Introduction

Text2teach is a pilot project being implemented in science classes in Grades 5 and 6 in elementary schools in the Philippines. It is the Philippines version of a global programme called BRIDGEit, an initiative that aims to improve the teaching of basic education in developing countries.

The text2teach project aims to improve the teaching of science in the Philippines through the provision of interactive easy-to-use multimedia packages designed to make science learning more exciting and meaningful for young learners. The project makes use of digital satellite broadcasting and mobile phone technologies to transmit video materials directly to the classroom. This case study focuses on the teacher education component of the text2teach project.

Background

Among the 55 nations included in the Information Society Index (ISI)\(^4\), the Philippines is ranked 48th in terms of preparedness and ability to absorb advances and growth in information and communication technologies (ICT). Recognizing the need for improvements in the use of ICT in education and training, the Philippines Government has enacted laws to foster the use of ICT for widening access to education, improving the quality of teaching and fostering the development of lifelong learning skills.

The Philippines’ “Information and Communication Technology Plan for the 21st Century” (1998) sets forth the following objectives:

- To provide physical infrastructure and technical support that will make ICT accessible and useful to students, teachers, administrators and support staff.
- To develop competence among teachers in using technology, in designing, producing and using ICT-based instructional materials.
- To ensure access to the latest developments in ICT and to support research and development in this area.
- To undertake a curriculum improvement programme focused on the integration of technology into education.
- To promote the use of appropriate and innovative technologies in education and training.

A survey commissioned in 2002 by the Philippine Senate Committee on Education, Arts and Culture to the South-East Asian Ministers of Education Organization Regional Centre for Educational Innovation and Technology (SEAMEO INNOTECH), examined the ICT infrastructure of elementary and secondary schools in the Philippines.

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\(^4\) The ISI was developed by the World Times and the Data Corporation.
Some of the survey findings are as follows:

- Two-thirds, or 66.07 percent, of the 36,368 schools surveyed have electricity. The regions with the highest electricity supply are the highly industrialized regions of Luzon namely: National Capital Region (NCR), Region I, Region III and Region IV;
- Of the schools surveyed, 5,217 (14.28 percent) indicated they have computers. Only 726 (2 percent) have access to the Internet.
- 4,866 (13.3 percent) of the schools surveyed have access to landline telephones.
- The most common audio-visual and multimedia equipment in schools are traditional media equipment. Specifically, these are: radio-cassette players (42.22 percent of all schools); television (26.80 percent of all schools); and VHS players (17.19 percent of all schools).
- Schools in provinces in Mindanao (Regions IX, X, XI, XII, CARAGA and ARMM) have the lowest incidence of computers.
- Only one out of every seven schools has teachers who are computer literate.
- More schools have computer-literate teachers (6,632 or 18.24 percent) than have computers (5,217 or 14.28 percent).
- In the survey, 27,042 school heads (74.36 percent) indicated they had received no training on any topic related to ICT in the past five years. The remaining 4,774 school heads (13.13 percent) indicated they had received some sort of ICT training.

The survey also examined the level of computer training provided at schools:

- While in the majority of private elementary schools computer training starts at grade 2, in public elementary schools introduction to basic computer operations starts in grade 4, if computers are available.
- At high school, computer training is for further skills enhancement as an area of study in Technology and Home Economics (THE).

In recent years, the Philippines Department of Education (DepEd) has embarked on various “ICT in Education” projects. A brief review of the projects reveals that the projects generally aim to:

- Improve access to ICT by teachers and students.
- Develop the ICT competencies of both teachers and students.

Some examples of projects include:

- The Department of Education “Modernization Programme”. This project was initiated by the Office of the President in 1996. It earmarked PhP375 million for use on hardware and software procurement (75%) and staff training (25%) including training for teachers, administrators and support staff.
- The “Adopt-a-School” programme, initiated in 1998 by the DepEd aimed to enlist the help of private corporations in delivering educational goods and services including computer laboratories and equipment to schools in underserved areas.
- The Department of Transportation and Communication (DOTC), in partnership with the Science Education Institute (SEI) and Intel Philippines, provided Mobile Information Technology Classrooms (MITCs). These mobile classrooms are air-conditioned 32-seat buses equipped with laptops, television sets, video players, LCD projectors and screens, a public address system, a printer and a generator set. These mobile classrooms are also equipped with audiovisual and instructional materials on topics relating to science and technology.
- Coca Cola Philippines’ “Edventure” provides three ICT courses for administrators and teachers. The courses train teachers to use on-line communication tools and to initiate project-based
learning and telecollaboration. The administrators are equipped with knowledge, strategies and tools for making a school technology plan and ensuring its sustainability. During the courses, the administrators also build their capacity to develop policies on ICT use, and in community mobilization and resource generation, as well as monitoring and evaluation skills.

- “e-Mage 2000” (Math Games for excellence for secondary level) is a collaborative project in partnership with the private sector to enhance the teaching skills of mathematics educators through the use of ICT.

In her speech at the 2nd National ICT in Basic Education Congress held in September 2006, Philippines President Gloria Macapagal-Arroyo explained that the Department of Education and the Commission for ICT are crafting a national ICT programme for teachers, the National ICT Competency Standard for Teachers. This initiative will be implemented in all public high schools and the majority of the teachers should be able to satisfy the requirements of the ICT standards by 2010.

**The BRIDGEit programme**

The BRIDGEit programme aims to:

- Help provide access to high-quality educational resources for learners in remote geographical locations.
- Address social exclusion caused by limited or lack of education. BRIDGEit aims to create an open platform that provides access to new and innovative teaching solutions to teachers in emerging economies and improve both teachers’ and students’ motivational and skill levels.
- Harness public and private partnerships. Digital bridging in education requires the coordination of diverse partners among a number of public and private organizations.

The goals of BRIDGEit were a major consideration in the conceptualization and planning of the text2teach conceptual framework.

**Text2teach goals and objectives**

The overall goal of the text2teach project, implemented between July 2003 and March 2004, was to raise the quality of education in the Philippines in order to strengthen the competencies of the country’s youth and to properly prepare them for the challenges of the 21st century.

The main objectives of the pilot project were to:

- Enhance basic education learning in science for Grades 5 and 6 students.
- Train science teachers, school heads and schools division supervisors in the pilot schools on the use of technology for enhancing learning.
- Develop a blueprint of a model for delivering digital content to science classes in the Philippines. Test the tenacity of the architecture and infrastructure of the said model for delivering digital content for education.
- Generate data and measure the results to determine the viability of scaling up the programme nationally and replicating it on a global level.
Text2teach pilot project

The programme was implemented by 82 teachers from 15 schools in Batangas, 13 schools in Cotabato City and 10 schools in Quezon City.

Under the programme, 120 science lesson plans were developed – 60 in Grade 5 and 60 in Grade 6 – complemented by over 100 video clips.

The major management partners of text2teach are: the Global Support Team (GST) composed of the International Youth Foundation (IYF), Nokia, Pearson Education and the United Nations Development Programme (UNDP), and; the Philippine Project Team composed of Ayala Foundation, the Department of Education, SEAMEO INNOTECH, Globe Telecom, PMSI and Dream Broadcasting.

Project components

The text2teach project had four main components:

1. Content Planning and Lesson Development
2. Capacity Building
3. Advocacy and Promotion

The main activities under this component were:

- A launch event was held to generate interest in the project at the national and international levels.
- Community launches and orientation sessions which were held at each project site to inform the education sector and other community stakeholders of the nature and scope of text2teach and to generate support from the community. The majority of the schools held school or barangay project launches.

4. Monitoring and Project Coordination

Project monitoring was undertaken by SEAMEO INNOTECH together with designated project monitors at each of the pilot sites.

The monitoring objectives were to:

- Prepare a profile of how the project was being conducted at various levels in the three pilot sites.
- Identify gaps, deficiencies and potential problem areas.
- Determine project features which may serve as insights in improving project operations.
- Document best practices which may be useful for modifying or enhancing project activities.
- Disseminate the results of monitoring work to the project managers and stakeholders to update them on project progress.

Content development and capacity building

Two of the most important components of the text2teach pilot project were Content Planning and Lesson Development, and Capacity Building.

The Content Planning and Lesson Development component included two major activities:

- Planning and development of lessons which involved: review of the DepEd Basic Education Curriculum (BEC), specifically the curricular programmes of Grades 5 and 6 Science which enabled the identification of over 100 video packages to be made available to teachers and the development of 60
lesson plans for Grade 5 science and 60 lesson plans for grade 6 science. A team of DepEd master teachers and lesson plan writers developed these lessons. The lessons are in compliance with the DepEd Basic Education (Science) curriculum.

- Review and revision of the lesson plans based on the lessons learned from the experiences gained through implementing the text2teach programme during the school year.

The second major component is capacity building. It has two strands:

- Training of trainers (TOT), which involved training a core group of trainers who conducted the training of the project teachers.
- Training teachers, school principals, project monitors and school division officers at the project’s pilot sites

A five-day live-in training programme was held in May 2003 for the participating science teachers, school principals or school heads, assistant school division superintendents and school division supervisors.

The objectives of the training programme were to:

- Explore the role of today’s teacher and how it relates to use of technology in the classroom.
- Orient the project participants on the project concept – its objectives, scope and coverage, expected outputs and different project components.
- Discuss the pilot project, the roles of the participants, expectations, and support network.
- Explore the lesson plans augmented with video material and review how they were developed.
- Develop participants’ competencies and skills in utilizing ICT tools and conducting project activities, namely: using the teachers’ manuals; using cell phones to request video packages from the Pearson KnowledgeBox; using the Nokia Mediamaster and video technology to enhance science lessons; enriching student learning with the use of innovative teaching strategies; and project monitoring and evaluation activities.
- Plan for successful project implementation.

In addition to the training programme, the teachers, school heads and other local education officials were also given suggestions and advice on various aspects of text2teach implementation during the regular school visits by the project monitors.

During the project communication was encouraged between the teachers, school heads, and SEAMEO INNOTECH and Nokia (in charge of technical aspects of the project). Through the project help desk, this communication facility served as an avenue for continuing provision of advice and mentoring activities of the project.

Text2teach technology

The text2teach project utilizes a system that integrates digital satellite broadcasting and mobile phone communication to transmit video materials directly to the classroom for use in grade 5 and 6 science subjects.

The video materials are directly transmitted via satellite to the schools, recorded by digital broadcast recording specially provided for this purpose, and used by science teachers to supplement their teaching in the classroom.
Video materials are ordered by the teacher through Short Messaging Service (SMS) on the mobile phone from the KnowledgeBox (KB) Video Library of Pearson Education. The KB is an on-line digital library of multimedia resources that support instructional goals.

The text messages sent by the teachers are converted into ASCII texts to be sent through email to the Nokia media server. Nokia then directly transmits the ordered video clips via satellite to the schools. The video materials are then recorded on the Nokia Mediamaster. This is a digital recording device that enables the viewing of the recorded video materials on the 29-inch television set in the science classroom.

**Using text2teach in the classroom**

During the project, participating teachers followed these steps whenever they gave a lesson:

Step 1: The teacher refers to a prepared lesson plan to check which video will be needed for a particular science lesson.

Step 2: The teacher orders the recommended video clip using a provided Nokia mobile phone. The teacher sends an order via SMS, specifying the code of the selected video clip.

Step 3: The text is received through an order processing system facilitated by Globe, Chikka and Dream Broadcasting. Orders for the day are compiled and transmitted via satellite the next morning. The school’s Nokia 260S Mediamaster, also provided under the project, records the video clip as it is broadcast.

Step 4: The material is stored in the Mediamaster digital recording device, ready for viewing.

Step 5: The teacher previews the video material and prepares for the scheduled lesson using the prepared lesson plan.

Step 6: On the day of the scheduled science lesson, the teacher teaches the prepared lesson using the video material to demonstrate the science concepts, and engages the students in an interactive discussion of the topic using the techniques recommended by the text2teach programme.

**Results and impact of the project**

Following the implementation of the text2teach pilot project, SEAMEO INNOTECH examined and analysed the Teachers’ Lesson Logs (3,256 logs) produced by the teachers at the three pilot sites.

Analysis of the teachers’ logs indicated that:

- Preparation by teachers (for teaching a lesson) entailed previewing the video, studying the lesson plan, planning out the lesson and preparing the learning materials and teaching aids to be used. Adding more activities and reading texts required more time, as did research on the topics for discussion.

- Teachers needed substantial time to prepare for the lessons. The time spent for each preparation depended on the level of difficulty of the lesson. Time for lesson preparation varied widely. A third of the teachers (30.5 percent) required between 2 and 2.5 hours to prepare, while 27.9 percent
needed less than two hours. A significant number of teachers (22.6 percent) required five hours or more of lesson preparation.

- All teachers took the time to view the videos before class. The majority of teachers previewed the video many times. In Batangas, 91.5 percent of teachers previewed the video at least three times, while in Quezon City 73.6 percent of teachers did so, and in Cotabato City 64.4 percent did so. Teachers generally previewed the video more than once because they wanted to master the concepts to be learned by their pupils and be well prepared in presenting the lessons. The teachers also wanted to be prepared in case they needed to do additional research on the topic before the class.

- To enrich teaching, the teachers used a range of teaching materials. In most (92.2 percent) of classes, teachers prepared materials for the lesson. They used teaching aids such as charts, pictures, activity cards and flashcards.

- In around half of the classes (46 percent), the teachers felt that the materials they had and the KB videos were enough to enable them to teach the lesson well. For the other 50 percent of classes, teachers felt that they needed additional materials. Teachers used various reference materials to substantiate the science lesson to be taught, including science textbooks and reference books, encyclopaedia (in print and CD-ROM formats), Internet resources, VHS tapes magazines, atlas, maps, puzzles, pictures, dictionaries, laboratory materials, models, pamphlets, graphs and charts, activity cards, drawing materials, posters, news clippings, and BEC lesson plans.

- To emphasize some processes being demonstrated in the video, to become more acquainted with the science concepts, and to allow students to take note of key words shown on screen, teachers chose to make “video pauses” (75.3%) and “video replays” (66.9%). When teachers repeatedly paused or replayed the video, and the video was not completed in one session, they would then continue the lesson in the next class meeting.

- The use of videos in class had the advantage of enabling students to have repeated exposure to the subject matter. Because the video materials are digitally recorded, teachers and students could pause the video and playback (repeat) to gain a better understanding of the subject matter. Students were also able to watch the video again in their spare time. The students took particular pride in having learned how to operate the video equipment.

- Most teachers (95 percent) agreed that the lesson plans developed under the text2teach programme were easy for them to follow and implement. In addition, they commented that the lesson plans significantly eased out their burden because with ready-made lesson plans they had more time to prepare for a particular lesson. Teachers also found that the lesson plans contributed to meaningful learning and enhancement of attitude and behaviour toward science. Teachers observed that the pupils became more enthusiastic about the lesson and more participative in class. The teachers also perceived that the lessons resulted in the desired student knowledge, attitude and behaviour in most classes.

- Teachers in all of the participating schools found that there were increases in teacher-student, student-student and student-video interactions in over 96 percent of their classes. In 72.1 percent of the lessons taught, teachers “strongly agreed” that the “video was interesting”. The teachers
also noted that the videos and lesson plans were useful tools which significantly reduced the difficulties of teaching science. These results indicate that utilizing video in these science classes was effective in creating a more dynamic classroom environment and enhancing science learning and teaching.

- With regard to the manipulation of the ICT tools, the teachers were confident and knew how to operate the tools in almost all (95.6 percent) of their classes. This indicated that the design of the equipment was user-friendly and that the training of the teachers had been effective.

- Teachers were able to use SMS with ease and confidence and had enough knowledge to assist their co-teachers to address problems. The project thereby assisted teachers in finding solutions to their problems and in sharing experiences. As a result of the project, teachers also engaged in peer to peer demo-teaching and critiquing.

- Many of the teachers affirmed the positive impact that the project had on their teaching of science and on the pupils' performance in science. They were also proud to be associated with the project and believed that the project nurtured camaraderie among the teachers, within the school and between schools. The project also had unforeseen benefits. For example, when the text2teach project's utilization of new technologies in science teaching became known in the community, this enabled the schools to be successful in requesting funding from the community for various activities.

Another outcome of the project was that even teachers who were not formally trained under the project learned how to use the technology and to implement the lesson plans, with the encouragement and support of their formally trained colleagues and school principals.

Project monitors (Division Supervisors for Science) conducted classroom observations to identify how the teachers put into practice what they learned in the text2teach training sessions. The monitors carefully noted the teachers' behaviour and activities.

With regard to the preparation made by the teachers for their lessons, it was observed that:

- Teachers usually ordered the KnowledgeBox (KB) videos five or more days before the scheduled text2teach lesson that matched the video, and prepared additional instructional materials and teaching aids to enrich their teaching of the science concepts.

- Teachers generally followed the text2teach guidelines given in the training workshop. They all knew how and when to cue the video to start and pause during playback. They used the prescribed video and watched the complete video clip. They gave repeated viewings of the video to their pupils, most commonly, two or three times. The number of video viewings or pauses was dependent on either the teacher or the ability of pupils to comprehend the lessons. The teachers also followed guidelines for giving directions and for group work.

- In implementing the lesson plans, the teachers usually followed the text2teach lesson plan as it was written but also incorporated some changes, the most common of which were video pauses and replays. Other modifications included rephrasing of questions, addition of questions that would lead to higher order thinking skills and changing of grouping strategies. These changes were performed to highlight certain points and familiarize the pupils with the content and
language used in the video. The teachers evaluated their pupils by giving them a test or class exercise. All teachers gave their students additional work to be accomplished at home or outside the classroom.

- The lesson plans involved interesting activities designed to make the lesson more entertaining and enriching for the pupils. The activities included role-playing, experiments, demonstrations, guessing games, group activities and singing. While some teachers were content to remain within the recommended activities in the lesson plan, many teachers conducted additional activities. The teachers were able to motivate their pupils to actively involve themselves in various classroom activities.

- In all three schools, teachers reported reduced absenteeism as a result of the text2teach classes. In the first quarter of the school year, project teachers and school heads began to notice that fewer students would miss class. These observations were supported by school records which indicated a reduction in absenteeism since the text2teach project was implemented.

The project monitors noted that as a result of the text2teach project, students gained science knowledge more effectively and became more active in class discussions. During visits by the monitoring staff, some students were asked how they liked the text2teach classes, and if there were any changes in the classroom environment. Some of the findings are as listed below:

- All students agreed that science was much more interesting with the use of videos and they were beginning to enjoy science more because of the video clips they were watching. The interviews confirmed what the teachers and school heads had observed: students were more interested in attending classes because text2teach helped to make the learning of science fun.

- One student summed up the effect of text2teach on her motivation to come to class by saying, “I no longer want to miss my science classes. I find it exciting to watch the video clips, and I enjoy science more now.”

The teachers were also asked for their feedback. Overall, the teachers were delighted to have had a chance to participate in the project, especially as it allowed them to experience utilizing technologies in the teaching of science. Regarding the effect of the project in increasing student motivation to learn, some of the teachers responded as follows:

- “Students enjoy the multimedia content being presented to them and cannot wait for their text2teach classes”.
- “It is the fascination with seeing things that they have never seen before that motivates them to come to class and learn – they do not want to miss the video for that day”.

Summary of benefits of the text2teach project:

- Reduced absenteeism among the pupils for their science classes.
- Students found science learning interesting and fun.
- Teachers organized themselves into discussion groups to share learning experiences, problems and solutions.
- Some parents became more interested and visited the school to observe text2teach classes.
Issues and recommendations

Some of the problems encountered during the project are outlined below:

- Students sometimes had difficulty in comprehending the English language used in the video. The narration, in American English, proved difficult for the students to understand. Words and accents were unfamiliar to most of the learners. The narrations were also sometimes too fast for students to follow. Teachers tried to explain unfamiliar words to the pupils. Teachers often felt, however, that this provided a good opportunity for pupils to improve their English communication skills.

- Some videos seemed too long for the class time allotment. Other videos were only five minutes long and were considered too short.

- Although it was generally easy to manipulate the equipment, teachers encountered some technical glitches such as: failure to receive the video clips that were ordered; incomplete and defective downloading of video; and technical problems with the Mediamaster. These problems often arose from a poor satellite signal, unfavourable weather conditions and power fluctuations.

- Foreign plants, animals and other materials presented in the videos were unfamiliar to students. Exposure to the videos, however, enabled the students to learn about a range of new materials and objects.

Despite its general success, there is still much room for improvement in the project. The following recommendations were made to address some of the concerns encountered during project implementation:

- Clearer narration in English or narration in local languages.
  Some students, and even teachers, thought the American accent used by narrators was difficult to understand.

- Videos should be an appropriate length for the class.
  Teachers and students felt that a five-minute video was sometimes too short to explain the scientific concepts introduced in the lesson. On the other hand, some videos were too long.

- Localization of the video content.
  Participating teachers and project monitors recommended development and production of videos that are more suitable for Filipino pupils. Videos could be made using local items (eg. native animals, plants, and scientific events) in order to give students a local perspective about science.

- Inclusion of more activities.
  More classroom activities were seen to benefit students, as the hands-on work would make them better understand the scientific concepts introduced in each lesson.

- Videos for other subjects.
  Teachers and students felt that all lessons should have videos to aid in better understanding of the lessons.
• Expansion of the text2teach project to other schools and grade levels. Teachers, parents, principals and LGUs felt that the Project was so beneficial that a majority of schools could benefit from it.

• Deployment of more Mediamasters especially in schools with large numbers of students. There were a number of schools that had so many students that it was logistically difficult to schedule each group to view videos for their science class. It was therefore suggested that this problem could be solved by the delivery of additional Mediamaster units, as it would allow classes to view the videos at different classrooms.

• Use text2teach technology not only in a formal education setting, but also in community learning centres. Relevant educational digital content could be created and educational videos could cover subjects ranging from Filipino history to AIDS/HIV awareness lessons.

Future Possibilities

In 2004, the ELSA text2teach project was initiated which addressed some of the recommendations made following the pilot text2teach project.

ELSA text2teach, under the USAID Education Quality and Access for Learning and Livelihood Skills (EQuALLS) Programme produced videos that were more suitable for Filipino learners. The narrations were simplified, made clearer and spoken at a pace Filipino students could understand. The materials also used local scenes and situations that both the teachers and students could relate with. The subject matter of the audio/video materials expanded to include not only science but also mathematics and English.

ELSA text2teach is on-going and has reached out to more than 100,000 students since 2004 when the project was first implemented in 122 schools in the Cotabato, South Cotabato, and the Autonomous Region of Muslim Mindanao (ARMM) including Maguindanao and Sharif Kabunsuan. It has trained 720 teachers and oriented school heads from the 122 schools to implement the project. The project has produced an additional 129 video and 144 audio packages to illustrate to learners important concepts in science, mathematics and English.

SEAMEO INNOTECH’s experience in text2teach indeed bears witness to the boundless possibilities of integrating technology as an important component of teaching and learning. However, the recommended approach to integrating technology must focus on comprehensive planning that involves all of the stakeholders, foremost of which would be the teachers. Teachers must have a reason to use the technology -- it is important to promote teacher-development of projects or plans where teachers can apply technology to meet particular instructional and student needs identified within such projects and plans. Teacher training, therefore, is very critical. Time and money must be set aside for formal training classes as well as opportunities for teachers to discuss discoveries or problems with their colleagues. There is need for teacher involvement to produce commitment to sustain integration of technology into teaching.

Another important consideration is to make sure that it is the curricula that drive the technology, and not the other way around. It is not prudent to just accept materials or hardware that do not fit with the curriculum and the school’s technology plan. Technology decisions must be based on curriculum and instructional needs. The approach to implement technology emphasizes instructional and student needs first, and then through planning, integrates technology in ways that enhance and extend
instructional and learning opportunities. It is also important to remember that acquiring technology is not a matter of plugging in a computer – it will affect all aspects of the school culture, from architecture to interpersonal relations.

Lastly, it is also important to remember that technology requires administrative and community support and involvement that are critical to its successful integration in education. Studies constantly show that the commitment and interest of teachers and school heads is the most critical factor for successful implementation of any school innovation, especially technology.

In a survey of 100 schools that benefited from the computerization programme implemented by the Philippine Department of Education, it was found that the student to computer ratio averages at 267 students per computer.

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