Chapter 2-8

PHILIPPINE PERSPECTIVE ON THE ICMI COMPARATIVE STUDY

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1. SOCIAL CONTEXT

The first impression of a visiting mathematics educator from countries with a stronger mathematics education tradition in discussions with counterparts from the Philippines might be that of similarities in situations. As solutions begin to be discussed, however, he might begin to realize that beneath these similarities are greater differences. The dominant reality in a country like the Philippines is the scarcity of resources, both human and material. Five or six students have to share a textbook. Many schools lack classrooms, so classrooms meant for 40 students are crammed with 80 students. Or schools have double sessions, in some cases triple sessions a day. Teachers are poorly trained and have to teach in a very difficult environment.[1]

2. DEPENDENCE ON WESTERN COUNTRIES

The paradoxical aspect of these differences, in particular the scarcity of human and material resources, is that instead of isolating us from developments in advanced countries, they make us more vulnerable to them. This is because we have to depend on Western mathematics educators and Western textbooks. We do not have the necessary number of experts nor the funds to develop our own textbooks. In the 1960s, for example, our Department of

Education invited Peace Corps Volunteers from the U.S. to bring in the 'New Mathematics' into Philippine schools. In the late 1980s and early 1990s, the Secondary Education Development Project, which developed new mathematics textbooks and teacher training, was funded by the World Bank with foreign consultants and advisers.

3. NO SIGNIFICANT IMPROVEMENT

However, after several decades of curricular reform in mathematics education, we have not seen significant improvement in the achievement of our students. The challenge then is to reflect on our methods of mathematics education reform and ask if we can find better ways.

4. DOMINANT APPROACH

The dominant approach has been to:

1. Bring in a new approach, usually theory-derived and usually from the U.S. This was the method in bringing in the New Mathematics in the 1960s and in subsequent reforms – newer trends such as back-to-basics, problem-solving, constructivism.
2. Develop materials based on these approaches.
3. Do pilot studies on small, selected scales, which usually say that the new approach is better.
4. Then, given that necessary funding is available, implement on a national scale. In this implementation, teacher training is done following what is called the cascade model:

The school system is organized into regions, which are divided into divisions, then into districts and finally into individual schools. The training program cascades as follows:[2]

- National level training for regional trainers
- Regional level training for division trainers
- Division level training for district trainers
- District level training for school trainers
- School level training for teachers in the schools

5. SHORT TIME FRAME FOR REFORMS

One of the major constraints in World Bank or OECF funded projects is their short timeframe, namely about 5 years. The teacher training part usually takes place in the last year or so. Because of the number of students and teachers in the Philippine school system and financial and time constraints, the training periods tended to become shorter and shorter as the training cascaded down until, at the level of school teachers, the training was just too short. While the training of the regional trainers might be for six months, by the time the training gets to the schoolteachers it might be just two weeks. Worse, because the training had to be compressed into such tight schedules, harassed administrators would send teachers for the training just to comply with quotas, even if they were not going to be teaching mathematics.

In talks I have given, I have compared the impact to that of a flash flood, too much in too short a time. The new curriculum and textbooks wipe out the past, but they are not absorbed.

As one reflects on this mode of mathematics education reform, one notes the following: the focus is on the intended curriculum. The greatest amount of time is given to the development of the textbooks and materials and the higher-level trainers. It is also from the top, from mathematics education experts from universities and from abroad. The time frame is too short.

6. TYPICAL OF WORLD BANK FUNDED OR FOREIGN-ASSISTED REFORM INITIATIVES

This is typical of World Bank and other Overseas Development Assistance Education Reforms in Developing Countries. The 5-year time frame of the ODA funding might work for building school-buildings, but in a large country like the Philippines or Indonesia it is too short for academic reform to be absorbed down to the individual classroom.

There seems to be an underlying assumption that there is an absolute best way of teaching and learning mathematics (usually the one espoused by the experts hired by the project). The method is to incorporate it into the new textbooks and materials and cascade it through the rapid teacher training.

Subsequent studies, of course, show that there is not much measurable improvement in the teaching and learning. The reason always given is the inadequacy of the teachers. Since this is the recurrent refrain, one wonders why the money is not simply used to address the inadequacy of the teachers rather than embarking on another curricular reform.

7. SEARCHING FOR MODELS IN EAST AND SOUTHEAST ASIA

Because of my work since the early 1970s in mathematics and mathematics education in East and Southeast Asia, I began to ask if there might not be a different way. I had noticed already in the 1970s that Singapore and Hong Kong did not simply drop their old curriculum and take in the New Mathematics as a whole (as we did), but only took certain parts and preserved much of the traditional mathematics.[3]

7.1 Role of ICMI Comparative Study

Thus, what is the role of this ICMI Comparative Study on mathematics education reform in a country like the Philippines? I offer the following reflections:

1. It relativizes dominant country influences (the United States for us) and helps us see alternative ways. In particular, that there are no off-the-shelf solutions and no absolute best way. What is good or best has to be seen in a particular situation and culture.
2. Weaknesses in mathematics education are not just due to lack of money or other resources. Resources are needed (e.g. textbooks), but if the deeper underlying factors are not understood, the resources will not be well used. For example, while new textbooks may be well and good, if the adequacy of teachers and sufficiently long teacher-training are not taken care of, not much improvement will come from the investment in new textbooks.
3. For us in the Philippines, a deeper appreciation of the importance of culture and values in mathematics achievement may help us look more closely at the different cultures in our own country. For example, we all know that the students coming from Chinese-Filipino schools are outstanding in mathematics performance. Our mathematics educators might consider studying these schools and benchmarking with them.
4. We could consider effective cooperation and benchmarking with schools in other countries. We have started to do this with the Grade School and High School of Ateneo de Manila. For example, our high school has been visiting and learning best practices from Anglo-Chinese High School and Chinese High School in Singapore. Before going there, we asked our visiting administrators and teachers to first read and discuss Stevenson and Stigler's "Learning Gap" and Liping Ma's "Knowing and Teaching Elementary Mathematics". These helped our visiting team look into areas they never looked at before.

The conclusion is not to copy practices blindly, but to reflect on the goals and values and to ask what practices (they may be the same) in our culture might achieve them. As one of the papers in this ICMI study says, we seek not blueprints, but mirrors.

8. A DIFFERENT MODE OF SCHOOL MATHEMATICS REFORM: FOCUSING ON THE IMPLEMENTED CURRICULUM

In talks to various groups in the Philippines, I have been discussing a different mode of school mathematics reform. The usual way (as described above) has been to focus on the intended curriculum, following major trends in the West. Then, to develop new textbooks and learning materials and do a pilot project which shows that the new approach is more effective (pilot projects always give this result) and then to seek to implement in the larger school system.

I have compared this with the longer 10 to 12 year cycle of school mathematics reform in Japan, where

a. Immediately on implementing a new reform, a process begins of feedback on the textbooks, materials, etc. from teachers and classrooms
b. This feedback is then processed and sifted through reports, conferences, discussions at different levels of the school system
c. Then policies and decisions are made on the main lines of the next cycle of reform
d. These are carried out in guidelines for new textbooks, books are written, pilot-tested
e. And implementation begins for the new cycle.

The main feature I have pointed out is that reform begins from the classroom, the implemented curriculum, and ideally the key players are the classroom teachers and school leaders. It is also a more evolutionary, rather than a revolutionary approach. We begin with what we have and improve on it, rather than wipe it out and totally replace it.

9. RECENT EFFORTS FOLLOWING THIS DIFFERENT MODE

We have been following these reform approaches at two levels:

1. Ateneo de Manila Grade School and High School

   Here we have asked our teachers to learn best practices from other schools in the Philippines (notably the Chinese-Filipino schools) and from partner schools in Singapore. We have also introduced them to comparative studies such as those of Stevenson and Stigler, Stigler and Hiebert, and Liping Ma. We use these "mirrors" to help us in continually improving our materials and our teaching.

2. On a larger scale, I led a group that was asked to help in improving mathematics teaching in the larger public school system (12.3 million elementary school students, 5 million high school students, 36,579 elementary schools, 4,629 high schools) in school-years 2001-2002 and 2002-2003. It is a huge and complex system.[4]

I will describe mainly the work we did for high schools as the work with elementary schools is just starting.[5] The first goals were to address the lack of textbooks (several students had to share one textbook) and the inadequacy of teachers and to do this on a large scale.

10. TEXTBOOKS AND LESSON GUIDES

We decided to go back to the more traditional discipline-based approach, rather than the spiral approach, to high school mathematics. The four-year high school series would thus be: Elementary Algebra, Intermediate Algebra, Geometry, Algebra and Trigonometry (with some Statistics). It is not that the spiral approach is not good in itself, but it demands more ideal conditions for its success (better trained teachers, ability to cover most of the book, etc.)

It was also emphasized that it was important not to introduce too many innovations to the teachers, to stay with what they were familiar with and improve on them patiently, and to develop teacher-training modules that help them with their actual textbook and day-to-day teaching.

In practice, this meant two things: We stayed with their actual textbooks, but reorganized the material with some transition sections. And we worked with the master teachers of the Department of Education together with some private high school teachers to develop detailed lesson guides for the teachers. This was done for the first three years of high school in 2001-2002 for implementation in 2002-2003 and for fourth year high school in 2002-2003 for implementation in 2003-2004.

11. TEACHER TRAINING

Teacher training for 1500 mathematics teachers for first to third year high school was done in April 2003 using the textbooks and the lesson guides. The training was given by high school teachers, master teachers from the public schools and selected private high school teachers. We found that it was more effective to have high school teachers with actual classroom experience deliver the training, rather than have college teachers. These 1500 teachers in turn provided training in their divisions and districts to the larger group of teachers using the same lesson guides and textbooks.

The same process was followed for fourth year high school with teacher training for 500 teachers in April 2003 and these teachers providing training for the others in May-June 2003.

12. INITIAL FEEDBACK AND AREAS FOR IMPROVEMENT

In terms of levels of mathematics, it is a small start. But in terms of scale, it is a large initiative. Students in high schools expressed appreciation that for the first time they each had a textbook. Teachers expressed appreciation that they had detailed lesson guides corresponding to their syllabus and their textbooks.

Areas needing improvement also surfaced quickly. In the first national consultation in school-year 2002-2003, third year high school teachers pointed out that the third year Geometry book was quite weak and needed a lot of work. This is true and we noted it when we looked at the Geometry content. But then this was the content that had always been there in the past 10 years or so. Their inadequacy was just not noted, because the material was distributed over several years in the spiral approach. This will have to be an area of follow-up this school-year.

13. FOCUS ON SCHOOLTEACHERS AND IMPLEMENTED CURRICULUM

If there is any point to be emphasized in these initiatives, it is the focus on the classroom and schoolteachers and on the implemented curriculum. Throughout the process, the leadership and work was carried out by high school teachers. The feedback on reform of the Geometry book has come from the classroom teachers.

It is a beginning effort, following a more evolutionary process, centering on the classroom and teachers. But given the scale of our school system, it is a very challenging effort.

The grade school work is even more challenging, given the size of the system and dispersal of schools in remote parts of the country.

NOTES

1. The reflections in this section and the next were already made in Nebres (1980) after the Berkeley International Congress on Mathematics Education.
2. More data on various interventions and reform initiatives may be found in Talisayon (1998). The description of the cascading model of teacher-training is on pp. 125 ff.
3. This was noted in Nebres (1988), the plenary address I gave at the Budapest ICME which compared East and Southeast Asian values, beliefs and practices in mathematics education with the Philippine experience from the United States.
4. Nebres (2003) is a report given to the National Academy of Science and Technology on the scale and complex problems of our public elementary and secondary school system.
5. A more detailed report is given in Oracion (2003).

REFERENCES

Ma, Liping, 1999, *Knowing and Teaching Elementary Mathematics*. Lawrence Erlbaum Associates, New Jersey.

Nebres, B.F., 1980, Major Trends from ICME IV: A Southeast Asian Perspective, in: *Teaching Teachers, Teaching Students*, Steen and Albers, eds., Birkhauser, Boston, pp.56-67.

Nebres, B.F., 1988, School Mathematics in the 1990s: Recent Trends and the Challenge to Developing Countries, in: *Proceedings of the Sixth International Congress on Mathematical Education*, Ann & Keith Hirst, eds., Budapest, Hungary.

Nebres, B.F., 2003, Demographics and Basic Education, paper presented at Annual Scientific Meeting of the National Academy of Science and Technology, July 10, 2003.

Oracion, C., 2003, A Report on Initiatives towards Improving Achievement in Mathematics at the Basic Education Level, report prepared for the Department of Education.

Stevenson, H.W. and Stigler, J.W., 1992, *The Learning Gap*, Simon and Schuster, New York.

Stigler, J.W. and Hiebert, J, 1999, *The Teaching Gap*, Simon and Schuster, New York.

Talisayon, V.M. et al, 1998, Materials and Methods in Basic Education and In-Service Teacher Training in Science and Mathematics, in: *Science Education in the Philippines: Challenges for Development, Technical Papers (Vol. I)*, E.B. Ogena and F.G. Brawner, eds., pp.107-147. Manila: NAST, SEI & CIDS.