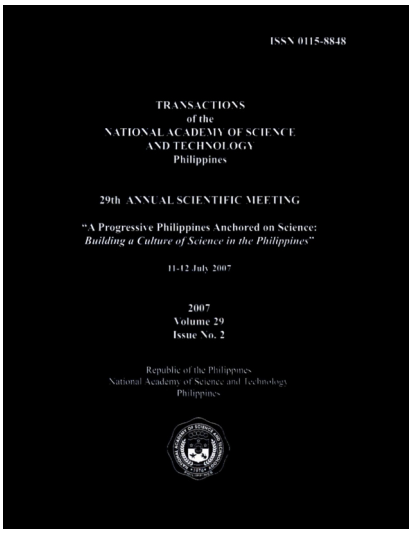
TRANSACTIONSNASTPHL
ISSN 0115-8848 (print)
ISSN 2815-2042 (online)
https://transactions.nast.ph
Vol. 29 Issue No. 2 (2007)
doi.org/10.57043/transnastphl.2007.4454






# Building a Science Culture in the Philippines

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Member, National Academy of Science and Technology

**Citation**
Nebres BF S.J. 2007. Building a science culture in the Philippines.
Transactions NAST PHL 29(2): 177-196. doi.org/10.57043/transnastphl.2007.4454

*Trans. Natl. Acad. Sci. & Tech. Philippines 29: 177-196 (2007)*
*ISSN 0115-8848*

# Building a Science Culture in the Philippines

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## Introduction

I am grateful that the topic of my talk is "Building a Science Culture" and not "Improving Math and Science Education in the Country." This talk of mine went through several versions. Eventually, I realized that I needed to emphasize

## "Culture"

as much as or even more than "Science" if I were to help us make progress on the theme of our Annual Scientific Meeting: "**A Progressive Philippines Anchored on Science: Building a Science Culture in the Philippines**".

You have heard enough about our situation in science and mathematics education, that we rank number 36 out of 39 in the TIMSS, that performance on the National Achievement Test (NAT) is below 50% in so many schools and school divisions and so on. The following slides from the presentation of Dr. Vivien Talisayon during the roundtable discussion last February 16, 2007, "Special Science Classes: Summary of Findings" show that even Philippine Science High School (PSHS), our top science high school, performs only at the mean of Singapore, Korea and Hong Kong in mathematics and significantly below the mean in science (Figures 1 and 2).

At the same time, we hear good news: our young people winning prestigious competitions abroad in science and mathematics. We will hear about the work of the Bernidos in Bohol. At the roundtable discussion last February 16, 2007, we were inspired by the work of the Mathematics Trainers' Guild (MTG) and the outstanding achievements of the students in their training programs.

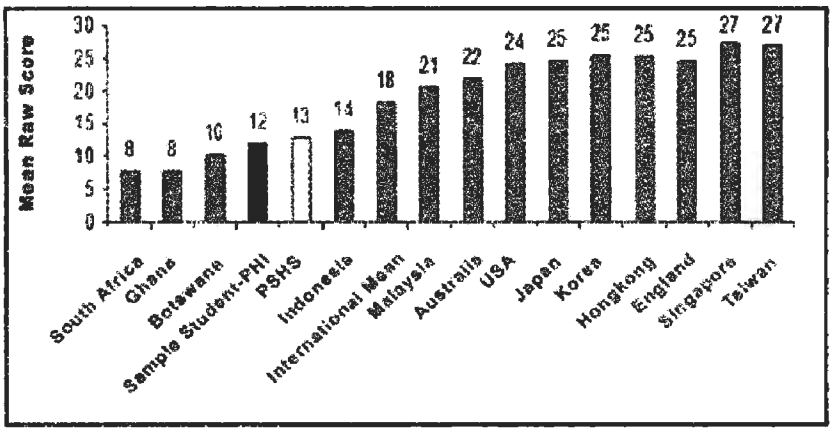


Fig. 1. Mean raw score in Science of PSHS vs sample students of Phil and selected countries.

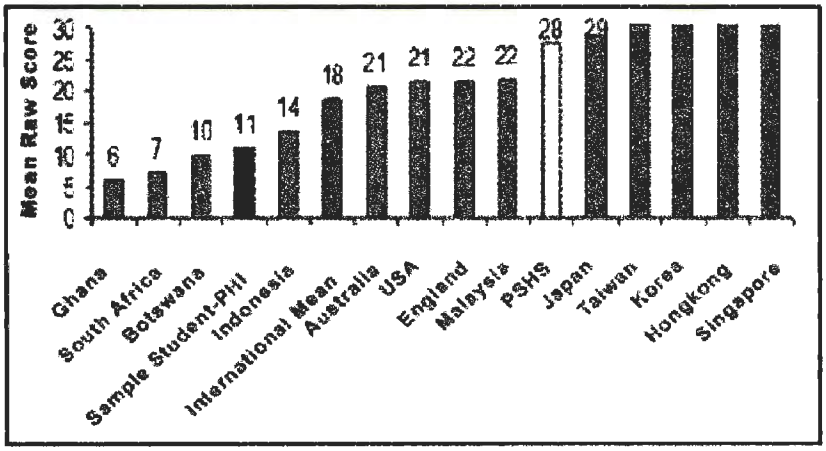


Fig. 2. Mean raw score in Mathematics of PSHS vs. sample students of Phil and selected countries.

We have been at this for a long time. There have been many interventions: the New Math of the 1960s, the Secondary Education Development Project (SEDP), the DOST – DECS Engineering and Science Education Project (ESEP) and the recent Revised Basic Education Curriculum (RBEC). There have been many conferences like ours and many resolutions such as we have been making in our scientific meetings, addressed to DOST, DepEd, CHED and other institutions.

But the same pattern emerges — a few bright lights and victories and a mass of poor performance. While we are proud of the bright lights and victories, I would like to recall a quote from a Japanese mathematics education colleague, who said, "We believe that a country can only march as fast as its slower members."

The Philippines will march as fast as the majority of our students and not at the pace of the few at the top.

**The challenge for us then is to ask how we can make progress for**

**the majority of our students.**

## Part I: Defining a Solution

This address is on "Building a Science Culture". The culture of the natural sciences and mathematics is not to bewail or just describe a problem, but to solve them. If we are to be scientific ourselves in approaching the theme of our annual meeting, it is not enough for us to describe the problems or write resolutions about them. We should actually engage the problems and show that we are contributing to solving them. We have to engage Philippine culture and move it into a problem-solving mode, away from a blaming or complaining mode.

Assuming then that we are going to actually engage and help solve the problem, how do we proceed? Particularly, because years of effort and frustration have shown us that the problem is very difficult!

We have to begin by defining what we mean by a solution. Frequently, in research on mathematics and science education (or education, in general), the methodology is to propose an approach towards improving performance, then do a small scale pilot study, which normally shows that the approach works. The approach is then attempted on a larger scale and usually fails. The conclusion is usually to blame the teachers or the principals. But from our point of view of building a progressive Philippines anchored on science, the approach has to be considered a failure. It did not solve the intended problem of improving science or math education on a reasonable scale.

Since our goal is to improve mathematics and science education for the majority, a solution or a possible solution should have the following characteristics:

- be on a reasonable scale, at least a cluster of schools
- can be replicated successfully within normal parameters in the system (including the actual situation of teachers and principals)

## Part II : The Way Forward on the Mass (Some Relative Success Stories)

In this address, I would like to share some relative success stories on a relatively large scale. I shall use as a framework a paper I wrote in 1983 for a conference in Japan.

## Addressing the Social Context of Philippine Schools: Macro-Problems and Micro-Problems

After a decade of working on math education, I shared my reflections in a 1983 paper for a Regional Conference on Mathematics Education held in Japan:

> "We can classify problems of mathematical education into two types: the first we might call micro-problems or problems internal to mathematical education. These would relate to questions of curriculum, teacher training, textbooks, use of calculators, problem-solving and the like. The second we might call macro-problems. These are problems affecting mathematics education because of pressures from other sectors of society: economy, politics, culture, language, etc. One of the features of a developed society is a reasonable differentiation of sectors and functions of society. While given sectors are, of course, interdependent and affect one another, they also have some reasonable autonomy. School budgets may increase or decrease, but they have some stability and so it is possible to plan. Teachers get a sufficient (though not high) salary so they can concentrate on their teaching chores. But in contrast, structures in developing societies are not sufficiently developed to provide (for example) education and culture with sufficient freedom from the pressures of politics and economics. Teachers may be called upon to perform many civic duties - – to the detriment of their classroom work. Their salaries may not be sufficient for them to be able to concentrate on their work. Budgets may be unstable and information and opinion tightly controlled.
>
> In the first situation (of developed countries), it makes sense to concentrate on internal problems of mathematical education. One has enough scope and freedom within the educational system to study and plan changes with hope of implementation. In the second case, however, the problems which one experiences most intensely are not internal to mathematics education, but due to pressures

> from outside society. Until some structures are established to provide some scope and freedom for the educational system, it is less useful to concentrate studies and plans on curriculum or other internal concerns."

I then went through a more detailed analysis of the challenges of mathematics education from this perspective. In that same paper, I concluded as follows:

> "The improvement of mathematics education in developing countries such as those of Southeast Asia requires continuing improvement of teacher — training, curriculum, textbooks (the internal concerns of mathematical education). However, their improvement is only possible if mathematical education has enough space and freedom (within the pressures of economics, culture, organization of education) so as to be able to plan and implement. It is the experience of developing countries that pressures from other structures of society (economic, political, cultural) are often too strong for the system of mathematics education to work realistically on its internal concerns."

From the experiences that will be described below, we can look at this approach to improving education in the social context of Philippine schools as:

- Creating the absorptive capacity of schools and clusters of schools to take in and implement significant reform and improvement (attending to the macro problems)
- Targeted and focused interventions to address priority needs (academic and non-academic) (attending to the micro-problems). This means meeting the schools where they are, setting next level targets with them, and moving them to the next level.

## Part IIa: School-Based Management in TEEP

**Our first example of a large scale reform project that tackled the macro-problems (created absorptive capacity in the school and community) and micro-problems (teacher-training, textbooks, lesson guides, etc.) is the Third Elementary Education Project (TEEP).**

**Engaging the community and creating absorptive capacity and bringing in targeted inputs**. The Third Elementary Education Project defines school-based management (SBM) as the decentralization of decision-making authority from central, regional, and division levels to individual school sites, uniting school heads, teachers, students as well as parents, the local government units and the community in promoting effective schools. Its main goal is to improve school performance and student achievement, where decision-making is made by all those who are closely involved with resolving the challenges of the individual schools so that the specific needs of the students will be served more effectively. Its objectives were to empower the school heads to provide leadership and to mobilize the community as well as local government units to invest time, money and effort in making the school a better place to learn, thus improving the educational achievement of the children.

School-Based Management is a framework that integrates several micro factors at play in SBM schools, namely,

- leadership (e.g. dynamic school heads)
- strong local government unit (LGU)-school or school-Parent Teachers Community Association (PTCA) partnership
- access to basic inputs like classrooms and textbooks
- focused teacher-competency development/INSETs (In-Service Training)
- support system at the district/division levels

The community has to be involved and TEEP would not proceed in a given community unless the community raised 10% counterpart funding. This would amount to about P10,000.00. There is a very touching story in Romblon. A community wanted so badly to get a School Improvement and Innovation Fund for their school (this was the overall name of the project support fund) that they each contributed funds from their own meager incomes. Their contribution was mostly in coins. Unfortunately, after counting all the coins on the deadline for approving projects, they had only P9,000 of the expected P10,000. The district supervisor was so moved by the community efforts that she gave the remaining money.

**Impact**. For the TEEP schools, school-based management has resulted in a bigger share of schools crossing the 75% mastery level and the 60% near-mastery level in the National Achievement Test. TEEP and non-TEEP schools started on the same level in SY 2002–2003 but relatively more TEEP schools attained mastery level in SY 2005–2006. Please refer to Appendix 1 for the comparator groups as well as the tables showing

the percent surpassing the 75% mastery level as well as the 60% mastery level, in terms of overall performance as well as specific performance in Math and Science.

It is worth noting the following:

1. With the exception of Aklan+, all clusters experienced a decline in scores and rankings from SY2004–2005 to SY2005–2006. Nevertheless, TEEP SBM provinces sustained their lead relative to all other clusters (cf. Appendix1).

2. There is a relatively stronger improvement in mathematics: 22.6% 9 ELS and 18.2 Non-ELS achieving 75% mastery level, all others are lower, with Pampanga closest at 16.6%. At 60% mastery level, the performance gap is even clearer, with TEEP ELS at 59.5% and non-ELS at 46.3% (cf. Appendix 1).

3. The improvement in mathematics is much stronger compared to improvement in science (cf. Appendix 1).

**The importance of addressing the implemented curriculum, the day-to-day work of teachers**. What accounts for the significant improvement in mathematics? I received a phone call in August last year from Dr. Cynthia Bautista, excited about some results of their end-project evaluation of the Third Elementary Education Project. There had been significantly greater improvement in mathematics in the National Achievement Test (NAT) in several divisions of the TEEP. The resource persons in the study conducted by the Japan Bank for International Cooperation (JBIC), "Lessons from the Third Elementary Education Project: Transforming Education on the Ground" attributed the very good performance of TEEP in Mathematics "to the Math Teachers' Lesson Guide series prepared by DepEd and Ateneo which TEEP printed and distributed to all its teachers. Written by Master teachers in elementary and high school, the series drew from existing textbooks and improved on them.

Tables 1 and 2 show the scores in Mathematics and Science in the National Achievement Test of the TEEP schools and the comparator groups.

Table 1. Scores in Math in the National Achievement Test of the TEEP Schools and comparators group.

| | Math | | | |
|---|---|---|---|---|
| | 2002/3 | 2003/4 | 2004/5 | 2005/6 |
| TEEP SBM | 46.1 | 54.1 | 62.0 | 59.0 |
| AKLAN+ | 49.9 | 52.0 | 58.2 | 56.4 |
| CAGAYAN+ | 46.6 | 51.2 | 57.1 | 53.1 |
| ILOILO+ | 42.1 | 47.5 | 54.6 | 49.7 |
| PAMPANGA+ | 46.9 | 55.1 | 61.3 | 56.2 |
| NCR | 42.0 | 50.7 | 60.5 | 47.7 |
| ARMM | 38.4 | 44.1 | 44.5 | 41.8 |
| Total | 46.0 | 52.3 | 58.9 | 54.7 |

Table 2. Scores in Science in the National Achievement Test of the TEEP Schools and comparators group.

| | Science | | | |
|---|---|---|---|---|
| | 2002/3 | 2003/4 | 2004/5 | 2005/6 |
| TEEP SBM | 47.1 | 50.0 | 60.4 | 50.2 |
| AKLAN+ | 46.7 | 47.5 | 58.2 | 49.1 |
| CAGAYAN+ | 44.4 | 46.8 | 55.7 | 45.3 |
| ILOILO+ | 41.3 | 44.4 | 54.5 | 44.7 |
| PAMPANGA+ | 45.0 | 50.2 | 60.5 | 48.2 |
| NCR | 42.0 | 43.2 | 47.9 | 43.1 |
| ARMM | 40.5 | 40.2 | 46.7 | 37.2 |
| Total | 44.4 | 48.1 | 58.0 | 47.1 |

**What are these Lesson Guides**? The Lesson Guides in Mathematics were prepared during the term of former DepEd Secretary Raul Roco. He invited us to a meeting in July 2001 to discuss what might be done to improve the performance of students in the different subject areas. We shared with Secretary Roco that the central problems continue to be the lack of teachers, need for teacher-training, lack of textbooks, classrooms and other basic needs.

We then suggested that considering the situation in public schools, e.g.,

- congested classrooms (65 - 70 class size in urban areas)
- lack of textbooks

- lack of library facilities or library materials for teachers
- absence of experts teachers may consult,

the need is to provide textbooks for students and a self-contained reference material (guide) for teachers.

The DepEd was able to provide Math textbooks for all high school students (1:1 ratio) during the time of former Secretary Roco. The series that was reproduced for all students was the only complete series available. Moving from the previous SEDP approach (spiral approach) to the discipline based approach (Elementary Algebra – 1st year, Intermediate Algebra – 2nd year, Geometry – 3rd year and Advanced Algebra and Trigonometry – 4th year), meant literally tearing apart the existing books and putting together the algebra parts, the geometry parts, and so on. (Later on, we realized how much improvement is necessary for the Geometry part. The deficiencies in Geometry were not very evident in the SEDP spiral curriculum.)

This move could not be done for the elementary level since no complete textbook series from Grade 1 to Grade 6 was available.

The Lesson Guides prepared by DepEd and Ateneo were designed to help the teachers in their day-to-day teaching. Each Lesson Guide included:

- objectives for the lesson
- development of the lesson
- suggested examples and exercises
- suggested teaching strategies with provisions for higher order thinking skills (HOTS), multiple intelligences (MI) and values integration

All work in the preparation of the lesson guides was a team effort among the Master teachers from public schools, the DepEd curriculum specialists and experienced teachers from the Ateneo de Manila Grade School and High School as well as the other Jesuit schools.

The preparation of Math Lesson Guides was a large-scale effort within a short time frame. The Lesson Guides for High School Mathematics were completed within August 2000–March 2002 while the Lesson Guides for Elementary were prepared beginning December 2002 until April 2003. Teacher training was conducted for 1,971 high school mathematics teachers in 2002 and 2,210 elementary mathematics teachers in 2003.

**The lesson learned from this initiative on Lesson Guides is worth noting:**

Focusing on providing enough textbooks, teacher guides or workbooks and working patiently with the teachers to use these well (teacher training) is a way of making progress on a large scale.

It is also important to note that the success of the TEEP schools with the Math Lesson Guides depended in great part on progress in the social environment of TEEP schools brought about by school-based management. SBM created the environment for reform, the absorptive capacity to make change.

## Part IIc: Capacity Building for Schools in Payatas Through Project SSPEEd and ACED

**The second example is a smaller scale effort by the Ateneo Center for Educational Development to see what it takes to help bring up poor elementary schools, mainly in Payatas, Quezon City.**

From research Ateneo had done in the early 1990s (led by Dr. Patricia Licuanan), it was seen that what differentiated high performing public elementary schools from low performing ones, given the same economic and demographic situation, was the leadership of the principal and the support of the community. We used this as a framework for our work with selected public elementary schools.

In 2001, Mr. Washington Z. Sycip, Mr. Alfredo Velayo and this author initiated Project SSPEEd or Sectoral Support for Public Elementary Education. Concerned with the declining standards of education in the country, this project aimed to provide support to particular public elementary schools patterned after the involvement and experience of Ateneo de Manila in the Third Elementary Education Project (TEEP). Project SSPEEd provided support to the following partner schools from 2001 to 2004: P. Burgos Elementary School (Manila), Payatas Elementary School (Quezon City), Bagong Silangan Elementary School (Quezon City), Payatas B-Annex Elementary School (Quezon City) and Kalayaan Elementary School (Caloocan City).

From this project, the Ateneo Center for Educational Development (ACED) learned significant lessons and insights on how to fuse macro-level goals and micro-level initiatives and involvement. Project SSPEEd

provided a framework on how institutions can assist public schools develop and at the same time create impact in the surrounding urban poor communities.

When Project SSPEEd ended in 2004, ACED pursued a closer partnership with four public elementary schools in the 2nd district of Quezon City

- Payatas B Annex Elementary School
- Payatas C Elementary School
- Lupang Pangako Elementary School
- Bagong Silangan Elementray School

Given the population of Payatas, these are very large schools.

This closer partnership with the schools began with data gathering. Much work was then done to bring the community together (principal, teachers, parents, baranggay officials, students) and do strategic planning and prioritizing of goals and objectives with them. This partnership, which ACED has carefully nurtured these past years has led to notable results. Because the need for buildings and classrooms came from the shared and careful planning by the whole community, Mayor Belmonte was impressed and moved forward to build the needed buildings, classrooms and comfort rooms. The private sector also came in with other needed inputs, like textbooks, workbooks, etc. The principals and teachers have become more confident and effective in their areas of responsibility as a result of empowerment programs and teacher-training programs. Student achievement has improved in different degrees. The most dramatic improvement is in Lupang Pangako Elementary School where the ranking of the school in the division level has moved up from rank 94 in 2003 to rank 18 in 2004 to rank 16 in 2005 and to rank 9 for 2007.

From Project SSPEEd and the work of ACED in Payatas schools, we have seen two things: the crucial role of the school principal and the community and the importance of a holistic and collaborative approach in school development and improvement. We have also seen that local government, especially Mayors, are a major partner in improving the schools.

**The lesson learned from the work with the public schools in Project SSPEEd and ACED is quite clear:**

The way forward on the mass is to invest in capacity building for

all major players: the principal, teachers, parents and barangay officials. When the principal and the community are organized and have good plans, there can be very good response from local government and the private sector.

## Part IId: Building Leadership and Community Support Through Synergeia

**The third example is the work of Synergeia Foundation.**

Synergeia Foundation, Inc. is a coalition of individuals, institutions and organizations working together to improve the quality of basic education. Synergeia and its partners implement systematic programs to improve the provision of basic education in more than 115 municipalities in the country.

Synergeia has focused on building leadership and community support through the following:

- Focus on Local School Board (Provincial, City, Municipal)
- Engage whole community in assessing situation, setting goals, deciding on priority objectives
- Focus on elementary schools, beginning at Grade 1, especially, English and Mathematics
- Provision of basic instructional materials (lesson plans for day to day use of teachers, workbooks for children, audio-visual materials)
- In-service training for teachers and principals

The programs of Synergeia have already resulted in significant improvements in the reading and mathematics proficiency of elementary students, and more importantly, in local governance. In monitoring the performance of participating schools, Synergeia uses the following metrics:

- National Achievement Test (NAT) for Grade School of DepEd
- DOLCH Basic Sight Words Test
- English Comprehension Test developed by Synergeia

**Synergeia in Bulacan.** Synergeia began working in Bulacan in

2000 under the leadership of Governor Josie de la Cruz. Over 620,000 pupils from grades one to six in 496 elementary schools in Bulacan are participating in the Synergeia program. In the 2000 National Achievement Test (NAT), pupils had an average score of 39.40% in Mathematics and 40.23% in English. Six years later, after interventions of Project JOSIE, pupils achieved a NAT average score of 64.39% in Mathematics and 65.45% in English.

**Synergeia in Lipa City, Batangas**. Among the 17 communities that pioneered the reading proficiency program, the most dramatic gain was achieved by Project K in Lipa City, Batangas. At the start of the project, grade one pupils' proficiency was measured at 25%. This meant, children could read only 1 out of 4 words correctly. Mayor Vilma Santos-Recto was floored upon seeing the results. Fueled by the urgency of the education crisis, various stakeholders including De La Salle Lipa, the local DepEd, local school board and parents, worked together to improve the way children learn how to read in school. After one year, the Division Achievement test results showed that on the average, grade one pupils could already read at 54.0%, doubling their score in the previous year's exam.

In 2002 2003, Lipa City's NAT average was 44.85%, in 2006–2007, it was 73.55%. The English average in 2002–2003 was 40.15%, in 2006–07, it was 73.06%.

Once again, the way forward on the mass is to invest in capacity building for the entire community.

The most challenging area of work for Synergeia now is in ARMM. But that has to be for another report.

## Part III: The Upper End of the Challenge

How can we close the gap between our top schools and the top schools in the region? Let me now turn to the upper end of the challenge. We have the top of the line, Philippine Science High School, other science high schools and leader schools. In ESEP, we worked to provide laboratories as well as a stronger curriculum and programs for these schools. We can add a list of private schools to these science high schools and leader schools.

As we saw earlier, based on the data given by Dr. Talisayon, even our best schools have a way to go to reach the levels of schools among

our neighboring countries. The best way to move forward is to explicitly benchmark with the best among our neighbors.

A framework might be a proposal sent recently by Dr. DJ de Jesus on benchmarking the top schools in the region: Singapore, Thailand, Vietnam, Philippines. On the initiative of the Minister of Education of Singapore and the Deputy Minister of Education and Training of Vietnam, the proposal is to benchmark the top science schools of Singapore, Vietnam, Philippines and Thailand. This could be done by the students from the three other countries competing in the national exams for science and math conducted by Vietnam. Singapore has already accepted the proposal. This benchmarking will also be an opportunity to compare the performance levels that the different schools expect from their students and to see if there are significant differences among them.

You might be surprised to know that the country I would expect to top the group will be Vietnam. From my experience of comparing the development of top talent in the Philippines and in countries like Vietnam, China, etc., what emerges is that, we have to develop a much stronger problem-solving culture. In mathematics, this means problems on the level of the International Mathematics Olympiad. When we benchmark our top students with say, Vietnam, we will find that we cannot compete at their level. Vietnam even during the wars with the U.S. continued to produce teams that would rank among the top in the IMO. I checked on the rankings of the four countries and from 2002 to 2006, Vietnam ranked 5, 4,4,15 and 13 respectively; Singapore ranked 30, 36, 18, 14 and 27; Thailand ranked 21, 19, 35, 23 and 16; the Philippines ranked 74, 79, 79 and 68 (we did not participate in 2006).

We should encourage participation in mathematics and science competitions. We should encourage the work of the Mathematics Trainers' Guild and support its spread to all our science high schools and leader schools. I personally teach a mathematics problem solving course in Ateneo college and we try to develop competitive teams in our grade school and high school and annually hold a competition between them and teams from MTG.

## Part IV: Postscript—Focus on the Day-to-Day Classroom (the implemented curriculum)

**Teacher Training for Day-to-Day Teaching**. We established the

Mathematical Society of the Philippines in 1972, the same year as the establishment of the Southeast Asian Mathematical Society. These societies from the start were involved in helping develop both university and research mathematics as well as mathematics education and teacher training. In our teacher training, I soon realized that our approach of providing generic training and enrichment materials or talks was not addressing the needs of the teachers. They needed something they could use in their day-to-day delivery of their classes. So, together with Sr. Iluminada Coronel, we began to work with their textbooks, providing support exercises, etc. MTAP continues to carry on this work and it was along the same lines that we carried out the work with textbooks and Teacher Guides under then Secretary Roco in 2001. As a side note, when we were discussing this recently with under secretaries and assistant secretaries of DepEd, they laughed and said that teachers have a comment about generic and enrichment type seminars, their Three T's: Tanggap, Tiklop, Tago. That is, they take the handouts, pack them and then put them away.

**Benchmarking Using Tests Like TIMSS**. One way to move forward is to use exams like TIMSS or College Entrance Tests in the Philippines or School Leaving Exams in other countries (like the Primary School Leaving Exams, O-Level Exams and A-Level Exams of Singapore) not just to compare performance, but to use them as a diagnostic. This means using the exams as a tool to identify the key areas where improvement or progress is most needed. Diagnose why students do poorly in these areas. Then, using the data, develop interventions: appropriate teacher training, workbooks, lesson guides, etc. to address these problems. Measure whether the interventions are working.

We have found it important to engage the teachers in this exercise:

- get the teachers to do the answer key (this helps them engage the challenges coming from the tests)
- get them to correct the students' papers or at least some of them(they will get a lot of "aha" experiences – seeing that what they thought they taught did not really sink in)
- then invite reflection on how to move forward

## Conclusion

To move towards "a progressive Philippines anchored on science", it is important that we actually engage the problems that face us and show that we are contributing to solving them. While depressing statistical figures and reports on the state of education in the Philippines continue

to discourage us, we look forward to a better future through the inspiring results from initiatives like the TEEP School Based Management Approach, the Math Lesson Guides, the focus of Synergeia on building leadership and community support, the work of Project SSPEEd and the ACED and the dedication of MTG in developing talent among the youth.

We realize the importance of giving attention to the social environment of our schools if we are to improve and develop our schools and educational system. We have seen that to move forward to the mass, it is important to invest in capacity building for the entire school community: principal, teachers, parents and baranggay officials. For the development of our top talent, we see that we need to benchmark explicitly with the best among our neighbors.

Finally, to move towards "a progressive Philippines anchored on science", it is important that we focus on the day-to-day classroom (the implemented curriculum) through teacher training and other interventions that give attention to the day-to-day delivery of lessons and benchmarking activities like learning from best practices of other schools and using reputable examinations to improve the standards of our schools.

## Acknowledgements

I would like to thank Dr. Cynthia Rose Bautista for sharing the report and experiences of TEEP. I personally directed the planning that led to TEEP, the development of the Division Elementary Development Plan (DEDP) 1994-98 and it is a tribute to those who carried out the work, especially Dr. Malou Doronila, that we have achieved such significant results.

I would like to thank Ms. Anne Lan Candelaria for the outstanding work with the Payatas Schools. The work has now been taken over by Mrs. Carmela Oracion, who also led the work for developing the Lesson Guides for Mathematics.

Finally, thanks to Dr. Milwida Guevara, President of Synergeia Foundation, and her team for the outstanding work of Synergeia Foundation in engaging mayors and the community, revitalizing the local school boards, and truly improving education for public elementary school students in so many municipalities and cities. I would like to thank Ms. Trissa Manalastas for her patience in organizing the data for me for this presentation.

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## Appendix 1: TEEP Comparator Groups and Percentage of Students Surpassing 75% and 60% Mastery Level (Overall, Math and Science)

To determine the comparator groups for TEEP/SBM, the Team examined how each province fared along four poverty indices:

- The Human Poverty Index (HPI),
- the 1997 and 2000 Fixed Level of Living or consumption-based measures and
- the 2000 official poverty line of the National Statistical Coordinating Board.

Comparator groups:

- **ARMM**
  Basilan, Lanao del Sur, Maguindanao, Sulu and Tawi-Tawi.

- **AKLAN+** the clearly poor provinces that satisfied the following criteria:
  - province HPI > median HPI for the country
  - falls below the poverty line based on consumption levels in 1997
  - falls below the poverty line based on consumption levels in 2000
  - falls below the official NSCB poverty line.

  Aklan, Camarines Norte, Lanao del Norte, Northern Samar, Sarangani, Sorsogon, Western Samar and Zamboanga del Norte

- **CAGAYAN+** provinces that satisfy two or three of the above criteria: Agusan del Norte, Albay, Bohol, Cagayan, Camarines Sur, Camiguin, Catanduanes, Cebu, Compostela Valley, Davao Norte, Davao Oriental, Isabela, Oriental Mindoro, Occidental Mindoro, Marinduque, Misamis Occidental, Quezon, Siargao, Siquijor, South Cotabato, Sultan Kudarat, Surigao del Norte

- **ILOILO+** provinces that satisfy only one of the above criteria Bukidnon, Davao Sur, Iloilo, Negros Occidental, Nueva Ecija, Nueva Vizcaya, Occidental Mindoro, Palawan

In addition to the poor provinces, TEEP schools were also compared to non-poor provinces, cities and the National Capital Region.

- **PAMPANGA+** Bataan, Batangas, Bulacan, Cavite, Ilocos Norte, Ilocos Sur, La Union, Laguna, Misamis Oriental, Pampanga, Pangasinan, Quirino, Rizal, Tarlac, Zambales and all cities outside NCR
- **NCR**

Note the relatively stronger improvement in mathematics: 22.6% 9ELS and 18.2% Non-ELS achieving 75% mastery level, all others below, with Pampanga closest at 16.6%. At 60% mastery level, the performance gap is even clearer, with TEEP ELS at 59.5% and non-ELS at 46.3% The improvement is also much stronger compared to improvement in Science.

**Percent Surpassing 75% Mastery Level: Overall**

| GROUP8 | 2002/3 | 2003/4 | 2004/5 | 2005/6 |
|---|---|---|---|---|
| TEEP ELS | 2.6 | 7.3 | 16.1 | 15.0 |
| TEEP NON-ELS | 3.2 | 4.9 | 13.6 | 11.2 |
| AKLAN+ | 4.7 | 3.3 | 9.4 | 8.7 |
| CAGAYAN+ | 3.5 | 2.9 | 9.1 | 7.0 |
| ILOILO+ | 1.0 | 1.0 | 5.3 | 1.9 |
| PAMPANGA+ | 3.5 | 6.7 | 15.8 | 11.0 |
| NCR | 0.0 | 1.3 | 6.1 | 0.4 |
| ARMM | 0.9 | 0.2 | 1.4 | 0.5 |
| Total | 3.1 | 4.1 | 11.3 | 8.3 |

**Percent Surpassing 75% Mastery Level: Math**

| GROUP8 | 2002/3 | 2003/4 | 2004/5 | 2005/6 |
|---|---|---|---|---|
| TEEP ELS | 7.31 | 5.0 | 32.6 | 22.6 |
| TEEP NON-ELS | 8.0 | 13.4 | 24.3 | 18.2 |
| AKLAN+ | 10.8 | 10.5 | 18.5 | 14.4 |
| CAGAYAN+ | 8.3 | 10.1 | 17.8 | 11.8 |
| ILOILO+ | 4.1 | 5.6 | 12.0 | 4.7 |
| PAMPANGA+ | 8.8 | 15.6 | 26.5 | 16.6 |
| NCR | 1.1 | 7.4 | 17.3 | 2.2 |
| ARMM | 0.5 | 5.4 | 4.3 | 2.2 |
| Total | 7.7 | 11.7 | 20.8 | 13.5 |

**Percent Surpassing 75% Mastery Level: Science**

| GROUP8 | 2002/3 | 2003/4 | 2004/5 | 2005/6 |
|---|---|---|---|---|
| TEEP ELS | 2.9 | 4.7 | 22.0 | 5.9 |
| TEEP NON-ELS | 2.8 | 2.9 | 17.2 | 3.7 |
| AKLAN+ | 3.9 | 1.9 | 14.7 | 2.1 |
| CAGAYAN+ | 2.9 | 1.5 | 11.8 | 1.8 |
| ILOILO+ | 0.9 | 0.6 | 8.1 | 0.6 |
| PAMPANGA+ | 3.1 | 3.3 | 19.5 | 3.4 |
| NCR | 0.9 | 1.8 | 11.7 | 0.0 |
| ARMM | 1.4 | 0.2 | 2.9 | 0.2 |
| Total | 2.7 | 2.2 | 14.8 | 2.5 |

**Percent Surpassing 75% Mastery Level: Science**

| GROUP8 | 2002/3 | 2003/4 | 2004/5 | 2005/6 |
|---|---|---|---|---|
| TEEP ELS | 2.9 | 4.7 | 22.0 | 5.9 |
| TEEP NON-ELS | 2.8 | 2.9 | 17.2 | 3.7 |
| AKLAN+ | 3.9 | 1.9 | 14.7 | 2.1 |
| CAGAYAN+ | 2.9 | 1.5 | 11.8 | 1.8 |
| ILOILO+ | 0.9 | 0.6 | 8.1 | 0.6 |
| PAMPANGA+ | 3.1 | 3.3 | 19.5 | 3.4 |
| NCR | 0.9 | 1.8 | 11.7 | 0.0 |
| ARMM | 1.4 | 0.2 | 2.9 | 0.2 |
| Total | 2.7 | 2.2 | 14.8 | 2.5 |

**Percent Surpassing 60% Mastery Level: Overall**

| GROUP | 2002/3 | 2003/4 | 2004/5 | 2005/6 |
|---|---|---|---|---|
| TEEP SBM ELS | 15.5 | 39.3 | 65.1 | 59.5 |
| TEEP SBM NON-ELS | 15.8 | 29.3 | 50.3 | 46.3 |
| AKLAN+ | 22.4 | 24.4 | 43.3 | 44.0 |
| CAGAYAN+ | 16.5 | 22.4 | 37.5 | 32.3 |
| ILOILO+ | 8.9 | 14.7 | 32.3 | 24.9 |
| PAMPANGA+ | 16.4 | 31.9 | 49.9 | 40.3 |
| NCR | 6.7 | 19.5 | 49.8 | 19.7 |
| ARMM | 11.6 | 13.6 | 11.1 | 10.4 |
| Total | 15.5 | 25.6 | 43.3 | 37.0 |

**Percent Surpassing 60% Mastery Level: Math**

| GROUP | 2002/3 | 2003/4 | 2004/5 | 2005/6 |
|---|---|---|---|---|
| TEEP SBM ELS | 20.5 | 46.9 | 66.6 | 59.5 |
| TEEP SBM NON-ELS | 22.5 | 38.5 | 54.3 | 48.9 |
| AKLAN+ | 31.4 | 34.0 | 47.8 | 43.9 |
| CAGAYAN+ | 23.0 | 32.1 | 44.8 | 34.9 |
| ILOILO+ | 14.2 | 23.9 | 37.9 | 25.2 |
| PAMPANGA+ | 22.9 | 41.2 | 53.9 | 41.8 |
| NCR | 10.5 | 27.8 | 55.6 | 17.9 |
| ARMM | 5.6 | 20.4 | 19.7 | 14.8 |
| Total | 21.8 | 34.9 | 48.5 | 38.6 |

**Percent Surpassing 60% Mastery Level: Science**

| GROUP | 2002/3 | 2003/4 | 2004/5 | 2005/6 |
|---|---|---|---|---|
| TEEP SBM ELS | 15.0 | 33.7 | 68.6 | 31.7 |
| TEEP SBM NON-ELS | 13.7 | 24.0 | 52.3 | 24.5 |
| AKLAN+ | 19.5 | 19.3 | 47.9 | 21.8 |
| CAGAYAN+ | 14.4 | 17.2 | 40.6 | 15.5 |
| ILOILO+ | 8.5 | 11.7 | 35.7 | 9.8 |
| PAMPANGA+ | 14.5 | 25.9 | 53.0 | 21.1 |
| NCR | 6.1 | 16.8 | 52.7 | 6.5 |
| ARMM | 12.4 | 8.3 | 20.6 | 4.8 |
| Total | 13.8 | 20.5 | 46.5 | 18.4 |