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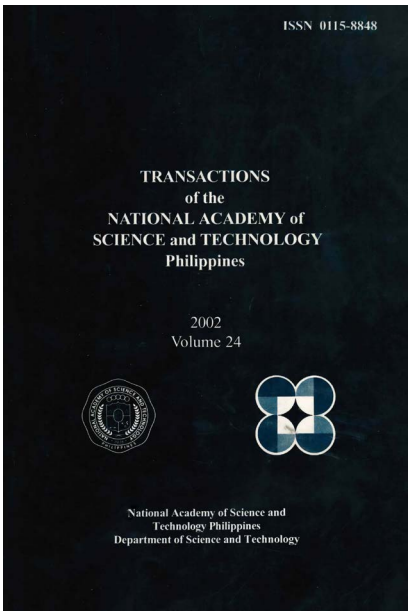

ICT Intervention Programs in Science Education

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ICT INTERVENTION PROGRAMS IN SCIENCE EDUCATION

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ABSTRACT

Various information and communications technology programs implemented by the Science Education Institute (SEI) are presented. These programs are aimed at improving the environment for learning and providing greater opportunities for students to learn science through ICT.

Keywords: science education, ICT

INTRODUCTION

The challenges of Information and Communications Technology (ICT) in all sectors of society cannot be denied and are now being met with all possible applications and innovations which must be put in place for productive use. In the science education sector, the Science Education Institute (SEI) of the Department of Science and Technology (DOST), in line with its mandate, is taking a leading and catalytic role in supporting intervention programs on ICT.

This paper therefore will discuss the various ICT programs implemented by SEI that are focused on the following concerns: developing the environment for learning, developing teachers' ICT capability, developing ICT infrastructure, enhancing youth ICT competitiveness, web-based services, and international assessment.

DEVELOPING THE ENVIRONMENT FOR LEARNING

A favorable environment for learning science and mathematics includes the necessary facilities that will maximally allow the students to develop their potential. SEI has supported the following programs in this category:

Mobile IT Classroom (MITC)

The MITC was conceptualized as a mechanism for reducing the *digital divide* in priority areas of the country. It is envisioned to provide opportunities for students in far-flung areas to tinker with computers and have approximate learning opportunities in science and mathematics through ICT.

The MITC facility is a classroom housed in an air-conditioned bus fitted with computers and other ICT gadgets which is custom-made to accommodate 32 students and a teacher. It is equipped with the latest ICT facilities and interactive instruction and learning materials in science and mathematics.

Each MITC is equipped with 17 laptop computers (1 for the teacher and 17 for 32 students), 2 multi-media projectors, a television set, 2 VHS players, a public address system, 2 power surge protectors, a vacuum cleaner and two fire extinguishers. It has also a generator, which can be operated when the MITC goes to areas with no electricity. Otherwise, the MITC can be powered by connecting through the school host.

There are at present four MITC facilities deployed in the country – 1 unit each for CARAGA, Region V, Region VIII and 1 unit is being shared by Regions I an II. Science and mathematics teacher trainors in the covered areas served by the MITC were trained by the UP National Institute for Science and Mathematics Education. Considered priority in the utilization of the MITC are elementary school students.

Computer Literacy Program

DOST through SEI implements a program aimed at providing computer facilities in selected public schools. The program is intended to allow teachers and students in targeted areas to use computers as tools for teaching and learning. Basic computer operation and application software training packages were likewise provided to the schools. These ICT facilities are made available annually to a number of targeted schools to stimulate the learners' search for information and drive for innovation in S&T related areas.

Early recipients of this program includes the 110 S&T oriented public high school network which were given 15 computers per school and the corresponding teacher training program. Such ICT facilities in the schools attracted additional computers from other donors in the public school system.

For a period of 2000-2002, another set of 125 recipient public high schools was provided 10-15 computers each with the corresponding teacher training programs.

ICT Learning Assisted Program

The objectives of the program are providing teachers and students with opportunities to "explore" and "do" science for the improvement of understanding and learning in science and mathematics. Considering the limitations of resources, two types of projects were provided based on intended use, an *ICT Mediated S&T Learning Program* and a *Mini Computer Laboratory.*

1. ICT Mediated S&T Learning Program

Recipients of these projects are selected public elementary and secondary schools which are to be provided 1-3 computers, 1 unit of printer and 1 unit of microscope that can be linked to the computer. These ICT facilities are intended to be teaching tools for demonstration purposes and for limited hands-on-activities for students. Other gadgets that can be connected to the computer may be identified to maximize the use of the teaching tools.

2. Mini Computer Laboratory

The Mini Computer Laboratory in selected recipient public schools consists of 4-5 computers, a printer and set of software for science and mathematics. While the mini laboratory will be used for demonstration and teaching tool, it will likewise be used by students for their research related projects/activities.

Recipient schools are expected to provide for space to accommodate this ICT facility and the intended number of students who will use the facility.

There are 164 school recipients for this program in 2002.

- Development of Computer-Based Teaching (CBT) Modules

With the participation of science and mathematics teachers and experts in the field, SEI developed 27 CBT modules in the following areas: general science, biology, chemistry and physics; and Mathematics 1 to 4 at the high school level. The CBT modules cover lessons that are usually hard to teach by ordinary teachers, where concepts have been simplified and could easily be understood with ICT facilities. The lessons selected for the modules cover concepts that have application to daily life activities.

The CD-ROMs on the CBT modules were distributed to the following: 110 S&T oriented high schools, 1,145 recipients of the computer literacy program of the Department of Education, 122 school recipients of the DTI-DepEd-DOST PC's for Public Schools' Program and 100 other school recipients in the different regions of the country.

In addition to this, SEI has supported the UP-National Institute for Science and Mathematics Education Development (NISMED) in developing other teaching-learning modules which will made available to public schools and sold at cost at UP-NISMED.

DEVELOPING TEACHERS' CAPABILITY

As a strategy to enhance the teachers' skills on ICT and to allow them to effectively deliver instruction and encourage their learners to innovate, several training programs are being implemented by SEI. These are:

- Intel Teach to the Future Program

This program is being supported by Intel Philippines under the world-wide program of Intel called "Intel Tech". The program, which is implemented by DOST-SEI and DepEd, through the network of Regional Science Teaching Centers (RSTCs) in the different regions, provides for 10 days training for teachers of the basic ICT tools and practical application of these tools on their lessons and other teacher activities. The major concern is to create a pool of ICT literate teachers with the skills for effective delivery of instruction.

Intel targets to train 20,000 teachers nationwide for this program for a period of two years.

- Robotics Training for Teachers

A teacher training program on robotics and the use of advanced ICT facilities for physics was implemented by SEI through the Philippine Science High School Campus in Diliman. Physics teachers of PSHS acted as trainors to physics teachers of the other public science high schools in the country. This project was intended to provide for advanced training to the other science high schools under the Department of Education so that their students will be able develop skills on robotics and other emerging S&T areas. Robotics facilities were given to the schools which sent participants to the program.

- Training on Use of Graphic Calculators

Another support for enhancing the skills of science and mathematics teachers in the public schools with S&T special classes is the teacher training program on the use of Graphic Calculators for Mathematics and Calculus. The Mathematics Association of Teacher Education Institutions (MATHTED) was tapped to handle the teacher training program participated by mathematics teachers from 110 S&T oriented high schools and other public science high schools. Graphing calculators used during the training program were donated to the schools where the teacher trainees came from.

- Training on Assembly of Computers

Technology (or THE) teachers of the 110 S&T oriented high schools and other special science high schools were given intensive training on electronics and assembly of computers at Meralco Foundation Center. The objective of this program

is aligned with the need to provide for appropriate technology skills to teachers of schools with special S&T programs. The program package allowed the recipient schools to receive from SEI the computers assembled by their teachers together with the knowledge that they have learned.

DEVELOPING ICT INFRASTRUCTURE

Support for developing proper ICT infrastructure in top two teacher training institutions in the country was supported by SEI. Both the Philippine Normal University (PNU) and the University of the Philippines College of Education (UPCEd) received from SEI grants for developing Model ICT Learning Centers for teacher training. The Model ICT Learning Centers were provided state-of-the art facilities for training teachers in the field and other future teachers both for their graduate and undergraduate program offerings. The project also includes wiring and internet connectivity programs, both for students and faculty use.

ENHANCING YOUTH ICT COMPETITIVENESS

- The Young Web Designers Competition

Opportunities for identifying talents on ICT are provided by SEI in cooperation with the private sector. The Young Web Designers Competition was held for the first time in 2000 and will be done again this year to provide for hands-on competition for high school students in developing websites. Students are encouraged to submit their entries online from whom the national finalists are drawn by the National Board of Judges. The competition selects the finalists and calls them physically to a two-day national competition. A one-day standard training program is provided to the finalists after which the students are tasked to develop their own designs and interpretations for given situations.

- International Programming and Micromouse Competition

These two major international competitions are participated annually by the Philippine Computer Society. The competition is intended to create a pool of highly competitive Filipino talents to represent the country in the South East Asia Confederation. SEI has consistently supported the training component of this program for the Filipino youth team that won the national competitions prior to their joining the international competitions. Computers and gadgets like the micromouse units were acquired by SEI as part of the training facility for the students. The track record of the Philippines in these competitions are commendable. However, the country expects higher records of winnings and sustained efforts in the annual events.

Web-based Services:

Web-based services are made available by SEI to provide for relevant information in S&T education and S&T manpower development. Among the websites hosted by SEI are:

- STEDNET and other web-services (science-mindanao.ph)

The Science Education Network (STEDNet) provides for data bases in science education and has established links with educational institutions that agreed to electronically publish R&D results in science and mathematics education which include abstract of masters and doctoral theses/dissertations, publications, and other research studies. It likewise provides for other important data bases like international studies and activities in S&T education.

- ***www.science-scholarships.ph***

This is the science scholarship portal that allows one to look for information on local scholarships from government institutions and the private sector. Arrangements have been forged with relevant institutions that have scholarship programs in S&T to post such information in the website. Downloadable application forms are likewise available. Electronic applications for scholarships will be available soon. The scholarship programs range from Technician to BS, MS, and Ph.D. levels and information on the implementing educational institutions for the S&T programs are likewise provided through the website.

- Scholarship Program Administration System (SPAS)

SPAS is a computerized system to keep, update, evaluate and verify the SEI'as undergraduate scholars' data. It is a system, which is now being pilot tested in selected areas of the country, which is expected to systematically organize such data so that processing and evaluation can be done effectively.

International Assessment

- Second Information Technology in Education Study – Module 2 (SITES-M2)

The Philippines joined SITES-M2, a qualitative study on pedagogical practices of the best schools that use ICT in the delivery of instruction. Two elementary and four high schools in the country constituted the sample group where analysis were made on teachers' practices on the use of ICT for teaching-learning activities. The international report on the study will be made by the SITES-M2 International Coordinating Committee of the International Association on Educational Assessments in August 2002 while the Philippine Report will be made by SEI in November 2002.

CONCLUDING REMARKS

The SEI intervention programs on ICT for science education are expected to catalyze development efforts in science education, in particular, and education, in general. Despite limitations in resources, the institute is expected to continue initiating innovative programs that will provide models for developing, enhancing and strengthening institutional and local capabilities in ICT and science education.