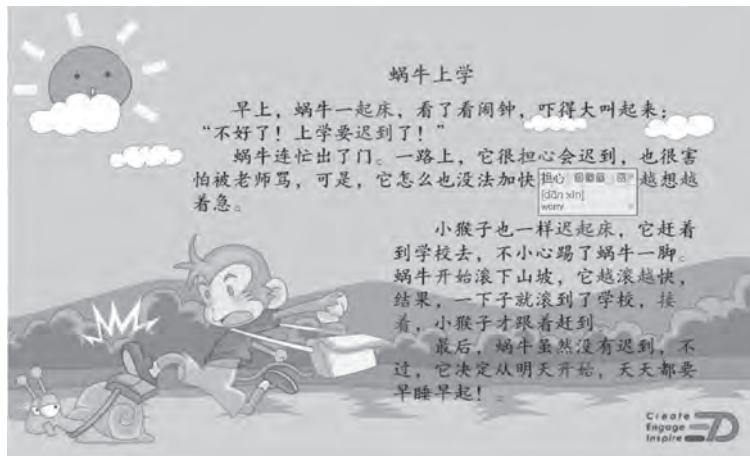
Taking into account the differences between our local pupils and those in China, such as native versus second language competency, cultural variations, teaching methodology and practices as well as learning environment, the following modifications were made to better cater to our target group:

- Creation of a centralised portal with ICT-based interactive tools (e.g. personal blogs, discussion forum, online peer editing, rating system). See figure 10.1.



**Figure 10.1. Teachers and pupils use the on-line editing function to give suggestions on a piece of work.**

- Design and development of over 2000 extended reading resources based on the specific lesson objectives in partnership with 10'C teachers; and
- Provision of multimedia support (e.g. options for hanyu pinyin, pronunciation and dictionary functions) to facilitate self-paced reading (see figure 10.2); and



**Figure 10.2. An example of a reading resource with word bank functions**

- (c) Provision of oral communication activities to assist weaker pupils before introducing them to computer-assisted writing activities.

## Impact on Students' Learning Outcomes

Responses from the participating classes have been positive. Pupils enjoy the lessons, and look forward to the time set aside for self-paced learning. Teachers are heartened to find that their pupils are enthusiastic, actively participating in lessons, and are able to produce good work using computer-assisted writing activities.

Teachers involved in 10'C conducted action research on the programme under the guidance of Dr Soh Kay Cheng, a veteran education research consultant,. Based on teachers' findings, the programme has yielded medium effect size. Dr Soh concluded in his evaluation report that 10'C has produced the desired effect in enhancing pupils' achievement and interest in the learning of the Chinese Language. The reports have since been compiled for publication and distribution to schools.

Officers from the Ministry of Education and teachers from participating schools have presented papers on the project at educational conferences in Singapore and internationally, including the National Institute of Education Conference on Redesigning Pedagogy, the 6th International Conference on Internet Chinese Education (ICICE) in Taipei in 2009, and the International Conference on Teaching and Learning with Technology (ICTLT) in 2010.

## Transformation of School and Classroom Practices

The use of ICT in 10'C has enabled the following:

- (a) **Development of Reading Skills**  
During extended reading sessions, pupils mouse-over unfamiliar words to access the pronunciation that comes with a brief explanation. This use of ICT has helped tentative and diffident readers overcome initial fear of reading the prescribed text. ICT-assisted learning has also facilitated independent and personalised learning among pupils.

(b) Development of Writing Skills

By using the hanyu pinyin text input system, pupils are more ready to express their ideas and thoughts that are at times beyond their store of Chinese characters. More often than not, pupils have prior knowledge of certain concepts and lexical terms acquired through reading or listening, but may not have learnt the respective Chinese script. The use of ICT has helped accelerate the entrance into continuous prose writing.

(c) Differentiated Learning

By using the “assign work” function, teachers can allocate individual pupils with different extended readings, thereby enabling finer differentiation of learning.

(d) Collaboration

The incorporation of web2.0 features has facilitated peer interaction not only within the same class, but also across different classes and schools. Pupils are able to rate, edit and comment on work done by their peers posted in the billboard of the centralised portal. They are engaged in discussions and such opportunities for interaction on a regular basis will go some way in helping pupils develop into collaborative and self-directed learners.

## Implications and Lessons Learnt

Although the project is still in its infancy, the evaluation report of Dr Soh Kay Cheng and feedback from both teachers and students in 2008 and 2009 have been positive and encouraging.

The lack of motivation and interest to study Chinese has been cited by teachers as one of the major reasons for poor performance in this subject and there is a positive indication that 10°C has in some way, addressed the issue.

A primary school principal shares her observation on how 10°C has helped make the learning of the Chinese Language more interesting to her pupils:

***“When we make use of ICT to enhance the learning of the Chinese Language, pupils become more interested in the subject. They always look forward to attending the next Chinese lesson.”***

From the practitioners’ point of view, teachers have found that 10°C has helped achieve lesson objectives. Comments from these teachers include:

***“This teaching method emphasizes the practical usage of the Chinese Language for its learners. Combined with modern ICT tools, pupils are placed in a conducive and practical environment to learn the Chinese Language. I feel that this project is very beneficial.”***

***“Students are able to grasp the main ideas of the reading passages easily. I feel that this is the biggest achievement for students in the 10°C programme.”***

These positive findings have prompted the Ministry of Education to scale up the project to include more schools. In addition, the Ministry has adapted the strategies and lessons learnt for the learning and teaching of other languages, such as Malay and Tamil. An equivalent 10’M programme for the Malay Language, together with a similar portal has been launched in 2010 for pilot schools. This will be followed by the Tamil Language programme in July 2010.

## Appendix XI

### Best Practice in Brunei Darussalam

#### Transforming ICT-Mediated Teaching and Learning

##### Pedagogies in Pre-school Phonic Teaching

By Md Yussor Metassim

Ministry of Education, Brunei Darussalam

The management team of Rimba Primary School has come up with the thought that ICT exposure should not be started at Primary 1 Level. It could be done at the Pre-school level with a different approach of fun and play. With this idea a small step has taken place where the school made teaching of reading as the starting point.

The teaching of phonic reading for pre-school students at Rimba I Primary School is currently integrated with the use of technology, specifically the interactive whiteboard. Previously, there was no integration of technology in the methodology of teaching in the pre-school level. The students in this school will only begin to be introduced to computers and the use of technology across curriculum only happens when they reach Year One. With the new development in technology and ideas, the introduction of technology has begun from the pre-school level. Apart from the interactive whiteboard, the school has also initiated the provision of computers in the pre-school classrooms.

#### Objectives of the Project

The main aim of the programme was to provide early exposures to students on technology and the use of technology. The students and teachers at the pre-school level are expected to utilise the potential benefits of the available technology in the school. It is expected that the learning of the students will be more exciting especially in reading. The teachers have the opportunity to change their teaching practices from conventional teaching methods to an environment where the students are active learners by utilising the use of modern technologies in their teaching. It is believed that the use of the multimedia capabilities of the interactive whiteboard in teaching phonetic could develop student's basic ICT skills. The use of the interactive whiteboard will also encourage teachers to design their own interactive teaching resources that suit their students' ability.

#### Teaching and Learning Tasks and Activities in the Project

The interactive whiteboard was supplied to the school in the middle of year 2008. The pre-school teachers have been trained on how to develop teaching and learning resources by using interactive whiteboard software. The pre-school teachers were able to develop interactive teaching resources in an innovative way of teaching phonics. The pre-school students have the opportunity to learn phonics by doing interactive 'drag and drop' activities and writing the alphabets with the tools available with the interactive whiteboard software. The use of the software allowed the students to write and say the letter by using its respective sounds as the teachers did not have to prepare lots of alphabet/phonetic cards for phonics teaching.

By using the software, the students' attention could be maintained as they are attracted to colourful and interactive materials on the interactive whiteboard rather than using static teaching materials. All the students have participated actively as they are seated in groups instead of learning at their own table and chair.

With the availability of internet connectivity, the teachers have the opportunity to carry out activities that required the students to read simple Malay and English storybooks from relevant educational websites. The students were able to view illustrations of the story clearly and read the sentences clearly on the interactive whiteboard. The teachers observed that reading storybooks with the use of technology has a positive impact to the teaching and learning process as it allowed active learning in the classroom rather than sitting in front of the group holding the book.

One of the teacher commented that her students participated more actively when she used the interactive whiteboard in her teaching when compared to teaching phonics in the conventional teaching approach. Integrating the use of the whiteboard has allowed the students to be active learners in their learning process. The students have also showed their no fear to come forward and do the activities on the interactive whiteboard by themselves.



After six months all the pre-school teachers were glad to see most of their student could read fluently. They believed that the use of technology had helped the student to perform better in their reading. The findings on the reading progress gathered from the three pre-school classes showed that out of 64 students only 19 students have difficulty in reading.

Teaching phonics by using technology have enabled the students to not only acquire basic ICT skills but were also able to acquire other related computer-based activities such as using word processing. By utilising technology in teaching and learning, the demand of individual learning styles could be met.





## Transformation of Classroom and School Practices by Teachers/School Leaders

The use of technology in teaching phonics at the pre-school level has prepared the students towards developing appropriate ICT skills based on the needs of the National Education System for the 21st Century (SPN21). In a conventional classroom, pre-school students would be taught to read out loud the alphabets which might be written on the classroom board. The students would learn the alphabets in the correct sequence by rote learning. The environment is significantly different from the classroom that applies the integration of technology in the teaching and learning process. In the technology integrated classroom environment, the student are encouraged to actively participate in the teaching and learning process where a student's centred environment was able to be created with the teacher as the facilitator in the classroom.



The school leaders are impressed with the performance shown by the pre-school students thus they have encouraged all the teachers in the school especially those who teach English Language, Mathematics and Science to use technology in their teaching and learning especially with the use of the interactive whiteboards available in the school.

## Impact on Students' Learning Outcomes

The pre-school students are expected to be excellent readers at their stage. When they reach Year 1 in 2010 there would be no problems on reading as past experience showed a correlation between reading skills and general performance in academic achievements.

From the teachers report the students have shown a greater improvement and progress in their reading. This achievement and progress has been acknowledged by the school in a ceremony together with their parents. In the month of May this year a big number of the students have read Book 4 and Book 5 and were given prizes as a motivation for them. These students are considered to be independent readers who are expected to go for news paper reading when they completed Book 8 probably by the end of August in 2009.

## Implications and Lessons Learnt

Since there is only one interactive whiteboard available in the pre-school building and being allocated in a special room, the teacher has to take turn to use the facility with a limited time per day.

Preparing activities and teaching resources that utilises technology are time consuming and really challenge the teacher's creativity especially in designing suitable and interactive resources unless the teachers are expert in designing the computer-based activity.

The good implication of integrating technology in teaching phonics is that students become active participants in the classroom. They are active learners as they enjoy the learning environment which is more alive than the conventional classroom.

The school has received positive responses from the school visitors from other countries upon their visit to the school regarding the student capability in dealing with technology related activities especially at the pre-school level.



In this project, we have learnt that introducing reading lessons by integrating the use of technologies has a positive impact on the students ICT skills, communication skills as well as academic performance. By introducing ICT skills at the earliest stage in the school, the students will be more confident and comfortable as they proceed in their education.

## Appendix XII

### Best Practice in Singapore

#### The FutureSchools@Singapore Programme as Part of the Research Agenda for ICT in Education

By Chai Boon Yen

Ministry of Education, Singapore

The FutureSchools@Singapore aims to equip our pupils holistically with the essential skills to be effective workers and citizens in the globalised and digital workplace of the future. Each FutureSchool will also experiment, on a school-wide scale, with various innovative ICT/IDM-enabled pedagogical approaches for supporting high levels of engaged learning and provide possible models for the seamless and pervasive integration of ICT.

The programme is situated in the “Learning of the Future” key programme area of the Interactive Digital Media (IDM) in Education funding initiative supported by the National Research Foundation (NRF). To date, six FutureSchools’ programmes have been funded to support the learning of the future research theme, Learning for the Future, identified by Ministry of Education (MOE).

This example documents preliminary findings of best classroom and school practices, impacts and lessons learnt from the FutureSchools@Singapore programme.

#### Learning and Teaching Tasks and Activities in the Programme

Since its inception in May 2007, our FutureSchools are working very closely with various partners to redesign their curriculum, develop ICT/IDM tools for more engaging and effective learning environments, as well as to research on the impact of ICT/IDM enabled learning and teaching on students’ and teachers’ development.

In one primary FutureSchool, the school is redesigning its curriculum into an integrated curriculum programme for the primary one to five levels. The curriculum integration enables students to make connections between key learning ideas, skills and values across the various subject areas, in contrast to traditional ways of teaching strictly from within subject silos.

To create a coherent end-to-end experience for their students, the school has extended beyond designing an integrated curriculum to also retooling their pedagogy and assessment practices. For example, part of the integrated curriculum experience employs meta-cognitive teaching approaches to help students develop strategies for learning the English Language. Integrated performance tasks have also been designed for primary five students to create 3D animations based on environmental themes such as “Our World”, to demonstrate their learning in Science, English Language and Art.

The school is also partnering a consortium of companies to develop a number of innovative ICT/IDM tools and applications in tandem, and for use within, its integrated curriculum programme. One such development is the 3Dhive/4Di room that is under construction. 3Dhive can be used to create interactive games for students to learn from their collaborative and decision-consequence driven experiences. 4Di affords students the most complete immersion in a simulated learning environment. It facilitates learning and teaching interaction through a seamless wraparound panoramic projection, personal avatars for each student controllable via his personal learning device, simultaneous multi point, multi touch and multi user interface, and positional surround sound.

In a secondary FutureSchool, the school is making changes to the curriculum and pedagogy to develop students to be independent learners who can be very adept in their borderless learning environment.

Teachers work in teams to differentiate the curriculum so as to meet the school's curriculum needs that arise out of the students' profile. The differentiated curriculum is aimed at nurturing the different strengths and interests among students. The curriculum is thus redesigned to be rich in opportunities for students to explore and expand a wide range of intelligences and abilities.

Teachers' pedagogical and assessment practices are also shaped to develop students' critical and creative thinking habits, necessary for making independent learning decisions. For example, biology teachers are employing web-based collaborative concept mapping tools as well as authentic learning tasks to help students discover patterns of overarching concepts and principles as they relate to new content areas. Chinese Language teachers are having students apply their communication skills by acting as newscasters and posting their news production online.

Alternative assessments like presentations and research projects are used to more effectively assess and support student independent learning. Rubrics are given to guide students' learning in these alternative assessment tasks. Maths and Chinese Language teachers are also using reflective blogs for students to engage in a weekly sharing about their reflections on their Maths learning or newspaper articles respectively and for teachers to monitor students' progress and give them timely feedback on their work.

The school is working with their research consultant in conducting design based research to monitor and evaluate the effectiveness of ICT/IDM enabled pedagogical innovations in the school. Teachers viewed these educational research projects as part of their reflective and evidence-based practice, instrumental to the growth and spread of educational innovations in the school.

## Impact on Students' Learning Outcomes

As part of IT Master Plan 3 evaluation study baseline collection across 50 primary and secondary schools and Junior Colleges, 590 primary students and 1619 students from four of the six FutureSchools responded to a 37-items perception survey in May 2009. The survey used a 6-points likert scale to ask on students' self-directed and collaborative learning practices, students' ICT skills, students' use of ICT for school work, including self-directed and collaborative learning, and students' home computing environment.

For the primary FutureSchools, the mean score for students' use of ICT for self-directed learning is 4.56 (SD = 1.35). This is above the national mean of 4.34 (SD = 1.37). Multiple Analysis of Variance is performed to examine the effect of non LeadICT/LeadICT/ FutureSchools school type on the variables score of students' self-directed learning practices, use of ICT for general homework and use of ICT for self-directed learning.

The LEAD ICT@Schools scheme is part of MOE's top-down support for school initiatives and aims to support a wider range and greater number of schools that are ready to achieve a higher level of ICT use from 2006-2008. Besides supporting schools that undertake research in the use of emerging ICT-based pedagogies, the scheme also supports schools that engage in the effective use of ICT-based pedagogies that are scalable and sustainable. Results show that the non LeadICT/LeadICT/FutureSchools school type has a significant effect on the mean score of students' self-directed learning practices, use of ICT for general homework and use of ICT for self-directed learning,  $F(6, 8056) = 5.79$ ,  $P = 0.00$ ; Wilks' Lambda = 0.99; Partial Eta Squared = 0.04 (small effect). We proceed to perform pair-wise comparison to determine which school type means differ significantly from others. Results show that the FutureSchools score significantly higher than LeadICT and non LeadICT schools in students' use of ICT for self-directed learning.

For the secondary FutureSchools, the mean score for students' use of ICT for self-directed learning is 4.88 (SD = 0.96). This is above the national mean of 4.71 (SD = 1.06). The non LeadICT/LeadICT/ FutureSchools school type has a significant effect on the mean score of students' self-directed learning practices, use of ICT for general homework and use of ICT for self-directed learning,  $F(6, 13674) = 40.64$ ,  $P = 0.00$ ; Wilks' Lambda = 0.97; Partial Eta Squared = 0.02 (small effect). Pair-wise comparison results show that the FutureSchools score significantly higher than LeadICT and non LeadICT schools in students' use of ICT for self-directed learning.

In addition, the non LeadICT/LeadICT/FutureSchools school type has a significant effect on the mean score of students' collaborative learning practices, use of ICT for general homework and use of ICT for collaborative learning,  $F(6, 13672) = 38.36$ ,  $P = 0.00$ ; Wilks' Lambda = 0.97; Partial Eta Squared = 0.02 (small effect). Pair-wise comparison results show that the FutureSchools score significantly higher than non LeadICT schools in students' use of ICT for collaborative learning. There is however no significant difference in students' use of ICT for collaborative learning between FutureSchools and LeadICT schools.

## Transformation of Classroom and School Practices by Teachers/School Leaders

In building towards whole-school integration of ICT/IDM use into learning and teaching, our FutureSchools have also embarked on concomitant adjustments in their organizational processes and structures, and professional development practices. This effort reflects the schools' deep belief that innovation must go beyond a new, untested idea; concerted effort and well-planned implementation is required to transform the learning and teaching practices of students and teachers.

In one of the primary FutureSchools, ownership and shared commitment to the programme is ensured through crafting a common vision of the school's direction and purpose. School leaders emphasize the culture of open sharing among all staff. The principal makes time for one-to-one sharing with the teachers which aims to get them to contribute their ideas for the school vision by sharing their philosophy of education, as well as encouraging them to move forward from the old way of doing things. This could mean engaging in educational research or piloting new teaching approaches and re-designing the curriculum. Also, seminars and teacher committee groups have been set up as platforms for discussion of both the school vision and also curriculum design. Teachers often freely express their opinions and concerns during these meetings. In addition, school leaders often join their teaching staff for lunch to discuss their ideas and hear their concerns.

Teachers are placed in different committees to pilot new teaching methods, and their research work is documented and shared with other teachers in research seminars organized by the school. To aid in developing teacher's competence in educational research, a research consultant is available to aid in modifying the pedagogies used according to the theories learnt.

The emphasis on shared leadership has wider implications on the organizational structures in the school such as timetabled time and professional development of the teaching staff. Due to the shared leadership and the culture of open discussion, these organizational structures have been effective in promoting organizational learning, where staff mutually confront problems and develop solutions in learning and teaching.

In another secondary FutureSchool, the school leadership believes that good and committed staff is essential to the success of their FutureSchools programme. The school attempts to provide a positive and supportive environment for teachers implementing the FS programme, through good project management practices such as managing the workload distribution of teachers involved in the project, and implementing a gradual, phased approach when introducing changes to school programmes.

To ensure a shared vision, a common language and commitment amongst the teaching staff, the Principal and school leaders took the lead in personally conducting workshops during the first staff seminar of 2008, which focused on building a shared vision and understanding the programme framework.

The readiness of both teachers and students are taken into consideration in the FutureSchools programme implementation. For example, the school is introducing the IC in phases: Sec 1 in 2008; Sec 2 in 2009 and Sec 3 in 2010. Teachers have undergone training on Socratic Questioning in 2008 to prepare them for carrying out inquiry-based lessons. For alternative assessment, the school requires all departments to gradually introduce it into their curriculum over the years from 2008 and to eventually include a higher percentage score of the alternative assessment component in the summative grades of the students. This gradual approach of introducing alternative assessment will allow teachers and students to grow accustomed to this new style of testing and evaluation.

School leaders believe in building the teachers' capacity in carrying out the FS programme. The professional development plan of the school ensures baseline training for all teachers. The school has scheduled 4 days of professional training biannually for all staff, which consists of 2 days of staff seminars focusing on pedagogy and assessment, and another 2 days of ICT seminars focusing on the integration of ICT into teaching and learning.

Action Research is encouraged at the department level, where teachers collaborate in their subject areas during the white space provided in the time-table for reflective learning. From this collaborative effort at the department level, sharing takes place at the whole school level, often at the biannual staff seminar.

The school has developed a comprehensive, tiered ICT-based training programme for teachers. At the first tier of the programme, teachers are provided with essential ICT skills through the ICT induction programme and biannual ICT Seminar. The second tier of the programme comprises of department level ICT training. At the third tier, teachers who are interested and want to specialize in the use of ICT for learning and teaching can acquire the necessary skills to become an e-Coach. The team of e-Coaches includes teachers from various departments to assist and hand-hold new or beginning teachers in the use of ICT for learning and teaching.

Organizational structures have also been put in place to ensure ownership and scalability is centred on open sharing and reflective learning. The school has set up various sub-committees in areas such as pedagogy, assessment, action research and Curriculum redesign. These sub-committees are headed by Key Personnel to champion innovation and implementation in their respective areas. An example of the involvement of the one of these committees is the review and implementation of the redesigned Curriculum. Regular review sessions, facilitated by the Key Personnel were held with teachers. Teachers were encouraged to reflect on the lesson design and to surface implementation issues for possible rectification. Beyond these review sessions, these teachers also shared during the biannual staff seminar so that other teachers could understand the learning processes as well as their struggles in trying to implement the redesigned curriculum.

## Implications and Lessons Learnt

An internal review of the Phase 1 FutureSchools was carried out in April 2009. The reviews have shown that the primary benefit to schools so far has been the whole-school organizational learning and building of capacity brought about by the FutureSchools project. However, the large-scale, concurrent implementation of various curricular innovations, technology development and educational research activities within a 4-year NRF project timeframe has placed significant strain on schools.

In particular, schools have expressed that they are spending an inordinate amount of time working with industry to develop applications. In addition, concerns have been raised about the interdependencies between the schools' research activities and the completion of the industry partners' IDM products.

Schools are also concerned about sustainability in maintaining these applications after NRF funding expires. They have also expressed a desire for more time and space to refine and establish their curricular programmes and capacity-building processes.

# Appendix XIII

## Initiatives and Capacities on ICT Integration in Education of SEAMEO Regional Centres

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# SEAMEO Regional Centre for Tropical Biology (SEAMEO BIOTROP)

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## A. Area of Expertise on Integrating ICT in Education

The Information Technology Unit is one of the supporting units of SEAMEO BIOTROP. The task of this unit is to provide assistance and support for SEAMEO BIOTROP's staff regarding information technology, i.e. hardware & software maintenance.

SEAMEO BIOTROP has researchers in the field of tropical biology who provide assistance in developing training modules related to their expertise. A Geographic Information System (GIS) and Remote Sensing technology are tools using information and communication technologies (ICT) in natural resources management. This technology can analyze the earth's surface using satellite imagery and mapping. This use of this technology can be passed on to teachers and educators to get a better understanding of geography for use in the classroom.

## B. Programme on Integrating ICT in Education

### 1) Training on Retrieval of Digital Library Documents

#### *Introduction*

Having trouble collecting specific information published in an electronic journal/book or other documents? How can we use search engines in order to obtain desired information? These and other related questions were discussed in a two-day Training Course on Retrieval of Digital Library Documents at SEAMEO BIOTROP.

Information and communication technology – especially the internet – is rapidly evolving. Information and current news can be retrieved very quickly and easily through the internet, and the same is the case with electronic books (e-books) from digital libraries. To find the relevant information desired, a good research and retrieval method is needed.

#### *Objectives*

This training aimed at providing general information about the internet and internet browsers to search and retrieve digital documents. Materials to be taught cover tips and tricks for conducting accurate and quick document retrieval as well as lists of the websites which contain information on electronic books and journals.

It is hoped that after attending the training, participants will have the necessary skill to use search engines in order to obtain the information they are looking for. In addition, the use of internet media for the retrieval of digital library documents will support their teaching and research activities.

### ***Target Group***

The participants consist of teaching staff of the university, researchers, and librarians.

### ***Activities of the Project***

The training was implemented on 28 – 29 July 2009. It is expected that there will be another training session in 2010.

## A. Programme on Integrating ICT in Education

### 1) ICT for Library and Information Professionals

The information society has brought about developments in the way information is created, consolidated and accessed. ICT has produced larger volumes of information, new ways of packaging information and new tools for managing information. These developments require librarians, researchers and other staff to acquire new knowledge and skills to meet the demands of the global economy for information resources and services. ICT has greatly affected libraries, librarians and information seekers. The behaviour of users depends on the existing knowledge base on the searcher. This is also true for the librarian who assists users in their search and is likewise involved in conducting the search and repackaging the information for the user. New knowledge and skills are required for librarians and information seekers to enable them to use the new information formats and tools for searching and repackaging information.

This course is a part of one of the programmes of the Staff Development Plan of SEAMEO CHAT with the guidance of the Department of Higher Education (Lower Myanmar), Ministry of Education, Myanmar. The course has been developed by the Resource Centre under the supervision of the Director of SEAMEO CHAT.

#### **Objectives**

The course is intended to provide the knowledge and skills required for dealing with the application of ICT to library and information services for staff or participants from the Department of Higher Education (Lower Myanmar). It is to help enable other professionals to use the internet in the most efficient way.

#### **Teaching and Learning Tasks**

This course, planned to start in December 2009, has three core lessons: How the internet works; How to search for information on the internet; Ethical, legal and other issues involved in using the internet as an information resource.

**Lesson one:** How the internet works, covers what the internet is, what the major internet tools and services are, what the internet's history is, what the basic internet concepts, terms and technologies are, and how the internet works. Follow up activities for the lesson are: asking the participants to access internet sites with Web OPACs, full text journals, home pages of libraries, and book jobbers, so that they can experience different user interfaces and be aware of their impact on the information-seeking process. Additional activities include having participants work with the site: <http://ipl.sils.umich.edu/ref/websearching.html>, and employ search strategies suitable for the Web.

**Lesson two:** How to search for information on the internet includes ways to find information on the internet, internet search tools and services, how to use the internet tools and services and how to find information on the internet. Following the lesson, participants will be asked to access encyclopaedias and dictionaries, full-text e-journals, e-books, etc. on the internet using the URLs, asking the participants to say something about their libraries, asking questions such as: whether their libraries are automated, or if they have internet access. If the participants have a website, they are to show it to the class and demonstrate the use of search engines, online databases on the internet, etc. The participants will be asked if they have online indexes to access. Then they will be asked to conduct an informal search for information on their topics and to write down the steps they undertook to prepare for a formal search.

**Lesson three:** Ethical, legal and other issues involved in using the internet as an information resource includes how to evaluate information resources on the internet, how to properly cite the information resources found, what the ethical, legal and other issues involved in using the internet are, and what the trends concerning the internet are. The activities that will follow the lesson are: visiting the sites discussed in the previous slides, citing the websites and articles found in the lessons, searching the internet to learn more about these concepts and terms: Internet 2, Next Generation Internet, E-Commerce, B2B, Quantum Computers, Molecular Computers, E-Learning, Virtual Learning, Ubiquitous mobile computing, Virtual environments.

Each lesson includes PowerPoint slides, teaching tips, activities, references and recommended further readings. The lecture has been planned with exercises, activities and discussions.

Although experienced librarians may not be familiar with ICT, ICT for teaching and learning should be widely used. Participants should normally have a degree, with a knowledge of English and a working experience with using computers in a Windows environment. The participant will be from departments under the Department of Higher Education (Lower Myanmar). The lecture will be conducted by a resource person who is knowledgeable and skilful in using computers, the internet, CD-ROMs, and a variety of electronic resources as well as skilled in teaching such courses.

The training room will have computers with CD-Rom drives, online access to the internet and other resources.

This five-day course is designed for: two hours per day.

## Learning Outcomes

By the end of the course, participants should be able to define what internet is, identify the major internet tools and services, discuss briefly the internet's history, utilize internet search tools and services, understand basic internet concepts, terms and technology and describe how the internet works. Participants are expected to gain skills in identifying internet search tools and services, and understand how to properly utilize them. Moreover participants should be able to evaluate information resources on the internet, properly cite the information found on the internet, address the trends and issues concerning the internet and use the internet as an information resource. They should know the value of the impact of ICT on the information industry and services, know the different formats of information resources, know new ways of representing information resources, understand the information seeking behaviour of users in an electronic environment, and appreciate the impact of ICT on the librarian and other information professionals.

## A. Areas of Expertise on Integrating ICT in Education

SEAMEO INNOTECH helps Ministries of Education to use ICT tools to expand access to basic education, improve the quality of teaching and learning in classrooms, and enhance school management and administration. The Centre has been successful in research, capacity building, materials development, providing technical assistance experience in ICT for improving elementary science and mathematics achievement, ICT for schools with limited teachers, ICT-enabled continuing professional education for teachers and school heads, ICT for health, water and sanitation education (including HIV-AIDS preventive education), radio- and video-mediated learning, education resource tracking systems, and ICT-enhanced international conferences.

## B. Programmes and Projects on Integrating ICT in Education

### 1) iFLEX (INNOTECH Flexible Learning Management System)

#### **Background**

SEAMEO INNOTECH has been using a multi-modal flexible learning system that has so far enabled over 1,700 school heads from the Philippines, Indonesia and Thailand to undergo instructional and curriculum leadership training without having to leave their workplaces. This system, called iFLEX, allows learners to attend virtual classes through online chats. The lessons covered and the assessment activities are based on a developed a Competency Framework for School Heads in the Southeast Asian Region, a product of school heads' needs assessment.

The iFLEX system began in 2003 when SEAMEO INNOTECH's LEARNTECH eXCELS Action Research Project was planned. It was pilot-tested starting in 2005, completed and evaluated in 2008.

#### **Activities**

The pilot test consisted of several key activities. The first of these were four research and development (R&D) endeavours that resulted in:

- A competency framework for school heads in the Southeast Asian region;
- Operation guidebooks and competency based instructional modules with built-in and interactive assessment and evaluation activities;
- A multi-modal flexible learning delivery system incorporating print-based, CD/DVD based, and web-based teaching-learning approaches; and
- iFLEX, a platform for online learning

Other major activities were capability-building training for stakeholders; project implementation primarily through the rolling out of the LEARNTECH eXCELS course; monitoring and evaluation; and articulation activities with higher education institutions for the granting of academic credits to LEARNTECH eXCELS graduates.

iFLEX is home to LEARNTECH eXCELS, SEAMEO INNOTECH's first competency-based, multi-modal educational leadership flexible learning courseware for education leaders such as emerging elementary and secondary school principals, and new or experienced headmasters of public or private schools in Southeast Asia. eXCELS or Excellence in School Leadership for Southeast Asia is a menu of flexible learning courses on instructional leadership.

iFLEX is also used for ICeXCELS (Instructional and Curricular Excellence in School Leadership for Southeast Asia), a flexible learning short course package of SEAMEO INNOTECH for primary and secondary school principals/directors in developing instructional and curriculum development leadership competencies. It addresses the need to develop and strengthen the school head's role as a transformational and instructional leader in promoting better quality of teaching and learning in his/her school. The course is composed of two-self learning modules in printed and Web formats: (1) Affirm the Instructional Leadership Roles and Functions of the School Head and (2) Lead Curriculum Implementation and Enrichment. The ICeXCELS course runs for one month.



Instruction under LEARNTECH eXCELS and ICeXCELS are primarily delivered through the print and CD-based self-instructional modules. This is coupled with the extensive use of learner support mechanisms in iFLEX such as web-based discussion forums, chats, file-sharing, online access to multi-media resources and references, online submission of requirements, feedback loops, private messaging and other learning support systems.

iFLEX is a robust learning management system that is compatible with other training courses with blended learning, mobile learning or ubiquitous learning designs. iFLEX currently hosts DepEd eXCELS for the Philippine Department of Education, ICeXCELS Indonesia, SEDF courses in Peace Education and Monitoring & Evaluation of Standards-Based School Performance, Project APEX, SEAMEO TraiNET and the SEAMEO Centre Directors' Management Forum.



## **eXCELS Project Evaluation**

Using methodological triangulation (Methods applied: survey, focus group discussion, interview, documentary analysis, and unstructured observation) and data triangulation (Data sources: flexible learning tutors, national coordinators, school heads, school teachers, and SEAMEO INNOTECH personnel), evaluation data were obtained by an external evaluator from 141 respondents from Cambodia, the Philippines, and Vietnam where project pilot testing was conducted.

Five of six outcomes were rated to be of very good quality, including the iFLEX system. These were: prototypes of competency-based approaches to training programme design, assessment and evaluation serving as models for other SEAMEO INNOTECH training programmes strategic redirection of SEAMEO INNOTECH's training programmes under the LEARNTECH Initiative; strengthened leadership and management capabilities of selected educational administrators from the Southeast Asian region; SEAMEO INNOTECH's institutional capacity for flexible learning delivery; and developed and pilot-tested regionally-based modular flexible learning system.

Although overall, LEARNTECH eXCELS demonstrated best practice in all the outcomes, the evaluation recommends continuous upgrade work for the flexible delivery system as rapidly as possible.

## **2) e-IMPACT (Instructional Management by Parents, Community, and Teachers)**

### ***Background***

The e-IMPACT learning system is a technology-enhanced alternative learning delivery mode for basic education. It is a learning system originally developed in the '70's by SEAMEO INNOTECH, with funding support from the International Development Research Centre (IDRC) to address the educational problems related to access and quality of education.

The system heavily relies on self-learning modules based on the curriculum of the Department of Education (DepEd). As the basic education curriculum changed over time, the learning materials likewise were revised. The latest revision was done starting October 2004 to align the materials with the Revised Basic Education Curriculum (RBEC) of the DepEd. The materials were enhanced along with other multimedia components such as audio and video supplements, and self-learning modules on computer education. These revisions and technology-based enhancements were the reasons for renaming the system e-IMPACT.

There are three modes of delivery of instruction in the e-IMPACT system. These are programmed teaching, peer-group learning, and individual study. In addition, the e-IMPACT system utilizes other modes of learning for specific purposes.

In cases where two or three schools nearby are implementing the e-IMPACT system, these specialized teachers then become itinerant teachers for the three schools.

Skills trainings by community resource persons are undertaken when the system utilizes the specialized skills of some community members. The instructional coordinator or the principal arranges this. Certain learning modules in Makabayan, Science, and other learning areas may need an actual demonstration of skills, which a resource person in the community can very well provide.

The rating system being followed in the e-IMPACT system is that of conventional schools. Diagnostic tests are also administered at the start of the school year to determine learners' difficulties, and each learning module has a post-test in the form of quizzes covering the various learning areas. Likewise, periodic tests and other assessments as required by the Department are also complied with by e-IMPACT schools. The instructional supervisors assign projects, home work, and give ratings for recitations to comply with DepEd's requirements. Additional points are given to trained teachers and group leaders, thus encouraging more participation from the learners.

### **Requirements of the e-IMPACT System**

Certain facilitating conditions have to be met before a school can convert to the e-IMPACT system. These are as follows:

- The heads of the schools should be innovative, open to change, able to accept challenges, have a good rapport with community and parents, and have school staff who are supportive;
- Parents, community members, and local officials should be supportive of the schools; the schools should have some space for kiosks as additional learning space for children when there are not enough classrooms; and
- There should be "e-IMPACT Champions" in the schools district, division, and regional offices to be advocates for the sustainability of the system on an on-going basis.

### **Learner Impact**

The e-IMPACT system was developed, pilot-tested, validated and now has become a mature technology as proven by schools that implemented the system more than 25 years ago. These schools are the Culianan Learning Centre in Zamboanga City; San Francisco Learning Centre in Malilipot, Albay, and Bagong Buhay F Learning Centre in Sapang Palay, San Jose del Monte City. Recent evidence supporting the effectiveness of the system was shown during the First High School Readiness Test conducted nationwide in which the San Francisco Learning Centre in Malilipot, Albay ranked 1st in the Division, 3rd in the region, and 77.5 nationwide using the modules not yet attuned to RBEC; the Bagong Buhay F Elementary School in Sapang Palay ranked 950 nationwide; and the Culianan Learning Centre in Zamboanga City, still using the old IMPACT modules (version 1975), consistently ranked in the top ten highest achieving schools in the division. It ranked 1,737th in the 2004 High School Readiness Test.



In addition, e-IMPACT schools have consistently developed among its pupils the following “concomitant learning” skills which are even more significant than the increments in cognitive knowledge and understanding. These additional concomitant learning skills represent the effect of what may be considered the hidden curriculum, which can be traced to the three main components of the instructional management system: program teaching, peer-group learning, and individualized learning – all through the use of modules.

The following concomitant learning skills are more pronounced in students under the system:

**Social Sensitivity.** Children in the IMPACT system are reported to be more spontaneous, even uninhibited in their activities and expressions. They work and communicate equally well among themselves as well as with parent groups and visitors.

**Motivation to Learn.** The children are more motivated to learn and gain some mastery of their assignments as they are tasked to act as program teachers or as peer-group leaders among their peers.



**Self-confidence.** Children under the system are more confident particularly in taking tests and in interacting with visitors.

**Skill in Self-study.** As children are exposed to modular learning, their skill for self-study is enhanced.

**A Sense of Responsibility and Commitment.** The system has instilled in the pupils a strong sense of responsibility and commitment through the group-contracting scheme. In group contracting, a peer group signs out a number of modules to be finished at a specified time and for which they are responsible for monitoring the progress of the members in the group. The peer-group members take it upon themselves to assist an absent member, to tutor the slower learners, and to visit and help the sick.

**Development of Leadership.** As children are given the chance to become program teachers or peer-group leaders, they experience being looked up to, obeyed, and respected. Thus, the desire to excel as a group leader enters consciously or unconsciously in the mind of the young program teachers and the peer-group leaders.

In school year 2005–2006, five new schools converted to the e-IMPACT system. Three schools were partially supported by SEAMEO INNOTECH while two schools were fully supported by USAID EQuALLS-CAII who additionally fully supported the Culianan Learning Centre in Zamboanga City as a Centre of Excellence for e-IMPACT. Monitoring and evaluation data show that for the schools to benefit significantly from the learning system, full support in terms of one-to-one copy of peer-group learning modules has to be provided to pupils in levels 3 to 6. This was revealed in monitoring/feedback data from pilot schools in Antique, Albay, and San Jose del Monte City. Conversely, schools with full support in terms of copies of modules can implement the system quite efficiently as evidenced in schools fully supported by USAID.

Although the above findings show that the system can address quality issues of the Philippine educational system, there is still a need to undertake a systematic and scientific evaluation of the learning system based on current realities and conditions.

### 3) text2teach

#### **Background**

text2teach is a technology-based initiative that provides expanded access to educational resources via a technology and content platform for a sustainable and comprehensive education delivery solution that positively impacts learning. The easy-to-use multimedia solution delivers educational content by providing teachers with high quality training, curriculum-based lesson plans, teaching guides and video and audio resources. The project aims to help improve the quality of teaching in science, mathematics and English in Grade 5 and 6 classes in elementary schools. It also empowers teachers with the new teaching tools for delivering digitized content in ways that add value to the learning experience.

text2teach contributes significantly toward bridging the digital divide in the Philippines by creating a sustainable, scalable and replicable platform for the delivery of high quality supplemental education content.



#### **Project Goals**

1. Provide enhanced supplemental basic education learning to school children in marginalized classrooms in the Philippines;
2. Utilize the latest digital communication technologies to deliver content cost-effectively to schools and offer access to the internet;
3. Introduce advanced digital educational technology to teachers as a powerful medium of instructional learning in the classroom;
4. Empower teachers through training to effectively deliver online learning modules to their students;
5. Improve the capability of teachers through training to improve mastery of subject matter;
6. Establish local programme ownership within the Philippines and thereby help host strategies of sustainability and scale, and nurture local digital content development within the Philippines; and
7. Establish pilot projects that can be expanded within the Philippines and around the world in ways that are replicable and scalable.

#### **Project Components**

1. Content planning and lesson development
2. Learning materials development
3. Capability-building for teachers, school heads and other education officials
4. Field operations

5. Monitoring and evaluation
6. Advocacy and community mobilization

### ***Project Inputs***

1. Video and audio clips accessed through television set and a Nokia cellular phone
2. Lesson plans/teacher's Guides
3. Training for teachers
4. Linkages/networks

### ***Public-Private Partnership as***

The text2teach Alliance has been a critical factor for the achievement of project goals which involves several major organizations.

The Ayala Foundation is the social and cultural development institution of the Ayala Group of Companies. Providing project leadership, Ayala Foundation oversees the long-term sustainable implementation of the t2t project, project management and resource mobilization.

Nokia Philippines Inc. is the project's resource provider, technology enhancer and developer. Nokia provides schools with cellular phones with video and audio content in Grades 5 and 6 English, Science and Mathematics.

Globe Telecom as the exclusive telecom provider, assumes leadership in the development and exploration of new technologies for content delivery whenever and wherever technically and commercially viable.

SEAMEO INNOTECH, in coordination with the Department of Education, undertakes school validation and coordination, materials development, training design and development, conduct of teacher training and project monitoring and evaluation.

The Department of Education is the source of information, curriculum planning and development, school-based re-training and the implementation of the t2t project in the participating schools. Furthermore, DepEd is responsible for formulating policies as well as mobilizing resources to sustain project implementation.

### ***Learner Impact***

An external evaluator assessed the effect of text2teach as an intervention to improve learning gains, using paired t-test to compare each child's score pre- and post-test. The major findings of the comparison of pre- and post test performance of pupils in the study, either as exposed to the text2teach intervention or as controls, are the following:



- Exposure to text2teach as an intervention leads to significantly higher learning gains in English, Math and Science at both grade levels. The gains are very impressive for English and Science but less so in Math, although still highly significant.
- Although exposure to the intervention leads to learning gains in general, the magnitude of the gain is affected by the province where the school is situated. Being from Cotabato adds to predicted learning gains in all subjects at both grade levels, while being from Maguindanao has the negative effect of subtracting from predicted learning gains.
- The regression results produced one unanticipated finding, which is that being male has a negative effect on learning gains in grade 5 English, Math and Science and on grade 6 English and Science. It has been customary to focus on female children as the more disadvantaged, especially in the Muslim-dominated regions; therefore, the finding in this study of a male disadvantage in learning outcomes highlights the need to use more empirical bases for deciding on actions to take for programmes that target gender-based disparities instead of relying routinely on currently popular notions. The negative effect on learning of being male needs further study as it has many possible implications.

### A. Areas of Expertise in Integrating ICT in Education

As a centre formed to promote science and mathematics education in the region, SEAMEO RECSAM has committed itself to incorporating the potential of ICT into its activities, of which training and R&D are two of the most important. Training of science and mathematics educators from the eleven SEAMEO Member Countries forms a major activity of the Centre. As such, the Centre has steadily increased its investment in the provision of ICT infrastructure as well as on the hiring and retraining of staff that can use ICT effectively for teaching and learning. For instance, close to one million ringgit has been spent on procuring ICT equipment since 2007. Equipping all main teaching and learning rooms/labs with at least a computer connected to a LCD projector and with access to the internet was one such investment. RECSAM has invested heavily in ICT savvy staff – some of whom are science/mathematics education experts looking deeply into ICT while others are ICT experts looking deeply at science/mathematics education. They regularly participate and present papers in conferences at the international level as well as contribute articles and book chapters for publication. Some also have been sent overseas for training. SEAMEO RECSAM has also invested heavily in ICT related books, especially pertaining to science and mathematics education.

SEAMEO RECSAM has experience in conducting research, both pedagogy and policy related, regarding ICT in science and mathematics education. An example of recently concluded pedagogical research is ‘the EUREKA Project - The use of High Fidelity 3D Multimedia Animations for Teaching and Learning of Science and Mathematics’. The project’s “Teachers’ Use of the Geometer’s Sketchpad (GSP) in Malaysian Secondary Schools” and “The State of use of ICT for Teaching and Learning of School Science and Mathematics among SEAMEO Member Countries” are examples of policy-related research. It also regularly brings researchers in science and mathematics together to discuss current issues, including ICT, through organising seminars and conferences like the CoSMEd.

SEAMEO RECSAM works closely with the Malaysian Ministry of Education and the Penang State Education Department. Through this relationship, it provides opportunities for educators and researchers from around the world to understand the Malaysian Education System as well as to experience teaching in Malaysian schools through educational visits among others. SEAMEO RECSAM also works closely with the MOE in contributing to the development of the science and mathematics curriculum for Malaysia which places a high value on ICT integration.

## B. Programmes and Projects on Integrating ICT in Education

### 1) ICT Integration in SEAMEO RECSAM's Training Programmes

Training of science and mathematics educators from the eleven SEAMEO Member Countries forms a major activity of the Centre. As such, the Centre has steadily increased its investment in the provision of ICT infrastructure as well as on the hiring and retraining of staff that can use ICT effectively for teaching and learning. For instance, close to one million ringgit has been spent on procuring ICT equipment since 2007. Equipping all main teaching and learning rooms/labs with at least one computer connected to a LCD projector and with access to the internet was one such investment. The result is the progressive increase in the use of ICT for teaching and learning of science and mathematics training courses.



One-to-one help on using the computer in a Basic ICT Class for Regular Course Participants(2009)



Monitoring a task given to more advanced participants in a Basic ICT Class for Colombo Plan Participants (2009)

At the most basic level, facilitators make use of MS PowerPoint during teaching and learning. Participants are expected to do short presentations with the help of MS PowerPoint, write their reports using MS Word as well as search for resources on the internet. The Centre is aware of a number of participants in every course that come with very little or no experience at all on the use of ICT. As such, they are given a special eight hour hands-on course on Basic ICT which will help them use the computer, MS Word and MS PowerPoint as well as access the internet. In addition, ample opportunities are provided for the participants to improve their ICT skills at night. These sessions will help the participants cope with the high usage of ICT throughout the course.



Making use of the Interactive Whiteboard and the Geometers Sketchpad to illustrate geometry concepts in Mathematics for Colombo Plan Participants (2009)



Integrating readily available interactive simulations (PhET simulations) into teaching and learning of science for Malawi Customised Course participants (2009)



Although the focus of many of the training courses is on pedagogy, the Centre makes it a point to allow the participants to explore hardware and software technologies specifically used for the teaching and learning of science and mathematics. For instance, the Interactive Whiteboard is frequently used in the mathematics courses while data loggers are used in the science courses. Participants are provided opportunities to use software like the Geometer's Sketchpad and GeoGebra for mathematics, and EUREKA (a repository of 3D multimedia animations) and PhET (opensource simulations) for science. Participants' handouts are compiled on a CD (unless otherwise requested) and they are expected to summarize their learning activities in SEAMEO RECSAM in the form of a short video clip.



Integrating data loggers into teaching and learning of science for Regular Course Participants (2008)



A Myanmar teacher (Regular Course Participant) trying out lesson integrating data loggers in a primary school (2009)

Feedback from participants through course evaluations suggest that both beginner and advanced ICT users are very satisfied and appreciative of the extensive ICT integration examples and opportunities provided throughout the duration of the training course. The Centre will continue in its effort to provide optimal experiences for the participants, especially those from the SEAMEO Member Countries who come with various levels of competency in ICT.

## **2) The EUREKA Project – The Use of High Fidelity 3D Multimedia Animations for the Teaching and Learning of Science and Mathematics**

One important activity of the Centre is to conduct pedagogical research. The EUREKA Project was one such activity which was started in 2007. Eureka is an educational repository consisting of many hours of high quality, visually appealing and interesting short 3-8 minute 3D multimedia animations on school science and mathematics ranging from Primary 1 to Form 6. Six schools from Penang, Malaysia participated in this project. A number of workshops were conducted to familiarize the teachers of the participating schools with EUREKA. During these workshops, teachers were given the opportunity to explore the animations. They also had the opportunity to hear theoretical explanations on issues of learning from multimedia animations as well as discussing the most effective ways of learning from animations.



Learning mathematics with EUREKA animations in SMK Penang Free (2008)



Learning Science with EUREKA animations in SMK Abdullah Munshi, Penang (2008)

Towards the end of the project in 2008, basic research was conducted in the six schools with the purpose of exploring how students and teachers perceived the use of EUREKA. Data was collected from two questionnaires as well as observations of six lessons using EUREKA. The students' questionnaire elicited perceptions of the quality of EUREKA, its effectiveness for learning, whether some of the learning outcomes will improve with the use of EUREKA, whether some of the features of EUREKA can contribute to its effectiveness, and how desirable the software is for the school. The teachers' questionnaire elicited perceptions of the quality of EUREKA, its effectiveness for learning, whether some of the learning outcomes will improve with the use of EUREKA, whether some of the features of EUREKA can contribute to its effectiveness, and how desirable the software is for the school. The six observations of teaching episodes were done by video recording the lessons. They were then analyzed and recorded according to basic information, location and a brief description of the teaching and learning episode. One hundred and thirty seven students and twenty teachers were involved in the study. The study determined that most students found EUREKA to be a quality tool and that it should be regarded as a 'Should Have' tool for the school. The study also showed that most teachers found the science animations desirable. Observation of classrooms in session suggests that learning is a collaborative effort where content is obtained not only from an animation but also by talking to teachers and peers as well as consulting the textbook or reference books. The efficiency of this kind of partnership may be a useful direction to go rather than focusing on animation alone as is being done currently. A number of other results were also recorded and noted. It is hoped that further research can be done to explore the way teachers help students make sense of the contents as depicted in the animation. The findings of this study are already being used to improve the quality of teaching and learning where EUREKA and other multimedia animations are being used.

### 3) The Use of Geometer's Sketchpad (GSP) in Malaysian Secondary Schools

The Malaysian Ministry of Education purchased a nation-wide license for the Geometer's Sketchpad in 2004. The Centre was instrumental in providing support in the form of organising basic to advanced training on the GSP for teaching and learning for key personnel.



Malaysian Trainers Undergoing Advanced Training on the use of the GSP (2009)



A Malaysian Trainer Trying out a GSP Integrated Lesson with her Peers (2009)

A number of workshops and courses have been conducted by the Centres' facilitators as well as experts from the United States and Thailand. These workshops and courses focus on how to fully utilize the dynamic capability of the GSP for learning.

Feedback from participants suggested that many of them do not use the GSP regularly in the classroom and when they did use it, it served more as a teacher demonstration tool rather than as a learner-centred tool. As part of its effort to improve the quality and effectiveness of its training programme on the GSP, the Centre initiated a survey on teachers' use of the GSP for teaching and learning in Malaysian mathematics classrooms. The study had three main aims:

1. to survey the teachers' use of the GSP in the secondary mathematics classroom,
2. to investigate the relationship between the teachers' use of the GSP and their attitudes towards ICT in teaching mathematics, and
3. to identify the factors influencing the integration of the GSP in the mathematics classroom, including how these impact and extend teachers use the GSP in the secondary mathematics classroom.



A Malaysian Trainer Trying out his Improved GSP Lesson with Students (2009)



A Secondary School Student Learning Mathematics with the GSP (2009)

The teacher survey was conducted in 14 states in Malaysia including Kuala Lumpur. Selection of the number of schools was based on the total number of schools in each state. About ten to twenty percent of schools per state leading to 208 schools were selected using simple random sampling. For each selected school, five sets of questionnaires were mailed to the school principals to be distributed to the mathematics teachers. Stamped return envelopes were provided to the teachers to facilitate the collection of the completed questionnaires.

A total of 582 questionnaires (56%) out of 1,040 questionnaires and 125 out of the 208 selected schools (60%) were returned, indicating an acceptable response rate. Teachers completed a questionnaire which required them to provide information about their gender, educational background, their experience of professional development and the attitudes towards ICT in teaching mathematics. About 72.35% of the respondents were female.

The main findings of the study were:

1. Among the male teachers, 28.3% regularly used the GSP while 45.9% never used the GSP. About 31.5% of the female respondents used other software or courseware provided by the MOE.
2. The respondents in the 30-49 years age category (who form the majority group) who never used the GSP and used other software or courseware were 17.3%, 33.4% and 22.8% respectively.
3. Approximately 18.7% of the respondents that used the GSP hold a Bachelor degree, compared to 40.9% who never used the GSP and 25.4% who used other software or courseware.
4. About 11.4% of the respondents who used the GSP had 1-10 years of teaching experience compared to 31% of the teachers who never used the GSP and 17.1% used other software or courseware.
5. Only about 21.90% of secondary mathematics teachers used the GSP and while 29.66% used the courseware that was provided by the MOE. 48.45% had never used the GSP.
6. As for school support, 44.20% reported that they got strong support from their school principals, 30.6% got weak support and 25.2% no support at all. As for the support from the head of department, 49.5% of the respondents indicated that they got strong support, 29.2% weak support and 20.4% no support.
7. About 76.9% of the respondents used the GSP in a “one computer to a whole class” mode, 12% used the GSP in a “one computer to every small group” mode, while 11.1% used the GSP in a “one computer to one individual” mode.
8. Only 8.1% of the respondents stated that they used the GSP with high confidence, while 28% stated that they used it with low confidence. 31.2% of the respondents were new users and 32.7% had never used the GSP before.
9. About 53.73% of the respondents had attended the GSP workshops before, however, 80.25% of the respondents stated that they needed further training.
10. The factors that influenced the teacher’s use of the GSP were; teachers’ background, mathematics teaching experience, level of teaching and GSP experience.

The Centre expects to use the findings of this report to improve the quality and relevancy of its training and support the use of the GSP by Malaysian teachers as well as educators from the region and beyond.

#### 4) Science Across the World (SAW) International Flagship Programme

The SAW programme is hosted by the Association for Science Education (ASE) in the United Kingdom. SEAMEO RECSAM has been the project coordinator for the Asia Pacific region since 2004. The SAW programme plays a major role in promoting teaching and learning of science, and recently, mathematics education via ICT integration. The responses from the region are quite high with many secondary schools in the region frequently registering to participate as can be seen from the most recent (September , 2009) statistics of SEAMEO Member Countries; Brunei Darussalam 22 schools and 46 teachers, Indonesia 104 schools and 157 teachers, Laos 7 schools and 9 teachers, Malaysia 237 schools and 556 teachers, Myanmar 14 schools and 16 teachers, Philippines 91 schools and 179 teachers, Singapore 41 schools and 81 teachers, Thailand 187 schools and 323 teachers, Vietnam 19 schools and 20 teachers, with Timor Leste yet to participate.



Science Across the World (SAW) web portal [<http://www.scienceacross.org>]

It works by teachers registering their school on the website in order for their students to communicate with other members worldwide. Students work securely on a science topic of their choice. Some examples of topics are Food, Diet & Health, Genetics, the Environment and Energy. Many of the topics are available in several languages, and are suitable for students aged 10-17 years. To collaborate, teachers need to find other schools across the world working on a similar topic, in the same language and during about the same time period. Students exchange topics (and any associated materials) with their selected schools (or download examples from the electronic library). Through comparison of Exchange Forms, students obtain a global perspective on the science topics that they would like to explore further.

#### ***By joining the SAW programme,***

- Students and teachers develop contacts and links with other schools in different parts of the world.
- Students are interested and motivated by global science issues through communication with other young people from different countries and cultures.
- Students look at the wider aspects of science regarding issues such as diet and health, genetics, the environment, energy use and many more.

- Students develop key skills in communication, ICT, working with others and problem solving.
- Students develop thinking skills in reasoning, enquiry, creative thinking and evaluation.
- Teachers can develop different pedagogical skills and extend science into cross curricular activities, including citizenship and sustainable development education.

**Teachers like to work with Science Across the World for:**

- contacts with other schools in different countries
- student interest and motivation
- development of key skills in communication, ICT, working with others, problem solving
- development of thinking skills in reasoning, enquiry, creative thinking and evaluation
- language learning value
- usefulness of the topic/issue
- source of different pedagogical skills



Teachers from SEAMEO Member Countries undergoing a workshop on introducing SAW



Singapore and Brunei participants involved in the Global Science Project (2008)

**Teachers like to work with Science Across the World for developing constructive ICT activities such as:**

- searching for schools through the Science Across the World online database
- completing and sending Exchange Forms via email
- creating school websites related to the Exchange Form
- creating and using spreadsheets
- word processing
- researching using topic data and hotlinks

- by being involved in the wider aspects of science
- by making links with other countries
- by using foreign languages and ICT
- by developing their key skills and thinking skills
- by extending science into cross curricular activities, including citizenship and sustainable development education
- with on-going, on-line registration with traceable record of participating countries

Thus, in partnership with ASE, the Centre has succeeded in facilitating a global environment for science and mathematics teachers and students from SEAMEO Member Countries to collaborate on science and mathematics activities using ICT.

## A. Areas of Expertise on Integrating ICT in Education

There is tremendous potential for harnessing IT in language teaching and testing. SEAMEO RELC's work and efforts in using IT to conduct aural-oral tests have thus far been focussed on specific candidature with clearly identified needs and assessment criteria. Whilst there are certainly possibilities for exploring how this effort might be extended for use in other SEAMEO Member Countries, there is much work that needs to be done before such tests can be administered across borders for use in different SEAMEO Member Countries.

Potential areas of concern include the following:

- development of an appropriate engine that will facilitate English language testing across borders, especially in terms of test delivery, test integrity and submission of test data and outcomes
- the diverse linguistic character and cultural landscape of SEAMEO Member Countries which provide additional challenges in so far as ensuring that tests are culturally sensitive and that test instructions are well understood
- the functions and purpose of developing a single English language test, sensitive to the needs of English language users in the region so as to provide a good measure of the proficiency level of examinees, which would require the rigour of research before test contents can be valid and reliable

SEAMEO RELC's vision in the next five years is to work on developing such a test together with SEAMEO Member Countries who see the usefulness of such a test for the region. SEAMEO RELC is also working hard at identifying appropriate expertise in terms of developing the capacity for the region to have such a test administered across borders. It is also exploring the feasibility of undertaking research work that will provide rigour and meaning in developing an English language proficiency test for users in Southeast Asian countries. All these will take time, and more importantly will also require the shared interest of SEAMEO Member Countries committing the time of their interested researchers in developing such a test for use in their countries.

## B. Project on Integrating ICT in Education

### 1) Information and Communication Technology (ICT) in Spoken Language Assessment: SEAMEO RELC's Approach and Application

#### *Theoretical Underpinnings*

As Harlow & Caminero (1990) have noted, if we stress the importance of oral performance in our teaching, "then we must evaluate that oral proficiency in some visible way".



Despite the logic of that statement, the testing of oral skills has always been the subject of some debate. One of the most common approaches to testing spoken skills is the structured interview that might also include the examinee reading a text read aloud. However this test format has been criticized because of the possible lack of objectivity in the conduct and grading of the interview. Attempts to increase the objectivity and reliability of the test results usually involve increasing the number of examiners grading each examinee, which increases the cost of the tests. De Wet, Van der Walt and Niesler (2007) note:

*... the assessment of oral skills is generally highly subjective, and efforts that enhance inter-rater reliability further increase the labour intensiveness of the assessment process. The assessment of reading and writing comprehension skills, on the other hand, can be automated by means of computerised multiple choice tests, which have vastly reduced time and manpower requirements for their administration.*

Larson (1984) also points out that the oral proficiency interview presents serious problems for teachers. They find that this type of assessment is expensive and too time-consuming to administer to large numbers of students.

Malabonga & Kenyon (2002) look at the use of computers to deliver oral proficiency tests and note that it helps increase raters' efficiency in scoring the test. Saidatul Akmar Zainal Abidin (2009) points out that "the validity of testing spoken language using computer technology"...is "an area, which has to date, received little attention in the testing literature". He suggests that "(t)he main advantage of the computer test is in standardization in terms of test input and administration." The task demand elements of the computer test are similar to those in the direct test but the channel of communication, the topic, content knowledge and nature of information are standardized for all candidates.

A further problem with the traditional oral proficiency interview is noted by Yasmin bte Yacob et al (2009) who point out that students generally find the idea of sitting for formal oral assessments very daunting because of the prospect of facing an unknown examiner. They go on to suggest that this problem could be mediated in tests delivered by computer.

Larson (2000) notes that there are three notable benefits associated with computerized oral testing.

*First, the quality of voice recordings using digital sound through the computer is superior to that of analog tape recordings. This superior quality makes it easier for the teacher to discriminate between phonetically similar sounds that could ultimately cause confusion in communication. Since the procedure for recording responses into the computer is no more challenging than recording onto a cassette tape, students who are a little timid around technology should not feel any more anxiety than when recording responses into a regular tape recorder.*

*A second advantage of computerized oral testing over face-to-face interview assessment is that all students examined receive an identical test: all students receive the same questions in exactly the same way; all students have the same time to respond to individual questions; and students are not able to "manipulate" the tester to their advantage. In addition to enjoying the same administrative advantages as the [simulated interviews], computerized oral tests can include various kinds of response prompts (e.g., text, audio, graphics, motion video, or a combination of these inputs).*

Finally, besides the benefit of test uniformity mentioned above, another significant advantage of computerized oral testing is the access to student responses for evaluation purposes. The students' responses can be stored on the computer's hard disk – or on a network server – and accessed almost instantaneously for evaluation at a later time by the teacher.

It was with these points in mind that SEAMEO RELC approached the task of designing a test of basic oral language skills that was expected to involve relatively large numbers of students. The test had to be simple to administer without the usual heavy costs associated with tests of oral proficiency.

### ***Approach Adopted in the Use of ICT***

SEAMEO RELC endeavoured to develop a test of spoken communication skills in a number of languages. There were two requirements stipulated in the test design:

- The test should appraise the spoken language rather than the written language, grammar or vocabulary.
- The cost of administering the test should be kept to a minimum.

The solution that SEAMEO RELC decided on was to separate the grader or examiner from the process of obtaining the language samples to be graded. SEAMEO RELC developed a computer-based system that could simulate the interviewer's role in an interview, including the integration of pictures and video thus dispensing with the interviewer. The result was the Simulated Oral Proficiency Interview (henceforth referred to as SOPI).

The SOPI is a semi-direct, performance-based, computer-mediated test of oral language proficiency taken by groups or individuals in a language laboratory. SOPI relies on audio files of instructions and a test booklet to elicit language from each candidate. The candidate hears the directions and items for all parts of the test from a master test file. The master test file sets the pace of the test, which lasts approximately fifteen minutes. The candidate speaks in the target language during timed pauses throughout the test. The candidate's responses are recorded into a computer file and are subsequently evaluated by trained raters following the examination.

In SOPI, the test directions and items are written in the test booklets as well as given orally. The directions provide the context of each speaking task, including who the candidate is addressing, what the situation is, why the speaking task is being performed and any other relevant information. After listening to and reading the directions, the candidate hears a native speaker of the target language make a statement or ask a question relevant to the task described. Then the candidate performs the task by responding to the native speaker's prompt. SOPI contextualizes all tasks to ensure that they appear as authentic as possible.

SOPI has a four-part test format of Warm-up, Situational Talk, Problem-solving Talk and Wind-down. The stages are important in any interview format so that the interview remains as normal as a test situation will allow while at the same time putting the candidates through their paces. The Warm-up settles the candidates and prepares them to perform their best in the test. The Situational Talk and Problem-solving Talk stretch the candidates' use of different kinds of language and the Wind-down closes off the interview in a natural way. This follows the interview format recommended by test developers (Carroll and Hall, 1985).

This computer-based testing mode is particularly important where numbers are large as it helps reduce the cost and yet provides for close monitoring of the test administration. As discussed in the earlier section, there are a number of advantages in using such a closed, rather than open-ended, interview format delivered by computer:

- It reduces examiner subjectivity as the examiners will be completely guided by the prepared questions.
- Although the test design does not allow for gauging students' full interactive skills, it does give a fairly good indication of their overall oral communication skills.
- It means that a relatively large number of candidates can be tested at one time. The only limitation is test.
- The cost of bringing interviewers/graders to a central place to carry out the interviews is removed.
- The stress for the candidate is reduced to some extent because they are no longer sitting face to face with a 'critical' examiner.
- There is a consistency in the conditions under which the tests are carried out thus increasing reliability.
- The recorded interviews can be distributed to graders who can then do the grading at times that fit into their schedules. This again helps to reduce the cost.
- The fact that all interviews are recorded means that it is relatively easy to dipstick the grading to ensure it is fair. It is also easy to respond to queries that suggest the grading has not been done consistently.

The computer programme was designed so that multiple tests could be loaded at the same time. This allows for having different versions of the same test available to preclude collusion between candidates and for the possibility of having tests of different languages loaded onto the same platform.

### ***Evaluation of ICT-based Language Tests***

The development of the computer programme and SOPI have been the first few steps in developing tests of spoken language that can be valid and reliable without the costs that are usually associated with a test of oral skills. There is still a need to look at how the test process can be made even more efficient, for example, by making it unnecessary for the candidates to go to a central location to take the test. However, this last step will take some time and resources as it involves developing automatic candidate identification and security systems.

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## A. Areas of Expertise in Integrating ICT in Education

### e-Learning:

Developing a Moodle-based Learning Management System (LMS) including:

- Designing a new interface
- Designing a new course format (Tree format) for more convenience in Navigation
- Developing new functions of using multimedia learning content as templates
- Applying Moodle to teaching and learning
- Developing self-learning resources for students and teachers to support learning and teaching, especially in the field of English language training
- Designing supporting utilities and soft framework for short and long courses (including English language, educational leadership and management, post-graduate diploma in TESOL and master of arts in applied linguistics among others)

### e-Materials:

- Developing e-lessons by utilizing supporting software (Flash, Audition, Video Studio, Articulate, PowerPoint)

### Training:

Offering training courses in:

- Developing interactive lessons with Flash and PowerPoint
- Constructing and applying low-cost Interactive Smart Boards (ISB) in teaching and learning
- Processing multimedia components (video, audio, simulation) utilizing appropriate software

## B. Programme on Integrating ICT in Education

### 1) The Use of e-Material in English Language Training

#### *Introduction*

The SEAMEO Regional Training Centre in Vietnam (SEAMEO RETRAC), one of the fifteen regional centres of the Southeast Asian Ministers of Education Organization (SEAMEO), was re-admitted to SEAMEO in 1992 and started its operations in 1996.

Besides its major mandate in the field of educational leadership and management, the Centre undertakes various education-related activities to serve the social needs and demands of the Vietnamese people.

Among these, the English language training programmes (ELT), starting in 1997, have continuously gained in reputation all over Vietnam and positioned SEAMEO RETRAC as one of the most preferred ELT providers in the country. Our faculty consists of nearly 150 English language teachers; one third of these are native English speakers. Each year, there are approximately 12,000 learners attending various ELT programmes.

The use of technology in ELT dates back to 2003; however, it was in 2005 that SEAMEO RETRAC officially launched a comprehensive project titled “Developing e-Materials in ELT”. A self-sponsored project, it was jointly administered by the Divisions of Foreign Studies (DFS), Technology and the Administration.

### **Objectives**

The overall aim of the project is to use technology, specifically e-Materials, to enhance the teaching and learning efficiency of our ELT programmes.

#### **Specific objectives include:**

1. Designing and building a repertoire of electronic materials and resources to be uniformly used by all teachers across all programmes and courses
2. Transforming all of our training rooms into “smart” classrooms, i.e. equipped with LAN, the internet access, PCs and LCD projectors
3. Improving the faculty’s ICT skills through training and coaching
4. Improving learners’ performance through facilitating the learning process with the use of ICT skills and appropriate training software

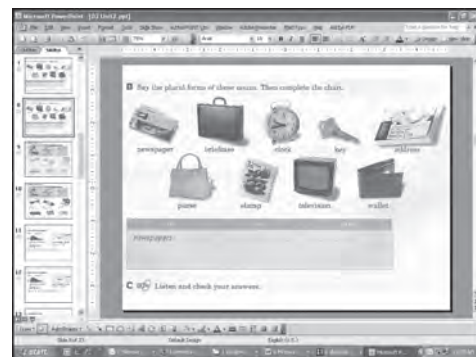
### **Activities**

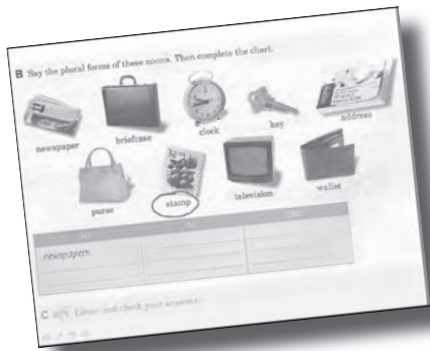
Activities within the project fall into three main phases and can be summarized as below:

#### ***1. Pilot Phase: August 2003 – May 2005***

During this stage, a team of experts was selected and formed including teachers possessing adequate basic ICT proficiency and more importantly, a passion for technology in teaching. Their tasks assigned included (1) designing and building a collection of e-materials to support the teaching and learning of various subjects of the general English programmes, and (2) piloting these materials in their own classes. Starting with three teachers in 2003, the team expanded to eighteen teachers in 2005.

Training was provided to the team through regular coaching meetings where the teachers took turns to share expertise and experience in teaching with others.





By May 2005, 20 out of the 45 training rooms were transformed into “smart” classrooms, each of which came equipped with one LAN networked PC with internet access and one multimedia projector.

Altogether, hundreds of e-materials were designed and made ready for use. Most of these were developed as complementary to the PowerPoint format for the teaching of such subjects/skills as grammar, reading comprehension, listening skills, vocabulary, and so on as well as for self-study.

## II. Phase 1: Jun 2005 – Dec 2007

June 2005 witnessed as an important milestone the official launching of Developing e-Learning and e-Materials in ELT. This important phase was expanded to a higher and larger scale in which all the teachers were encouraged to learn and use e-materials and visual aids in their classes.

### Highlights of activities of this phase included:

- Setting up a team of instructional designers to build a repository of e-material Version 2 for teachers to have at their disposal. This version replaced the first version by embedding in it audio and video components wherever appropriate. There were over 800 e-materials to be implemented during this 2-year phase (see sample below);
- Teacher training in ICT skills provided through periodic face to face sessions, online training and one on one coaching at the teacher’s request; and
- Upgrading of equipment and facilities with all the “smart” classrooms for use in the centre. Additionally, three new servers were purchased just for material storage and backup, and the current ICT system upgraded to serve the project.



### III. Phase 2: Jan 2008 – present

As mentioned above, the e-material versions 1 and 2 were in PowerPoint format. Complete sets of these materials were copied on to the PC in each classroom, and whenever modification was needed, it was then copied again on the PC. To overcome this deficiency, a new format was created in late 2008 and then hosted in the servers to be easily accessed from each classroom through the LAN system.

Just after the first six months of this phase, there were over 1,000 new e-materials completed. These were flash-based lessons with audio and video embedded and hosted in our servers which the teachers could access through shortcuts on the classroom PCs.



### Conclusion

After six years of implementation, a bank of electronic materials and resources has been built and uniformly used throughout the entire centre. In conjunction with that, each of our 45 classrooms has turned into a “smart” classroom with basic electronic equipment for effective teaching and learning. More importantly, teachers have been able to use the new style of teaching with ease and begun to develop their own activities/practices for use in class.

Student and faculty evaluations of the project are definitely positive. Their feedback together with class observations show that the e-materials are useful and have a significant positive impact on teaching and learning. Insightful suggestions/recommendations for improvement are also offered for future modifications. Recently, the adaptation and building of an interactive smart board (ISB) set at a cheaper cost of USD 40 has been developed and promises to bring a more active change in English teaching and learning to Vietnam in the future. This innovative uniqueness will be what SEAMEO RETRAC would like to share with other SEAMEO Centres and countries in Southeast Asia.



**3. Let's Listen**

Which activity does each person enjoy doing now? Listen and circle the correct answer.

- Zachary
  - playing the guitar
  - playing in a band
  - playing the piano
- Bradley
  - watching videos
  - hiking
  - playing video games
- Isabelle
  - painting
  - writing children's books
  - reading
- Evan
  - collecting stamps
  - collecting postcards
  - collecting baseball cards
- Miriam
  - reading the newspaper
  - playing golf
  - reading books

**Listening**

My great-grandfather

George Zavilo

Tessa (right) with her sister and great-grandparents

1 (7:5) Listen to Tessa talking about her great-grandfather, George. Answer these questions.

- Where was George born?
- Where did he live before the war?
- Where did he live after the war?
- What nationality was his wife?

Unit 1 **Things for School**

Let's Start

Let's Learn

Let's Learn More

Let's Build

LG 1

Who's she? Is she your mother?

Yes, Debbie, she is. She's short.

Unit 1 **Things for School**

A. Practice the words.

a desk

a chair

a ruler

an eraser

Unit 1 **Things for School**

C. Listen and circle.

- a b
- a b
- a b
- a b

# SEAMEO Regional Centre for Higher Education and Development (SEAMEO RIHED)

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## A. Areas of Expertise on Integrating ICT in Education

The SEAMEO Regional Centre for Higher Education Development (SEAMEO RIHED), as one of the SEAMEO centres specialising in regional cooperation on higher education development, has utilised ICT as an infrastructure and information resource to disseminate research findings as well as proceedings from seminars and conferences to those interested in higher education in universities, ministries/departments, and the general public of the region.

Following meetings of the Director General/ Secretary General/ Commissioner of Higher Education in Southeast Asia from 2007 until the present, e-learning and mobile learning has been agreed upon to be one area of future collaboration and is recognised as an instrument for the harmonisation process in higher education.

The 4<sup>th</sup> Meeting of Director General/ Secretary General/ Commissioner of Higher Education in Southeast Asia was conducted by the Ministry of National Education, Indonesia and SEAMEO RIHED on 11<sup>th</sup> March 2010, in Jakarta, Indonesia. The meeting contained an intensive discussion on the regional future collaboration in 4 main areas, namely student mobility, executive development, e-learning and mobile learning and research clusters.

Indonesia and SEAMOLEC were assigned at the meeting to be the leaders in implementing the e-learning and mobile learning programme. The project is designed to focus on collecting digital content in 5 study areas which are the focus of the M-I-T Student Mobility Project\*, namely agriculture, language/culture, hospitality and tourism, international business and food science and technology. In this regard, it is aimed at enhancing the interaction among quality assurance, student mobility and e-learning over the long run.

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\* A pilot project of student mobility in 3 countries (Malaysia-Indonesia-Thailand) was initiated by SEAMEO RIHED and the Department of Higher Education, Ministry of Higher Education, Malaysia; Directorate General of Higher Education, Ministry of National Education, Indonesia; Office of Higher Education Commission, Ministry of Education, Thailand.

## A. Programmes and Projects on Integrating ICT in Education

### 1) HYLITE Programme: ICT-based Open Distance Learning (ODL) for Indonesian Teachers Education

#### *What is the HYLITE Programme?*

The HYLITE Programme is an in-service teacher training programme, developed especially for elementary school teachers in Indonesia, to improve their qualification from Diploma II to Strata 1 (S1) level, conducted via open and distance learning.

#### *Why the HYLITE Programme?*

Improvement of teacher qualification to Strata 1 (S1) has been a priority programme set by the Government of Indonesia according to the Teachers and Lecturers Law (No. 14/2005).

At present, the number of teachers in Indonesia is around 2,667,655. Of that number, only 887,751 or 34% have S1 qualification. In an effort to conform to the Teachers and Lecturers Law No. 14/2005, the capacity of 278 teachers' colleges (LPTK) (including 32 state LPTK) has not been adequate to fulfill the need of improving teachers qualification within a short period.

For that reason, open and distance learning has been determined to be the most viable alternative. Therefore, in 2007, the Government of Indonesia, c.q., Directorate General of Higher Education and Directorate General of Quality Improvement for Teachers Education Personnel, assigned 10 LPTKs, besides Universitas Terbuka, to work collaboratively as a consortium to offer an in-service teachers training programme for improving elementary school teachers qualification from DII to S1 via open and distance learning.

### ***Who are the providers of the HYLITE Programme?***

The following universities in Indonesia offer the HYLITE Programme:

1. Universitas Pendidikan Indonesia
2. Universitas Sriwijaya
3. Universitas Negeri Yogyakarta
4. Universitas Negeri Makassar
5. Universitas Negeri Malang
6. Universitas Muhammadiyah Malang
7. Universitas Cenderawasih
8. Universitas Nusa Cendana
9. Universitas Atmajaya Jakarta
10. Universitas Tanjung Pura
11. Universitas Lambung Mangkurat
12. Universitas Haluoleo
13. Universitas Jember
14. Universitas Pattimura
15. Universitas Pendidikan Ganesha
16. Universitas Prof. Dr. Hamka
17. Universitas Negeri Semarang
18. Universitas Gorontalo
19. Universitas Mataram
20. Universitas Satya Wacana
21. Universitas Negeri Lampung
22. Universitas Muhammadiyah Makassar
23. Universitas Sebelas Maret

### ***Who are the participants in the HYLITE Programme?***

The HYLITE Programme is intended for in-service elementary school teachers who do not yet possess the minimal qualification of S1.

In-service elementary school teachers are teachers who at present are already teaching in elementary schools, and reside in the surrounding areas of LPTK.

Teachers who do not have S1 qualification or teachers who have DII PGSD/MI are eligible for the HYLITE Programme.

For the first cohort of 2006-2007, 1,000 elementary school teachers were recruited as students for the HYLITE programme at 10 LPTKs, or in other words, 100 elementary school teachers were enrolled at each LPTK.

### ***Conclusion***

The HYLITE programme – an ICT-based ODL for in-service training teachers employing the hybrid model and conducted in a consortium of 23 teacher colleges – has been seen to have several benefits. Among other advantages, teachers can upgrade their qualification without leaving their daily jobs in schools, teachers (as well as lecturers and administrators of the HYLITE programme at the teacher colleges) can improve their ICT literacy and skills, and teacher colleges can improve their collaboration and mutual acknowledgement to implement the HYLITE programme.

The hybrid model of ICT-based ODL employed by the HYLITE programme eliminates the spatial and time constraints of more conventional teacher training methods. Implemented and maintained properly, its quality acknowledged by a consensus among the consortium members, the HYLITE programme has the potential to be a more effective, affordable, and flexible teacher training programme. Once the database of the web-based courses of the HYLITE programme has been developed, teachers, and even the public, can access those courses to meet their individual needs for continuous professional development.

The condition that HYLITE is a programme of the consortium demands a very high commitment among all member institutions and parties to follow through on the agreement achieved, and that the rules and regulations be developed together. The potential growth, sustainability, and maintenance of quality of the HYLITE programme depends on the commitment of all parties involved.

## 2) Southeast Asian Education Network (SEA EduNet)

SEAMEO SEAMOLEC is developing ICT systems of Multicast and IPV6 to improve the quality of education under a programme called the Southeast Asian Education Network (SEA EduNet). The SEA EduNet will allow all education communities within a particular country and among Southeast Asian (SEA) countries to collaborate in various innovative ways, including simple reusable learning objects up to sophisticated collaboration on transborder education. The SEA EduNet is a network, repository and portal tapping the expectedly vast rich learning object materials of SEA teachers, for SEA teachers, and by SEA teachers.

Some characteristics of the SEA EduNet will be as follows:

1. As an education network, the SEA EduNet provides a common ground or meeting point of all educational practices, institutions, scholars, learners, communities, and governments in SEA.
2. As an educational repository of ODL programmes, training packages, and individual courses, the SEA EduNet provides educational ODL resources which are developed by SEA educational institutions and individual faculties/teachers and can be used by any faculty/teacher and reused by the education community in SEA as long as the copyright guidelines contained on the site are adhered to.
3. As an ODL mechanism, the SEA EduNet provides referrals, consultations, and collaboration services to any government, institution, or individual interested in open and distance learning through the use of an expert network in the area of ODL from within Southeast Asia as well as all over the globe.
4. As an electronic/digital system, there are two major components of the systems of SEA EduNet, i.e. e-Administration and e-Payment. e-Administration should be developed as a database to give significant support to student learning. e-Payment is also a crucial development in the SEA EduNet. There are two main types of e-Payment, i.e. micro payment and macro payment.

In 2008, SEA EduNet was instituted in many cities of Indonesia, Myanmar, Philippines, Thailand, and Vietnam. The establishment of SEA EduNet will continue for other Southeast Asian countries, such as Lao PDR and Cambodia who have already proposed to SEAMEO SEAMOLEC that SEA EduNet be established in their countries.

### 3) ICT Training Programmes

The training division of SEAMEO SEAMOLEC has been designing various training courses to meet the needs of its partners and clients. Some training courses were designed for lecturers of universities such as the HYLITE (Hybrid learning for Indonesian Teachers) programme provider (PJJ PGSD). Some others were designed for teachers and even for the public.

Programmes:

1. Basic IT Skills for Lecturers
2. Learning Material Design
3. Web-based Courseware Development (Flash Media, Moodle, Hot Potatoes)
4. Academic Information System
5. Graphic Design and Modelling
6. Mobile Game
7. Augmented Reality
8. Face-to-face Tutorial
9. Online Tutorial
10. Printed Learning Material Development
11. Video Learning Material Development
12. Test Construction
13. Self-Access Study
14. Multimedia: Company Profile Design

The courses above are addressed to teachers, lecturers, and the staff's centre for staff development programme. The training division also offers tailor-made training courses to meet the specific needs of customers.

Based on budgeting, the training courses above can be divided into 2 categories:

#### 1. Cost Sharing

The cost of any training courses above can be borne by cost sharing between SEAMEO SEAMOLEC and its partners.

- When the training course is conducted at SEAMEO SEAMOLEC, each institution/region should send 2 participants, the cost for one of which will be paid by SEAMEO SEAMOLEC and the other by the participating institution/region.
- When the training course is conducted at the partner institution or region, the institution should provide SEAMEO SEAMOLEC's facilitators with accommodation and meals. SEAMEO SEAMOLEC will pay the transportation cost and allowance for its facilitators.

Any training courses can be paid for by cost sharing provided that the institution/region has an MoU with SEAMEO SEAMOLEC.

#### 2. Fully Borne by Participants

The cost of any training course can also be fully borne by participants. For more details, see the Training Programme Book or contact training division by email at: [training@seamolec.org](mailto:training@seamolec.org) or call +62 (021) 742 2184, or 742 3725.

#### 4) Masters Degree: Digital Media and Game Technology (By ODL)

The Open Distance Learning Programme for Master Degree in Digital Media and Game Technology is a joint programme between the Bandung Institute of Technology (ITB) and SEAMEO SEAMOLEC.

This programme started on 19 January 2008 and for the first 2 months, the students will conduct a bridging course which is held at ITB. ITB functions as the main campus for residents, whereas SEAMEO SEAMOLEC Jakarta, VEDC Malang, Dian Nuswantoro University Semarang and Politeknik Negeri Bali are committed as local campuses to support Open and Distance Learning (ODL). There are currently thirty students participating in this programme. The curriculum duration is 3 semesters for 20 months with 36-46 SKS credits. The final exam and final project will be held at the main campus.

This programme is product development-oriented and every student is required to contribute to a product development project of interactive digital media, such as: 1) Human-Computer Interaction; 2) Computer Graphic & Virtual Environment; 3) Virtual Reality & Augmented Reality; 4) Modelling and Simulation; 5) Tracking, Robotics and Automation; 6) Signal, Image and Sound Processing; 7) Biometrics such as the Speech Synthesis, Speech Recognition, Gesture Recognition; 8) Computational Infrastructure and Embedded System; 9) Ubiquitous Computing & Communication Mobile; 10) Java for Mobile Edu-Game; and 11) Programming and Computer Sciences.

#### 5) D4 Programme

In order to help the government to improve the nation's intelligence through education, and also in accordance with the national education system decree, Minister of National Education (MONE) decree No. 107/U/2001 and the Strategic Plan of MONE 2005-2009, in which open and distance learning (ODL) is one of the main alternatives to achieve raw participation numbers in higher education especially to support access coverage and education quality improvement, SEAMEO SEAMOLEC as a Centre of ODL in Southeast Asia is developing a distance learning programme for qualification improvement from D3 to D4 in collaboration with:

- ITB and Polytechnic of Art and Craft Yogyakarta, on D4 working Animation Programme
- ITB and VEDCA, on D4 Tissue Culture and Aquaculture Programme
- PENS-ITS, on D4 Information Technology Programme

This programme is partly sponsored by government scholarship, and partly by students themselves. Matriculation was held in November – December 2008 and the class was started in January 2009 for each programme. The duration of the programme ranges from 12 to 15 months. SEAMEO SEAMOLEC's role is as provider for infrastructure in the multicast system through SEA Edunet, which is being developed.

# SEAMEO Regional Centre for Graduate Study and Research in Agriculture (SEAMEO SEARCA)

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## A. Areas of Expertise in Integrating ICT in Education

SEAMEO SEARCA has a pool of talent/skills in ICT that can be applied in education. A good number of staff are trained in and are familiar with development applications of ICTs. However, SEAMEO SEARCA's focus on graduate education and research in agriculture, rather than on education per se, gives the Centre little avenue to participate in ICT in education initiatives within its institutional mandates.

Available expertise at SEAMEO SEARCA on ICT relevant to education include use of Moodle as an online platform for knowledge and solutions exchange among academics; development of multimedia learning materials; development of relevant learning strategies capitalizing on the ICTs, including web-based platforms for networking; mobile telephony; and digitization of learning materials. Knowledge/learning resources in the form of electronic files of publications, seminar presentations, and training materials harvested or developed by SEAMEO SEARCA may thus be accessed and downloaded via its website.

As the Centre beefs up its linkages with graduate fellows (past recipients of graduate scholarships), it also will manage its network of academic and agriculture leaders via online modalities.

The Centre is also currently exploring a web-based platform for reviewing and collaborative writing of scientific papers and journal articles.



## A. Project on Integrating ICT in Education

### 1) ICT and HIV/AIDS Preventive Education in the Cross-border Areas of the Greater Mekong Subregion

The Greater Mekong Subregion is home to more than two million of the reported cases of HIV as of the end of 2003. New infection cases are increasingly found among women who also bear the responsibility of caring for those living with HIV/AIDS. A report of UNAIDS/ UNICEF/WHO 2004 shows a total of 10 million young adults aged 15-24 years living with HIV at the end of 2003, 20% of whom were found in Asia. Several factors that increase the youth's vulnerability to HIV include lack of HIV information, lack of education and services, as well as adolescent experimentation and curiosity, coerced sexual relationship, and gender inequalities. One of the factors that fuel the spread of infection in the GMS is the presence of porous and active borders. These borders provide easy access to intravenous drug use and the sex industry. There is still no cure for AIDS and vaccines are still being developed. Thus success in reducing the spread of the virus depends on changing behaviours and addressing the environmental and socio-economic factors that increase people's vulnerability to the infection.

The school-based preventive education programme plays a major role in prevention activities especially for the youth. It can reach large numbers of young ones long before they get to be sexually active. The use of the skills-based approach in preventive education enhances the development of life skills that enable the youth to make healthy decisions to protect themselves from HIV/AIDS and also improve their educational and economic opportunities. In all of the participating countries, policies/enabling statements of the Ministries of Education are in place to support implementation of preventive education for HIV/AIDS in the school setting. The implementation of preventive education in schools is undertaken through curricular and co-curricular activities. However, the coverage, and scope of implementation vary from country to country. Moreover, there are several issues and concerns that influence its effectiveness and efficiency. Two of these concerns underscored during the fact-finding workshop are appropriateness of teaching/learning materials and teaching methodologies.

The use of ICT in HIV/AIDS preventive education can promote fundamental improvements in teaching and learning. To date, the use of ICT for HIV/AIDS preventive education is not maximized in all participating countries. Realizing the potential of ICT, this Project was conceived to address the two most pressing issues in implementation of preventive education.

This technical assistance has two development goals i.e. (i) reduce incidents of HIV/AIDS infection among vulnerable age groups, poor and marginalized population groups; and (ii) expand the use of ICT and other multimedia technologies in HIV/AIDS preventive education.

The objectives of the Project are: (i) develop ICT learning materials for HIV/AIDS preventive education in local languages; (ii) build capacities of teachers, health workers, multimedia providers, and other stakeholders for HIV/AIDS preventive education; (iii) expand use of ICT interventions in HIV/AIDS preventive education; and (iv) deliver ICT-based interventions to isolated, marginalized, and vulnerable populations. There are two international organizations designated as executing agencies, one for each of the two project components, SEAMEO AND UNESCO.

SEAMEO's component focuses primarily on teachers and in-school youth and addresses indirectly the communities where the selected schools are located. This component of the Project was implemented in nine border areas between the five participating countries i.e. Cambodia, Lao PDR, Thailand, Vietnam and the Yunnan Province of PRC. A total of 36 lower secondary schools, two schools per side of the border, were included in the Project. The project inputs include: (i) situational analysis of the sites and schools (ii) training of national trainers in a regional centre for the enhancement of their skills on instructional design development, use of ICT tools (word processing, presentation, spread sheet, video) and hands on production of prototype ICT based materials; (iii) provision of basic ICT equipment to the five national teams and 36 schools; (iv) training of classroom teachers implementing preventive education on use of ICT and development of learner generated materials at the school level; (v) materials development; (vi) delivery of ICT enhanced preventive education in the school setting; (vii) community preventive education; (viii) development of data base for the SEAMEO component ; and (ix) monitoring.

### **The Outputs of the Project are:**

- One regional and five national training curricula and manuals in the local language for use of ICT in preventive education;
- 10 national trainers' ICT capability strengthened;
- 614 classroom teachers trained on the use of ICT, which is much higher than the targeted number of 200, 57.82% % of whom are females;
- ICT based materials developed by trainers and teachers comprising about 650 computer generated print materials like flyers, brochures, newsletters, posters and pop-up materials; 207 PowerPoint presentations; 15 videos in the local language ; 79 interactive games; 8 VCDs of folk songs; and 6 radio scripts for local community;
- 26,679 students reached by ICT enhanced preventive education, of whom 46.79% are females;
- an estimated 100,000 community members reached by community preventive education activities in the border sites;
- ICT capability of 36 schools and five national teams strengthened; and
- Web-based project database developed.

Other intangible outcomes of the project are: (i) establishment of the culture of ICT among the 36 schools, thus contributing to the reduction of the ICT divide; (ii) higher morale and satisfaction of teachers delivering the programme; (iii) increased interest and participation of students; (iv) higher commitment of school officials and community leaders and members involved in the Project and school programmes as manifested by the provision of financial support to build infrastructure to house the ICT hardware, provision of electricity to a number of schools in Lao PDR to accommodate the ICT equipment, and their participation in school-community activities; (v) strengthened partnership between health and education sectors at different levels; (vi) upgraded local capacities for decentralized responses to emerging issues in the communities; (vii) initiated cross-border activities and bilateral cooperation between countries; (viii) reaching poor marginalized populations along the border areas; and (ix) reaching girls and women in the school and communities and addressing their need to reduce their vulnerability to HIV.

In terms of management, the overall policy direction for the project was a responsibility of the SEAMEO Secretariat; the training component was the major responsibility of SEAMEO INNOTECH, and the development of the database was undertaken by SEAMEO SEAMOLEC. The SEAMEO TROPED Network was responsible for the overall management of the project and the primary technical resource. Country focal teams composed of Ministries of Education officials with a representative from the Ministry of Health were established and were responsible for the country level implementation.

# SEAMEO Regional Centre for Vocational and Technical Education (SEAMEO VOCTECH)

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## A. Areas of Expertise in Integrating ICT in Education

Commencing fiscal year 2009-2010, a new division has been conceptualised named the Educational ICT Division. The role of this division is to enhance the provision of support and services in the applications of ICT in the teaching-learning experience. Realising the importance of ICT skills for all teachers and administrators of the Ministry of Education Brunei Darussalam, SEAMEO VOCTECH has been working closely with the Ministry to train and to certify their staff in Internet and Computing Core Certification (IC3). The following have been earmarked as the Centre's area of expertise in relation to ICT in education:

### **Digital Literacy Certification**

The Centre has been the prime partner for Certiport in Brunei Darussalam since 1 September 2006. This enables it to run the IC3 training and exams which are the internationally accepted standard in computer literacy.

### **Educational Multimedia**

Multimedia enables difficult concepts to be communicated in simple ways. The use of multimedia enhances the teaching-learning experience by providing a multi-sensory perspective. With the availability of software like Adobe Flash, Photoshop and Dreamweaver, multimedia lessons can be developed with a little practise with the software. But knowledge of the software alone is not enough to prepare a good educational multimedia. In order to be useful to the learner, a multimedia programme design needs to have a sound pedagogical base.

Since 2007, SEAMEO VOCTECH has been hosting the Creativity and Innovation Centre (CIC) whereby teachers in Brunei and training participants from SEAMEO Member Countries are able to enhance their knowledge and skills in multimedia development and new teaching approaches.

The Centre has also been hosting the Instructional Design Laboratory (ID-Lab) since 2009 to provide opportunities to teachers to enhance their teaching deliveries through various interactive technologies.

### **Applications of ICT in Education**

This highlights the need to provide appropriate support in adapting educators' activities to fit the changing paradigm of learning, and the role of school administrators in understanding that process. Both the CIC and ID-Lab have supported the applications of ICT in education.

## **Online Education**

This encompasses all forms of Technology-Enhanced Learning (TEL) such as web-based or online learning with a recognised set of pedagogy. SEAMEO VOCKETCH has not implemented online education totally, but uses more of a blended approach whereby both face-to-face and online learning are used simultaneously.

## **B. Programmes and Projects on Integrating ICT in Education**

### **1) ICT in Education Training Series**

#### ***Background***

In its aspirations to become the leading centre of excellence in vocational and technical education and training in Southeast Asia, SEAMEO VOCKETCH engages itself in three main activities: 1) training programmes, 2) research and development, and 3) information dissemination services. Each of these activities reflects the five areas of expertise offered by the Centre: Information & Communication Technology (ICT), management, research, curriculum development, and training of teachers. The activity reported in this section focuses on training programmes related to ICT in education.

#### ***Objectives***

In general, the objectives of the training series are one or more of the following:

1. Sharing of ideas on current trends and issues in ICT in education in Southeast Asia
2. Discussions of various topics on ICT in education
3. Development of ICT-based teaching and learning tools and materials
4. Development of Action Plans to disseminate and implement new skills and knowledge acquired in the training

#### ***Target Group***

The main target participants of this ICT training series are administrators, lecturers, and teachers of VTET institutions from Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. A total of 673 people have participated in this training series in the past 7 years.

#### ***Teaching and Learning Tasks and Activities***

The ICT training programmes offered by the Centre consist of regular trainings, in-country trainings, and customised trainings. Participants are provided with slides and materials of the training in the Training Handbook. A DVD is provided at the end of the training containing a compilation of the Country Reports, Projects, and Action Plans developed by participants, training materials, pictures and videos of training activities, and news coverage from the press. The training is supported with Edunet, an e-Learning Management System developed by SEAMEO VOCKETCH. The list of trainings on ICT in education for the last 7 years is as follows:

## Regular Trainings

The regular training programmes are trainings attended by representatives of 11 SEAMEO Member Countries sponsored by the Centre. Additional participants are invited to join on a fee-paying basis.

No.	Title	Venue	Date	M	F	Total
1	Development of Multimedia Learning Resources in VTET	Brunei	13 Aug - 6 Sep 03	14	7	21
2	Computer Software Application for Managing VTET Institutions (For non-IT Specialist)	Brunei	8 – 20 Dec 03	12	5	17
3	Developing Online Multimedia Resources for E-learning in VTET	Brunei	24 May – 12 Jun 04	12	4	16
4	Development of Multimedia Instructional	Brunei	10 - 29 Jan 05	10	5	15
5	Using ICT to Enhance Instructional Delivery in VTET	Brunei	4 – 16 Apr 05	11	5	16
6	ICT Towards “F.R.E.S.H” Instructional Delivery System in VTET	Brunei	14–26 Nov 05	9	5	14
7	Integrating Relevant and Interactive ICT	Brunei	16 – 28 Apr 07	10	7	17
8	Integrating Learning Technology Interactivity within VTET	Brunei	25 Feb – 8 Mar 08	11	7	18
9	Integrating ICT with VTET System	Philippines	19 – 30 May 08	15	4	19
10	Managing Teaching and Learning Through ICT	Philippines	11 – 23 May 09	17	11	28
<b>Total Number of Participants</b>				121	60	181

## In-Country

In-Country trainings are requested by and held in the Member Countries. SEAMEO VOTTECH shoulders the costs incurred by the presence of the specialist such as international transportation, accommodation, and per-diem, while the host country shoulders the remaining costs. Each Member Country is allocated one sponsored in-country training every year. Additional trainings are possible under full sponsorship by the Member Country.

No.	Title	Venue	Date	M	F	Total
1	Networking Technology: Using Intranets for VTET Educational Data Interchange	Myanmar	20 – 24 Jan 03	16	15	31
2	Intranets for Information Sharing (Networking Technology in and Across VTET)	Thailand	15 -19 Mar 04	22	7	29
3	Managing Information of VTET Institutions Using Databases	Malaysia	6 – 10 Dec 04	8	22	30
4	Preparing Web-Based Teaching Learning Materials Resources	Thailand	9 – 13 May 05	21	8	29
5	Multimedia Courseware Development in VTET	Malaysia	8 – 12 May 06	30	12	42
6	Science Learning Based on Multimedia ICT	Indonesia	3 – 8 Jul 06	30	30	60
7	Preparing On-line Teaching Learning Materials	Myanmar	28 Jan–1 Feb 08	8	17	25
8	Theory and Practical of Online Learning	Thailand	21 – 25 Apr 08	10	28	38
<b>Total Number of Participants</b>				145	139	284

## Customised Trainings

This type of training is custom-made for the requesting institution or country, and all costs are shouldered by the requestor.

No.	Title	Venue	Date	M	F	Total
1	Information Technology Programme & English Communication Skills Development Course for East Timor, Vietnam, Cambodia and Lao PDR	Brunei	20 – 24 Jan 03	12	4	16
2	Web Based Application for Instructional Delivery in VTET (DTE)	Brunei	15 -19 Mar 04	4	2	6
3	Computer Based Teaching and Learning Resource Development (School Adoption Project)	Brunei	6 – 10 Dec 04	4	12	16
4	MIS Development for Education: Development of Education Database	Brunei	9 – 13 May 05	8	4	12
5	Networking and Intranets for Educational Information Management	Brunei	28 Jul – 2 Aug 03	9	12	21
6	MIS Development for Education: Development of Education Database	Brunei	4 – 9 Aug 03	4	7	11
7	Instructor-Led-Training for Microsoft Internet Information Services (IIS)	Brunei	16 – 20 May 05	7	0	7
8	Project Management (Information Technology) for Ministry of Defense	Brunei	16 – 18 Aug 05	8	2	10
9	Microsoft Certified Administrator	Brunei	5 – 17 Feb 07 26 Feb – 3 Mar 07	4	2	9
10	Camp@Apples Session for MoE	Brunei	27 – 30 Apr 07	3	14	17
11	In-house Training Programme on Microsoft Project 2002	Brunei	9,12,14 May 07	4	6	10
12	EC-Council: Security Training and Certification Programme	Brunei	23Jul – 10 Aug 07	10	0	10
13	Visual Basic.NET Programming with SQL Server 2005	Brunei	19 – 28 Nov 07	4	1	5
14	Visual Basic.NET Programming with SQL Server 2005	Brunei	29 Nov – 10Dec 07	2	2	4
15	Final Cut Pro 101:An Introduction to Final Cut Pro 5 (Pusat Dakwah Islamiah)	Brunei	9 – 11 Jun 08	8	0	8
16	Final Cut Pro 101:An Introduction to Final Cut Pro 5	Brunei	9 – 11 Jun 08	3	2	5
17	In-House Training Programme: System Design for the Internet	Brunei	11 – 18 Jul 07	4	4	8
18	SEAVERN: Integrating Relevant and Interactive ICT in VTET through Research	Brunei	14 – 26 Jan 08	13	6	19
19	Workshop on ICT Integration in Education: Policies and Practices in SEA	Brunei	28 – 29 Feb 08	9	0	9
20	Internet and Computing Core Certification Course for Public	Brunei	15 – 24 Dec 08	1	1	2
21	Internet and Computing Core Certification Course for Public	Brunei	16 Feb – 17 Mar 09	1	2	3
<b>Total Number of Participants</b>				122	83	208

## 2) SEAMEO VOTTECH EduNet

The SEAMEO VOTTECH EduNet is an e-Learning Management System developed to facilitate teaching and learning in the Centre. EduNet was developed based on the Moodle Open Source LMS and is accessible on the internet through the Centre's web server. The system can be used by participants to download materials, upload assignments, and share ideas. Participants are encouraged to access the EduNet even after the training to update themselves on new developments and share their experiences with other former participants. The following are screen shots of EduNet:



The Index page of a training programme showing available training materials



A view of participants' online activities

### Impact on Students' Learning Outcomes

The use of ICT in the teaching and learning process is expected to improve students' learning outcome by:

1. Catering for individualized learning in terms of learning styles and speed
2. Fostering stronger collaborations through multi-channel communications
3. Providing flexibility of learning regardless of time and location of study



## ***Transformation of Classroom and School Practices***

The ICT in Education training series encourages school administrators and teachers to utilise advancements in technology in classroom and school practices such as:

1. Eliminating the confinement of teaching and learning to the classroom
2. Allowing more intensive discussions between teachers and students

### ***Implications and Lessons Learnt***

ICT is a rapidly evolving field, and to maintain interest in the ICT training series SEAMEO VOCTECH should always adapt and modify trainings based on new and emerging technologies.

### ***Conclusion and the Updated Status of the Project***

The ICT Training Series has been able to upgrade school administrators' and teachers' capability to utilise ICT in education. The reported trainings are continuously conducted based on the current needs of the clientele and Member Countries, and it is recommended that these efforts would be continued and increased in the future.

## **3) ICT Competency Training and Certification for Ministry of Education Brunei Darussalam**

### ***Background***

Realising the importance of ICT skills for all teachers and administrators of the Ministry of Education Brunei Darussalam, SEAMEO VOCTECH has been working closely with the Ministry to train and to certify their staff in Internet and Computing Core Certification (IC3). This project is funded by the Ministry of Education Brunei Darussalam. It is under the human capacity building program of the E-Education project.

### ***Objective***

It aims to develop basic ICT competencies among teachers and officers of the Ministry of Education whose skills were later measured against an internationally accepted standard.

### ***Certification Program***

The Internet and Computing Core Certification (IC3) from Certiport in the United States was chosen as the certification programme.



It is the world's first validated, standards-based training and certification program for basic computing and internet knowledge and skills.

## **Program Benefit**

Global, broad-based IC<sup>3</sup> certification verifies that candidates possess the accepted standard level of basic computer and internet literacy and are efficient and marketable. Successful completion of IC<sup>3</sup>:

- Provides core skills and knowledge necessary to use some computer applications and the internet
- Effectively tests computing knowledge and skills to ensure mastery is achieved
- Gives a resume-building standard certification as proof of successful completion of the programme
- Provides the foundation necessary to further enhance productivity and marketability with other desktop application-specific certifications
- Gives individuals confidence and security in being part of today's digital world

## **Skills Covered**

The IC<sup>3</sup> training and certification program covers a broad range of computing knowledge and skills that proves competency in the areas described below. Individuals seeking IC<sup>3</sup> certification are required to take and pass all three IC<sup>3</sup> exams: Computing Fundamentals, Key Applications, and Living Online.

## **Module A: Computing Fundamentals**

### *Computer Hardware:*

- Identify types of computers, how they process information and how individual computers interact with other computing systems and devices
- Identify the function of computer hardware components
- Identify the factors that go into an individual or organisational decision on how to purchase computer equipment
- Identify how to maintain computer equipment and solve common problems relating to computer hardware

### *Computer Software:*

- Identify how software and hardware work together to perform computing tasks and how software is developed and upgraded
- Identify different types of software, general concepts relating to software categories, and the tasks to which each type of software is most suited or not suited
- Identify fundamental concepts relating to database applications

### *Using an Operating System:*

- Identify what an operating system is and how it works, and solve common problems related to operating systems
- Manipulate and control the Windows desktop, files and disks
- Identify how to change system settings, install and remove software

## Module B: Key Applications

### *Common Program Functions:*

- Be able to start and exit a Windows application and utilise sources of online help
- Identify common on-screen elements of Windows applications, change application settings and manage files within an application
- Perform common editing and formatting functions
- Perform common printing functions

### *Word Processing Functions:*

- Be able to format text and documents including the ability to use automatic formatting tools
- Be able to insert, edit and format tables in a document

### *Spreadsheet Functions:*

- Be able to modify worksheet data and structure and format data in a worksheet
- Be able to sort and manipulate data using formulas and functions, and add and modify charts in a worksheet

### *Presentation Software:*

- Be able to create and format simple presentations

## Module C: Living Online

### *Networks and the Internet:*

- Identify network fundamentals and the benefits and risks of network computing
- Identify the relationship between computer networks, other communications networks (like the telephone network) and the internet

### *Electronic Mail:*

- Identify how electronic mail works
- Identify how to use an electronic mail application
- Identify the appropriate use of e-mail and e-mail related “netiquette”

### *Using the Internet:*

- Identify different types of information sources on the internet
- Be able to use a Web browsing application
- Be able to search the internet for information

### *The Impact of Computing and the Internet on Society:*

- Identify how computers are used in different areas of work, school, and home
- Identify the risks of using computer hardware and software
- Identify how to use the internet safely, legally, and responsibly



Sample of Certificate

## Implementation

### Standards Compliance

In order to comply with the standards of training and testing, the Centre signed a Memorandum of Agreement with Wordware Malaysia on 14 September 2006.

The agreement allows SEAMEO VOCTECH to operate authorised training and testing centres for IC3 in Brunei Darussalam.

### Facilities

Initially the Centre utilises a computer lab as the venue for the training which is able to accommodate 32 course participants. As of 30 March 2009, SEAMEO VOCTECH has increased its training capacity to 50 participants. This is made possible by utilising the Creativity and Innovation Centre (CIC) Lab which has a capacity of 18 participants.



### Training Partners

In order to absorb more participants into the program, the Centre has appointed 3 established ICT training providers in the country to act as training outlets and Accredited Testing Centres (ATC).

They are listed in the table below at no particular order:

Training Provider	Maximum Capacity
Infomars Training and Technology Solutions	36 (2 classrooms)
Laksamana College of Business (LCB)	15
Had Technologies	35 (2 classrooms)

## Training Schedule

VOCTECH		
Group 1	2 – 23 October 2006	44
Group 2	6 – 27 November 2006	18
<b>TOTAL</b>		<b>62</b>

VOCTECH		
Group 3	8-30 Jan 2007	53
Group 4	7 Feb – 3 Mar 2007	29
Group 5	26 Mar – 17 Apr 2007	28
Group 6	23 Apr – 14 May 2007	32
Group 7	17 May – 9 Jun 2007	31
Group 8	25 Jun – 17 July 2007	30
Group 9	23 July – 14 Aug 2007	32
Group 10	16 Aug – 6 Sept 2007	32
<b>TOTAL</b>		<b>267</b>

		VOCTECH	INFOMARS	LAKSAMANA	HAD
Group 11	7 – 29 January 2008	29	-	-	-
Group 12	11 February – 4 March 2008	32	-	-	-
Group 13	31 March – 21 April 2008	32	-	-	-
Group 14	12 May – 3 June 2008	30	20	-	-
Group 15	30 June – 22 July 2008	27	19	-	-
Group 16	4-25 August 2008	31	37	-	-
Group 17	6-11 October 2008 and 20 Oct – 3 November 2008	31	30	15	11
Group 18	8-29 November 2008	32	36	14	14
<b>TOTAL</b>			<b>440</b>		

		VOCTECH	INFOMARS	LAKSAMANA	HAD
Group 19	8-31 January 2009	31	30	15	35
Group 20	9 February –3 March 2009	27	25	10	27
Group 21	30 March – 20 April 2009	26	35	13	29
Group 22	21 April – 12 May 2009	44	32	13	8
Group 23	21 May – 13 June 2009	38	30	13	11
Group 24	1 - 25 July 2009	39	28	14	11
Group 25	29 July – 19 Aug 2009	37	14	15	13
Group 26	29 Sept - 12 October				
	& 19 – 26 October 2009	24	16	20	19
Group 27	2 – 23 November 2009	47	14	15	16
TOTAL			834		

Total number of participants trained so far: 1603

### **Concluding Remarks**

Everyone needs basic ICT skills to function effectively in a knowledge-based and technologically advanced society. There is a critical need to develop ICT skills and integrate ICT in all professions to increase national productivity. To not have them may lead to marginalisation. It is through the application of ICT that people are going to be able to compete and remain relevant in today's society.

E-Education will integrate ICT in all educational institutions from the primary level to the tertiary level. Therefore it is important for educators to keep with the spirit of the times and equip themselves to learn, work, and teach with the innovations of ICT, which are replacing the traditional methods.

## **4) Online Journal Systems in Vocational and Technical Education**

### **Project Background**

The SEAMEO Regional Centre for Vocational and Technical Education and Training (VOCTECH) is one of the nineteen Centres of the Southeast Asian Ministers of Education Organisation (SEAMEO). It was established on 28 August 1990 and mandated to assist the member nation states in strengthening the vocational and technical education and training systems by enhancing their capabilities through training, research, and information services. To date, the Centre has conducted 499 training programmes and trained 15,469 education professionals from universities, colleges, polytechnics and vocational and technical education and training (VTET) institutions, implemented and completed 27 research studies, published a total of 10 journals, and recently embraced the idea of having online journal systems.

Recognising the contribution of research to the body of knowledge and to continuously improve policies and practices, SEAMEO VOCTECH is now putting greater emphasis on its education research mandate. The diverse and extensive changes in the status and content of vocational and technical education (VTE) over the last few years have created a host of new needs and challenges (Seng, 2004) that require the development and efficient use of research.

The Online Journal Systems (OJS) is one of the programmes initiated by the Centre in conjunction with the establishment of the Southeast Asian Vocational Education Research Network (SEAVERN). This network was initiated in 2007 with a total of 22 research coordinators from the 11 Member Countries and has more than 100 research members. This research network has been an avenue for collaboration among researchers in the Southeast Asia in generating, managing, and disseminating information based on research activities. In the end, the OJS will make this information easily accessible to policymakers, educational practitioners, and other researchers as a basis for their policy decisions, to improve current practices, and to generate ideas for further research.

### ***Objectives of the Project***

1. To have a resourceful online research database in the area of vocational and technical education and training in Southeast Asia
2. To offer easy access to research information to practitioners, policymakers, and researchers in the area of vocational and technical education and training
3. To have a comprehensive collection of research papers in VTET in Southeast Asia

### ***Target Groups of the Project***

The target groups are education practitioners, policymakers, and researchers in Southeast Asia who are involved or interested in VTET.

### ***Activities under the OJS Project***

The collection of the OJS consists of compilations of research papers submitted (either by email or direct submission to OJS) by contributors that have been reviewed by a committee assigned by the Centre. The contributors of the OJS are the research coordinators and members of SEAVERN, and also members of the education community who are interested in publishing their research papers. All papers must go through a proper selection process based on their relevance to VTET, sound research methodology, and suitability of language used. After getting approval, the papers are published and made accessible to the public.

The OJS is hosted by SEAMEO VOCTECH. The network diagram for hosting the OJS can be seen in Figure 1.

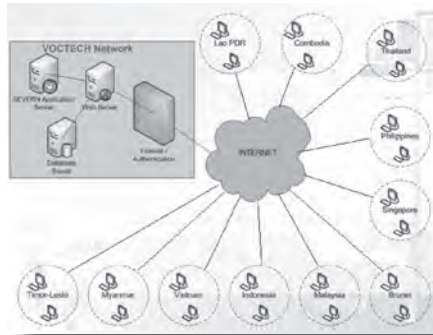
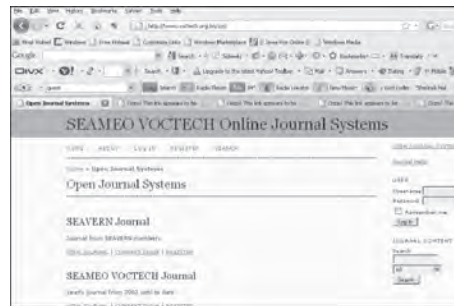


Figure 1. The Network of Hosting Online Journal Systems

With the system in place, research papers have been published and their number is continuously increasing. The future of this OJS will really depend on the contribution of the community in terms of research papers being submitted.

At the moment, there are still less than one thousand papers published. To access to the OJS, please visit: <http://www.voctech.org.bn/ojs/>



Currently, many of the articles are uploaded under the SEAMEO VOCTECH Journal. By clicking View Journal, you will see some free articles published in the OJS (see the following examples).



Figure 2. Example of Articles Listed in the OJS

By clicking the ABSTRACT or the PDF, a reader can access the journal article.





Figure 3. Example of an Abstract Published in the OJS

### **Concluding Remarks**

In this information age in which the knowledge society is continuously searching for valuable information, an easy-access database such as this VTET Online Journal System is very timely. Realising that in Southeast Asia, many of our decisions are not strongly supported by sound studies, we sincerely hope that this initiative will trigger positive changes in our policy-making process and ensure continuous improvement of our programmes.

We realise that it is not an easy task to instill a research culture, to make a habit of sharing our research findings, and to use information for making improvements or creating policies. We have encountered problems in compiling research information at this stage. The interest in submitting research information is still lacking regardless of various types of encouragement we have provided.

Realising the importance of this initiative, however, and regardless of the struggles and slow progress, we are still committed to strive for the betterment of this online database. If we do not start now, when then? We hope that this small contribution will change our attitude from being good followers to be potential leaders in the future.

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## Southeast Asian Ministers of Education Organization

The Southeast Asian Ministers of Education Organization (SEAMEO) is an international and intergovernmental organization established in 1965 among governments of Southeast Asian countries to promote regional cooperation in education, science and culture in the region.

Its 11 Member Countries include Brunei Darussalam, Cambodia, Lao PDR, Indonesia, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Timor Leste and Vietnam. It embodies 6 Associate Member Countries: Australia, Canada, France, Germany, New Zealand and Spain; and three Affiliate Members, namely the International Council for Open and Distance Education (ICDE), the University of Tsukuba, Japan and British Council.

Over the past four decades, SEAMEO has developed 19 specialist institutions throughout Southeast Asia which provide regional leadership in human resource development and the diverse expertise that they offer in education, health, environment, and agriculture and natural resources.

As an organization that has continued to nurture human capacities and explored the peoples' fullest potential, the SEAMEO maintains its work and aspirations for development with peoples of the region to make lives better in quality and equity in education, preventive health education, culture and tradition, information and communication technology, languages, poverty alleviation and agriculture and natural resources.

SEAMEO continues to expand its network of partners within and outside Southeast Asia, linking and networking with specialised agencies and organisations that have similar pursuits and interests. It collaborates with global organizations like UNESCO, UNICEF, UN-HABITAT, the World Bank, the Association of Southeast Asian Nations, and others.

The organisation's highest policy-making body is the SEAMEO Council, which comprises the 11 Southeast Asian education ministers. The SEAMEO Secretariat is located in Bangkok, Thailand.

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