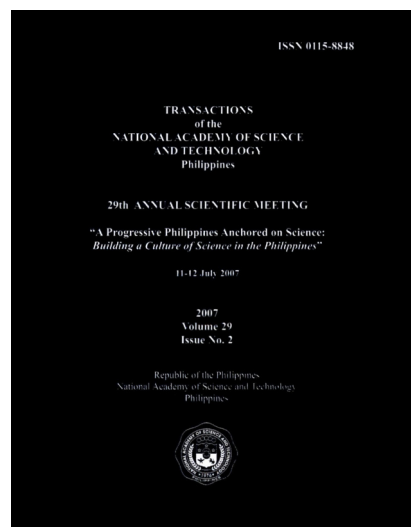


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Government's Support to Science Education

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Government's Support to Science Education

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Abstract

Recognizing the importance of science education to power economic growth, the Department of Science and Technology has set specific targets to accelerate the development of S&T human resources and to upgrade the quality of basic education through its visions outlined in the National Science and Technology Plan (NSTP) 2002 -2020. In support of said visions, various programs are being pursued over the short, medium and long-term to meet the targets. The programs include components covering improvement in teachers' capability, learning environment and infrastructure as well as promotion of S&T awareness and consciousness. Notable among these programs are the implementation of various undergraduate and graduate scholarship programs by DOST and its sectoral agencies and councils, training of elementary and secondary science and math teachers, improving access to ICT facilities, and participation in various local and international science and mathematics competitions, science projects and exhibitions.

The success of the government's support programs to science education depends on the degree of effectiveness of the aforementioned program which, on the other hand, requires the proper alignment of the visions and values of the people managing the system and delivering science instruction to the learner. Good leadership and management of the system, both at the macro (national and regional) and micro (schools) levels is a primary prerequisite.

Science education has always played an important role in the development of a country. It has been instrumental in imparting the 'hard' skills and knowledge to our students to enable them to make a living. For many years now, science education has helped the Philippines develop a

workforce to support the demands of industry, agriculture, service and the academe.

Recognizing the role that science and technology play in bringing about economic growth and development, nations are taking steps to strengthen its science and technology capabilities. But for a developing country like the Philippines, the daunting challenges of reconciling the increasingly limited availability of resources, escalating costs of research and development, and the rapid pace and complexity of technological innovation still continue.

The DOST however, with the mandate of formulating S&T policies, programs, and projects in support of national development priorities has remained steadfast in employing its strategies and program thrusts, inspite of the magnitude of challenges involved. This is because DOST is driven by three guiding "visions" stated in the NSTP, namely:

- By 2004, S&T shall have contributed significantly to the enhancement of national productivity and competitiveness, and to the solution of pressing problems;
- By 2010, the Philippines shall have carved niches and become a world class knowledge provider and user in selected S&T areas, and shall have developed a vibrant Filipino S&T culture;
- By 2020, the Philippines shall have developed a wide range of globally competitive products and services which have high technology content.

In support of the aforementioned visions, the Department has likewise established explicit targets/ goals of producing quality S& T manpower, enhancing the teaching of science and mathematics at the basic level, as well as science, mathematics and engineering at the tertiary and graduate levels. Moreover, DOST is also promoting the use of state-of-the-art information and communications technology to enhance the teacher-learning process.

INTERVENTION PROGRAMS

In recent years, several programs have been initiated by DOST and councils/agencies, aimed at improving S&T education. It is overwhelming to note that its programs and projects and collaborative efforts with both public and private sector partners have borne fruit that not only indicate the effectiveness of the interventions, but more importantly, provide much-needed encouragement to continue on regardless of the many obstacles faced.

Developing S&T Human Resources

In her speech delivered at the PAASE Meeting "MTPDP Key Challenges in Science and Technology", early this year, President Gloria Macapagal Arroyo emphasized the need to "enhance competitiveness of the country's human capital and develop a critical mass of scientists and R&D personnel". Towards this end the DOST has been implementing various S&T undergraduate and graduate scholarships.

1. Undergraduate scholarships

Republic Act 7687

This program provides scholarships in priority baccalaureate degree programs and post secondary courses to high school graduates inclined towards S&T, yet are hampered financially. Strong budgetary support allows the program to serve on a massive scale, on the average 10,000 or more students from various congressional districts and municipalities all over the country. Currently there are a total of 6,442 scholars being supported under this program.

Merit Scholarship Program

DOST's longest running scholarship program which is available to students who are academically talented and inclined towards science and mathematics. There are 810 scholars currently supported under this program.

Junior Level Assistance Program (JLAP)

The JLAP scholarships are awarded to qualified third year college students who are enrolled in priority engineering courses and other basic and applied sciences. As of SY 2007-2008 there are 65 scholars under this program.

Grant for Educational Assistance on Technology and Science Teaching Courses for Mindanao (Project GREAT-M)

A scholarship program for technical courses aimed at improving the quality of life of Muslim youths and enabling them to contribute positively to national development. Implemented in Mindanao provinces which

either consistently did not have qualifiers in the S& T scholarship exam or had examinees with very low passing score in the said exam. To date, there are 41 scholars under this program.

2. Teacher scholarship programs

The DOST also supports various scholarship programs aimed to fill in the gaps in the number of competent science and math teachers, specifically in the areas of Physics. Among them are:

Cooperative Pre-Service Education for Science and Mathematics Teachers (Project 8102 Ed) in cooperation with the PNU, DLSU and TUP Manila

Partial Scholarship for BSE Major in Physics (Project 9001 Ed.)

Scholarship Program for Science and Math Education, Major in Physics (RSTC Project 8901 Ed)

3. Graduate Scholarships

- DOST Human Resource Development Program offers scholarship grant for graduate studies in the fields of natural sciences, physical sciences, engineering and social science courses.
- PCIERD Scholarship Grant aims to uplift the quality of engineering education and increase the number of highly trained engineers needed in the industrial, educational and research institutions.
- PCARRD Scholarship Grant aims to upgrade the capability of the staff of NARRDS (National Agriculture and Resources Research and Development) member agencies through its Human Resource Development Program.
- PCHRD Scholarship Grant aims to develop research competence in the country and to produce a pool of human resources capable of implementing the priority programs of the National Health Research and Development Plan.
- PCASTRD Local Scholarship Grant covers both MS and PhD programs taken on a full-time or part-time basis. It supports programs offered by local flagship institutions identified by PCASTRD
- PCAMRD Research Fellowship provides graduate scholarships to researchers and extension workers from the National Aquatic Resources Research and Development System (NARRDS). NARRDS is composed of over 40 institutions implementing R & D in the fields of aquatic and marine resources.
- SEI Accelerated Science and Technology Human Resource Development Program is a graduate scholarship program which

is a partnership initiative of the SEI and the Semiconductor and Electronics Industries in the Philippines, Inc. (SEIPI) which is the leading and largest organization of foreign and local semiconductor and electronics companies in the country. It aims to train high level human resources needed for S&T activities initially in the semiconductor and electronics industry sectors.

- Faculty Development Program is a three-year scholarship program for Ph.D. in Science Education majoring in Physics, Chemistry, Biology and Mathematics. This project aims to bring to a much higher level the competence and knowledge of science and math faculty in the RSTCs, and to develop their ability to plan, manage, implement and evaluate pre-service and in-service for teachers. The program is offered in two modes—the residential program, implemented through the UP College of Education (UPCE) and Dela Salle University College of Education (DLSUCE) and the distance education mode through learning centers at the UP Open University (UPOU) and University of San Carlos. As of SY 2007, there were 44 ongoing scholars
- Graduate Program Science Education Consortium: The declining number of qualified science and math teachers has come to an alarming level that DOST deemed it necessary to set up more effective and strategic interventions to address this problem. In 2006, SEI-DOST spearheaded the establishment of a common consortium of four universities designed to provide a system for human resource development in the regions and to continually develop a pool of future leaders in S&T education. In this consortium, SEI is developing a common curriculum for a straight masters/doctorate program in science and math education with specialization in biology, chemistry physics and math. The consortium is composed of the University of San Carlos in Cebu City, West Visayas State University in Iloilo City, Mindanao State University in Zamboanga. The project targets to support 10–15 new scholars per university per year for five years and is expected to produce from 150–225 PhD in science education degree holders by 2012.
- The Master's Program for Faculty members of TELs provides graduate scholarships in science education to teacher educators with specialization in Biology, Chemistry, Mathematics and Physics.

4. Developing teacher's capability

There is a constant need to provide in-service training to equip teachers with both content knowledge and teaching skills for subjects like

physics, chemistry, biology and integrated science. Of all these areas of specialization, the most wanting of trained teachers is physics, where more than 92% of those already in the teaching force are neither majors nor minors in this discipline.

The DOST has been implementing new teaching and learning approaches to prepare our young to cope successfully in a knowledge-based economy and at the same time to create a challenging learning experience for both teacher and pupil:

- e-Training for Science and Mathematics Teachers is an online training designed to upgrade the competence and confidence of public and private science and math teachers in the elementary and secondary levels. This 10-month pilot online training program commenced in November 2005 and concluded in August 2006. Selected TEIs served as nationwide training venues where participants were trained simultaneously using on-line mode and printed modules.
- Project MUST. Launched in 2001, MUST is a 90-hr non-degree teacher training program designed to enhance content knowledge and to update teaching strategies of elementary science and math teachers who serve Muslim pupils and youth from other ethnic groups in Mindanao. A total of 6,331 participants were trained under the program from 2001–2005.
- Project RISE. Begun in 1997, this project is a massive non-degree training program designed to improve teaching competence and increase teaching confidence of science and math teachers both in the elementary and secondary levels. Implemented at the Regional Science Teaching Centers (RSTC) and other selected teacher training institutions in the country, Project RISE provides teachers a 180-hr training program for the subject area that each one is to specialize in.
- This program is intended to train physics teachers of selected science high schools in the use of computers and robots and integrate this in teaching physics concepts, theories and principles. The participants as well as the trainers were provided with individual Robolab kits. Hands-on activities included software programming and robot assembly. They were also taught how to integrate robotics concepts in topics on energy, light and optics, electronics and magnetism, force, power, work and motion. After the training, they are expected to introduce these concepts to their respective students, using robotics.
- Training program on new technologies and IT applications embedded systems and robotics aims to train innovative and

motivated students to eventually design their own electronic inventions. Teachers are exposed to the three aspects of robotics (programming, electronics and mechanical design) empowering them to assist students' research projects, and/or update the electives offered in their respective schools.

Developing ICT Infrastructure

DOST's emphasis on ICT began in the early 90s. The development of ICT as an economic sector which has the potential to provide a large number of jobs and entrepreneurial opportunities to many Filipinos, was given new impetus when the President declared in her SONA that ICT will be a leading engine for economic growth. The DOST aims to make the country a world class provider of ICT services and products.

- Mobile Information Technology Classroom (MITC) in the Regions. The MITC represents an innovative and highly effective approach, one which brought ICT to thousands of students. Through a rationalized sharing of the state-of-the-art computer technology, the MITC enhances school-based science and mathematics learning through interactive courseware experienced in 32-seater fully airconditioned MITC bus, equipped with notebook computers, audio-visual facilities, and teachers who have undergone specialized MITC-facilitator training. Initially intended for Mindanao, it was eventually expanded to other regions.
- Development of computer-aided instructional (CAI) materials for elementary science and mathematics. These are locally developed CDs for science and math intended for distribution to elementary schools with computers. The project aims to disseminate CAI materials for use in science and math teaching at the elementary level, thereby helping improve the quality of science and mathematics teaching. At the same time, it aims to minimize the purchase of costly educational software from other countries. A total of 340 CDs were distributed as of first quarter of December 2007.

Promoting S&T Awareness and Consciousness

The average school and the larger society do not nurture science-oriented students. Science is taught in elementary grades, primarily as absorption of information from textbooks and the teacher, with little

emphasis on observation, information gathering and the sense of discovery. At the tertiary level, the introductory science courses do not serve to recruit students into science careers. A very low percentage of high school students eventually proceeds to major in science. The usual perception of science and mathematics as being difficult subjects is carried over and perpetuated in college, hence, has not resulted in producing a critical mass of scientists for the country. For DOST, a skilled and informed citizenry makes for a competitive nation, which is why it continues to invest heavily in the extensive promotion and awareness of the value of science and mathematics.

- **Gawad LIDER.** This is a recognition and incentive program for individuals and/ or institutions that are able to make exemplary contributions to the development of science education, or the development of science and technology-based innovations or inventions that will improve education. The Gawad LIDER which stands for Leadership and Innovations for Development Relevant to Science Education is designed to be a biennial award.
- **DOST-BPI Best Project of the Year Awards.** The DOST has undertaken a joint project with BPI Foundation, Inc, the philanthropic arm of the Bank of the Philippine Islands. This project gives recognition and incentive to students who excel in the fields of science, mathematics, physics, chemistry, engineering, computer science and biology. This is exclusive to graduating students from the 10 BPI accredited universities.
- **Australian Mathematics Competition (AMC).** The AMC provides meaningful venue for secondary students to test their mathematical skills with their international counterparts. An annual international correspondence math competition organized by the Australian Mathematics Trust and sponsored by the University of Canberra and Westpac Banking
- **Corporation,** the AMC vigorously encourages the participation of schools from countries in the Asia Pacific region as a way to establish professional and cultural linkages through mathematics. The DOST and the Math Society of the Philippines have been supervising the participation of the Philippines in this competition.
- **Philippine Robotics Olympiad-DOST-SEI** organized the Philippine Robotics Olympiad for the past 5 years following the successes of the past events. This science activity aims to challenge the intellectual and critical thinking skills of elementary and high school students and support the Philippines' aggressive campaign in promoting robotics as one of the new alternative media of effective S&T learning among the youth.

RECENT PRESIDENTIAL S&T INITIATIVES

President Arroyo in her SONA stated "to step into the future, a country that wants to be a player in the global economy needs bold and well-funded research and development initiatives of its own. To this end, we will continuously increase the budget for science and technology and education. For in today's global economy, knowledge is the greatest creator of wealth." Towards this direction, PGMA issued a presidential proclamation on the creation of a science complex with a technology incubation park in a 21.9-hectare area in UP Diliman. The President then ordered through the DBM a release of a PhP 500 million as initial funding for the science complex.

- Proclamation No. 1132 on Sept 1, 2006 creating and designating two parcels of land in Brgy. UP campus as ICT park.
- Release of PhP 100 M for human resource development

The DOST Accelerated Human Resource Development Program (ASTHRD) is a collaborative program of DOST, its sectoral agencies and councils to help improve the country's global competitiveness and capability to innovate through alternative approaches on HRD in S& T and to accelerate the production of high-level human resources needed for S& T activities particularly in the area of R&D. There were a total of 400 slots available for SY 2007–2008. Out of the 363 applicants evaluated, 229 qualified for the 1st semester SY 2007- 2008.

CONCLUSION

While the Department of Science and Technology has already put in place intervention programs to bring about improvements in S&T education, much work has yet to be initiated and done. Moreover, the success of the government's support to science education cannot just happen without proper alignment of visions and values of the people managing the system and delivering science instruction to the learner. It requires commitment and involvement of all sectors in society. Appropriate programs on human resource development, improvement of science laboratory facilities and their maintenance, curriculum and instructional materials development efforts must be properly aligned. Good leadership and management of the system, both at the macro (national and regional) and micro (schools) is a primary prerequisite.

About the Author: Secretary Estrella F. Alabastro has been at the helm of the Department of Science and Technology (DOST) since March 2001. She was a Professor and former Dean of the College of Home Economics at the University of the Philippines before she held various positions at the DOST, including serving as Executive Director of Philippine Council for Industry and Energy Research and Development and Undersecretary for Research and Development of DOST. More information about the programs of the DOST is available at: www.dost.gov.ph.