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Kristine Joy E. Carpio
De La Salle University, Manila

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Kristine Joy E. Carpio
De La Salle University -- Manila

Abstract

This paper draws a picture of Mathematics education in the Philippines for Years 1 to 10. The factors included for this endeavor are the curriculum, the results of various national exams and the results of the studies undertaken by the International Association for the Evaluation of Educational Achievement.

INTRODUCTION

The year 2004 started my fascination with Mathematics education in the Philippines. It was the second year of my postgraduate studies at The Australian National University and a group of Filipino migrants asked me to give a talk on something that is relevant to our country . I chose to talk of Mathematics education. Since then I have been curiously putting the pieces together to paint an image of our educational system.

Pre-university public education in the Philippines last for a decade. The school year starts from June of the current year to March the next year. Prior to the academic year (AY) 1995-96 kids start school at the age of 7 but it was changed to 6. Elementary education covers the first 6 years while high school or secondary education takes care of the rest.

RESTRUCTURED CURRICULUM

On the 12th of June 2003 a new curriculum was signed into law. The current curriculum is the 2003 Revised Basic Education Curriculum (RBEC); this was the revision of the 2002 Basic Education Curriculum (BEC) which was pilot tested during the AY 2002-03. This came after the 1983 New Elementary School Curriculum (NESC) and the 1989 New Secondary Education Curriculum (NSEC). The new curriculum aims to focus on improving literacy and numeracy while imparting values across learning areas to make it dynamic; this is inline with the mission of the Department of Education (DepEd) to provide quality basic education that is accessible to everybody and to lay the foundation for lifelong learning (Batomalaque, 2002).

One of the problems addressed in the old curriculum is overcrowding. A congested curriculum and the possible irrelevance of some learning areas hinder or delay lifelong learning skills (*The 2002 Basic Education*, 2002). The new curricula have five learning areas: Filipino, English, Science, Maths and Makabayan. Filipino and English are for linguistic literacy and fluency, Science is for technological literacy, Mathematics is for numeracy and Makabayan ("laboratory of life") handles socio-cultural and politico-economical literacy. The subjects areas of the old curricula together with the time allotment are in Tables 1 and 3 while the subjects areas of the new curricula including the time allotment are in Tables 2 and 4.

Table 1. 1983 NESC

Subject Areas	Daily Time Allotment (In	
	Year 1 to 3	Year 3 to 6
Filipino	60	60
English	80	80
Mathematics	60	60
Science and Health	40	40
Civics and Culture	40	--
History, Geography, Civics	--	40
Arts and Physical Education	20	20
Home Economics and Livelihood Education	--	40
Charater-Building Activities	20	20
Daily Total	**320**	**340**

Table 2. 2003 BEC for Primary Education

Subject Areas	Daily Time Allotment (In Minutes)			
	Year 1 and 2	Year 3	Year 4	Year 5 and 6
Filipino	80	80	60	60
English	100	100	80	80
Mathematics	80	80	60	60
Science	--	40	60	60
Makabayan:	*60*	*60*	*100*	*120*
Civics and Culture	60	60		
Social Studies			40	40
Music, Arts and Physical Education			20	40
Home Economics and Livelihood			40	40
Values Education, Good Manners and Right Conduct				
Daily Total	**320**	**360**	**400**	**420**

There is an increase in the contact time in Filipino, English and Maths but Science disappeared in Years 1 and 2. In the first two years Science is integrated with English where simple science and health concepts are handled which include a child's interaction with his environment while process skills may also be developed in Makabayan classes (*Basic Education Curriculum*, 2005). In the first three years Makabayan requires 5 hours a week but this ballooned to 10 hours a week which doubles the time spent in other learning areas. Values Education is now to be integrated within each learning area. The daily amount of time required for both curricula is similar in the first two years but for years 3 to 6 there was an increase of 40 – 80 minutes.

In high school, daily contact time in English, Filipino and Maths increased by 20 minutes while time for Science went down by 20 minutes. In years 7 to 10 Values Education continuous to be integrated within each subject but meets 60 minutes a week on its own. Makabayan eats up 13 hours a week which is roughly 35 per cent of their time. In the new curriculum the students spend less time in school by 20 minutes a week.

Table 3. 1989 NSEC

Learning Areas	Daily Time Allotment (In
	Year 7 to 10
Filipino	40
English	40
Mathematics	40
Science and Technology	80
Social Studies	40
Physical Education, Health and Music	40
Technology and Home Economics	80
Values Education	40
Daily Total	**400**

Table 4. 2003 BEC for High School

Subject Areas	Daily Time Allotment (In Minutes)
	Year 7 to 10
Filipino	60
English	60
Mathematics	60
Science	60
Makabayan:	*180 for four days and 60 for one day*
Social Studies	60 for four days
Music, Arts and Physical Education	60 for four days
Home Economics and Livelihood	60 for four days
Values Education, Good Manners and Right Conduct	60 a week on its on but within each learning area everyday
Daily Total	**300 to 420**

In both curricula Makabayan serves as an umbrella subject over Social Studies, Arts/Physical Education, Home Economics and Values Education. This new learning area became a collective name for the subject areas in the old curricula that were seemingly left out in the new curricula.

THE HIGH SCHOOL READINESS TEST

Graduating primary and secondary students were evaluated by the National Elementary Achievement Test (NEAT) and the National Secondary Aptitude Test (NSAT) until the academic year 2001-2002 although it was revived in the latter years. These tests were designed to assess and evaluate skills in Mathematics, English, Filipino, Science and Social Studies (*National Educational Testing and Research Center*, 2005).

Table 5. NEAT Achievement Rate

	AY 1997-	AY 1998-	AY 1999-	AY 2000-	AY 2004-

	1998	1999	2000	2001	2005
Mathematics	51.75	52.45	45.69	49.75	59.10
Science	52.68	49.93	48.61	49.75	54.12
English	49.18	46.40	46.32	47.70	59.15
History, Geograhy, Civics	49.58	51.55	55.21	53.93	59.55
Filipino	---	---	50.13	57.49	61.75
Percentage of Passers	76.54%	73.21%	---	---	---

Table 6. NSAT Achievement Rate

	AY 1997-1998	AY 1998-1999	AY 1999-2000	AY 2000-2001	AY 2003-2004	AY 2004-2005
Mathematics	49.65	44.49	49.99	51.83	46.20	50.70
Science	45.63	42.99	46.29	45.68	36.80	39.49
English	47.07	44.19	50.43	51.00	50.08	51.33
Social Studies	---	---	58.64	57.19		42.48
Filipino	57.50	62.50	66.14	61.26		50.01
Percentage of Passers	94.40%	94.76%	---	---	---	---

During the term of then Secretary Raul Roco the NEAT and NSAT were abolished. The achievement tests were replaced by diagnostic tests for years 4 and 7 with Math, Science and English only. Unlike the achievement tests these diagnostic were not that useful in long-term planning since it fails to yield information on the relevance of the basic education curriculum and the ability of teachers (*Testing for High School*, 2004).

Achievement rate refers to the percentage of students who passed the specified learning area. For a student to pass the exam that student should have a passing mark in at least one of the learning areas. The data on school years with available percentage of passers indicate that very few students have a passing mark in all learning areas because of the big differences between the percentage of passers and the achievement rate (*Basic Education Statistics*, 2003). Except for AY 1999-2000 the students have the lowest achievement rate in English. In the year where English was not the culprit it was Mathematics. In the NSAT it was consistently Science that was getting the lowest achievement rate.

Table 7. Diagnostic Exam Achievement Rate

	Year 4 Students	Year 7 Students
Mathematics	38	27
Science	39	28
English	42	30

The percentage of passers was not available at the DepEd website but other sources indicate that the diagnostic test for elementary graduates showed that 7 out of 10 do not possess the required skills for high school and 6 out of 10 are not meant to be in the fourth grade (Carillo, 2003). The The DepEd factsheets have conflicting reports on the results of the diagnostics exam in the AY 2002-2003. The latter factsheets have shown the results in Table 8.

Table 8. Other Diagnostic Exam Results

	AY 2002-2003 (Year 4)	AY 2002-2003 (Year 7)	AY 2003-2004 (Year 4)
Mathematics	44.84	32.09	59.45
Science	43.98	34.65	52.59
English	41.80	41.48	49.92

The disappointing results encouraged then Secretary Edilberto C. de Jesus to give a High School Readiness Test (HSRT) (*Testing for High School*, 2004). This test may not be useful in long-term planning but it gives clues on the learning gaps of elementary graduates. Before the first HSRT was given on May 24, 2004 a National Achievement Test was given to almost a million senior high school students. Only 2.1 per cent of the examinees were able to get a score of 75 per cent or higher; the average was 44.36 per cent (*Mediocrity*, 2004).

The HSRT is a 90-item written exam on Mathematics, Science and English which aims to determine who among the elementary graduates are well-equipped for high school (*One Last Hurdle*, 2004). This must be taken by an elementary graduate who did not graduate with honors and who is neither going to a private high school nor a national science high school. Only 0.52 per cent of the estimated 1.4 million takers achieved the passing mark of 75 per cent (Amador, 2004). The highest score was 85 while the lowest was 1 with an average of 27% which forced DepEd to set the passing mark to the median which is 30 per cent (*DepEd Sets New*, 2004).

Those who failed to pass the test was initially required to undergo a year of Pre-Secondary Bridge Program to address the learning gaps but due to the lack of time for information dissemination and lack of infrastructure the program was made optional (Amador, 2004). A student in the program is having remedial classes in Mathematics, Science and English in preparation for high school. Two hours a day is spent on each subject and a student must pass all three subjects before moving to the next level. Failure means they will have to undergo the same program until they pass (Pazzibugan, 2004 March 24).

Students under this program will have 11 years of pre-university education which is at par with most countries. According to Secretary de Jesus this program addresses the oversight that was made in passing the 1940 education reform law which reduced the 11-year basic education cycle by getting rid of the seventh year in primary education without implementing the second part of the reform which was to add two years to secondary education (Olivares-Cunanan, 2004).

Since most of the non-passers chose not to take the remedial classes another round of HRST was given last August 31 to 1.2 million high school freshmen (Pazzibugan, 2004 September 14) . This time 1.16 per cent got 75 per cent and above. They have set the passing mark to 50 per cent but only 19.75 per cent made it. This figure is dismal but is definitely better than the first HSRT where only 7.9 per cent have scores of 50 per cent and above. These students have been high school for three months and yet most of them are still unprepared.

INTERNATIONAL ASSESSMENT

The International Association for the Evaluation of Educational Achievement (IEA) was founded in 1959. They have been conducting international studies in areas such as mathematics, science, language, civics and reading. The First and Second International Mathematics Studies were done in 1964 and 1980-82 respectively. The first time the association conducted one set of studies for both mathematics and science was in 1995. This was labeled the Third International Mathematics and Science Studies (TIMSS). The same integrated studies in mathematics and science was done in 1999 and 2003. The 1999 assessment was labelled TIMSS-Repeat (TIMSS-R) while the 2003 assessment was labelled TIMSS where T now stands for trends. The Philippines first participated in their studies on mathematics in 1995 then in 1999 and 2003. The next set of assessment will be this year. These studies also investigated the curriculum and its delivery in classrooms worldwide.

Questionnaires regarding decision-making and organizational features within the educational system were given to participating students, teachers of the participants and heads of the participating schools.The TIMSS 95 written examinations and performance assessment were given for three different populations. The first consists of year 4 students while the second is made up of year 8 students and the third were students in their final year of secondary education. In TIMSS 99 assessment were given to year 8 students only while TIMSS 2003 evaluated those in years 4 and 8. The Philippines participated in the written examinations for year 8 students in all three and year 4 students in 2003.

Basic education in most countries starts at the age of 6 so for IEA year 4 students are 9-year-olds while year 8 students are 13-year-olds. Each participating country was asked to identify the two adjacent grades containing the largest population of 9-year-olds and 13-year-olds. In TIMSS 95 evaluation was done for both the lower and upper grades (except for Israel and Kuwait which assessed only those in the upper grade) while succeeding ones assessed only those in the upper grade. Before 1995 basic education in our country starts at the age of 7 so during the first two assessments most of our 13-year-olds are in year 6 or 7 but by 2003 most of our 13-year-olds are in year 7 or 8.

The Philippines sent 13-year-olds for assessment in all three but the results during TIMSS 95 were not included in the main body of the report since the school sampling procedures used were not clearly documented. Selected results were instead placed in the appendix with the year 6 students having an average of 386 while the high school freshmen have an average of 399 (Beaton, Mullis, Martin, Gonzales, Kelly and Smith, 1996 pp. C-2– C-3).

The high school freshmen on the average scored 13 points higher than the year 6 students international average is 31.56. The only countries that have lower difference in scale-score among adjacent grades are the French Speaking part of Belgium and South Africa which have 7 and 6 respectively. Comparing our scores in TIMSS 95 with rest of the participants would land us in the fourth to the last spot among the upper grade and third to the last among the lower grade (Table 9) (Beaton *et al*, 1996 p. 22; Mullis, Martin, Gonzales, Gregory, Garden, O'Connor, Chrostowski and Smith, 2000 pp. 22 and 26; Mullis, Martin, Gonzales and Chrostowski, 2004 p. 34).

Table 9. The average achievement in TIMSS among 13-year-olds

	TIMSS 1995		TIMSS 1999		TIMSS 2003	
	Upper Grade	Lower Grade				
Singapore	643	601	Singapore	604	Singapore	605

Korea	607	577	Korea, Republic of	587	Republic of Korea	589
Japan	605	571	Chinese Taipei	585	Hong Kong, SAR	586
Hong Kong	588	564	Hong Kong SAR	582	Chinese Taipei	585
Belgium (Fl)	565	558	Japan	579	Japan	570
Czech Republic	564	523	Belgium-Flemish	558	Belgium (Flemish)	537
Slovak Republic	547	508	Netherlands	540	Netherlands	536
Switzerland	545	506	Slovak Republic	534	Estonia	531
Netherlands	541	516	Hungary	532	Hungary	529
Slovenia	541	498	Canada	531	Malaysia	508
Bulgaria	540	514	Slovenia	530	Latvia	508
Austria	539	509	Russian Federation	526	Russian Federation	508
France	538	492	Australia	525	Slovak Republic	508
Hungary	537	502	Finland	520	Australia	505
Russian Federation	535	501	Czech Republic	520	United States	504
Australia	530	498	Malaysia	519	Lithuania	502
Ireland	527	500	Bulgaria	511	Sweden	499
Canada	527	494	Latvia-LSS	505	Scotland	498
Belgium (Fr)	526	507	United States	502	Israel	496
Thailand	522	495	England	496	New Zealand	494
Israel	522	---	New Zealand	491	Slovenia	493
Sweden	519	477	Lithuania	482	Italy	484
Germany	509	484	Italy	479	Armenia	478
New Zealand	508	472	Cyprus	476	Serbia	477
England	506	476	Romania	472	Bulgaria	476
Norway	503	461	Moldova	469	Romania	475
Denmark	502	465	Thailand	467	Norway	461
United States	500	476	Israel	466	Moldova, Republic of	460
Scotland	498	463	Tunisia	448	Cyprus	459
Latvia (LSS)	493	462	Macedonia, Republic of	447	Macedonia, Republic of	435
Spain	487	448	Turkey	429	Lebanon	433
Iceland	487	459	Jordan	428	Jordan	424
Greece	484	440	Iran, Islamic Rep.	422	Iran, Islamic Republic	411
Romania	482	454	Indonesia	403	Indonesia	411
Lithuania	477	428	Chile	392	Tunisia	410
Cyprus	474	446	Philippines	345	Egypt	406
Portugal	454	423	Morocco	337	Bahrain	401
Iran, Islamic Rep.	428	401	South Africa	275	Palestinian International Auth	390
Kuwait	392	---			Chile	387
Colombia	385	369			Morocco	387
South Africa	354	348			Philippines	378
					Botswana	366
					Saudi Arabia	332
					Ghana	276
					South Africa	264
International Average	513	484		487		467

The performance in TIMMS 99 was generally lower as showed by the decline in the international average of the upper grade from 513 to 487 and this decline continued in TIMSS 2003. TIMSS also looked into factors that affect achievement such available resources, attitudes and teachers' qualifications. In TIMSS 99 the participants were grouped under the levels of low, medium and high in home educational resources, peer pressure to do well in school, out-of-school study time, self-concepts in mathematics and positive attitude towards mathematics (Brawner, Golla, Ibe, de Guzman, Ogena, Talisayon and Vistro-Yu, 2000 pp. 73-101) Within each level the average was taken and relationships were deduced. The Philippines had 6601 participants from 150 schools.

Table 10. Results for 9-year-olds

TIMSS 95			TIMSS 2003	
	Upper Grade	Lower Grade		
Singapore	625	552	Singapore	594
Korea	611	561	Hong Kong, SAR	575
Japan	597	538	Japan	565
Hong Kong	587	524	Chinese Taipei	564
Czech Republic	567	497	Belgium (Flemish)	551
Ireland	550	476	Netherlands	540
United States	545	480	Latvia	536
Canada	532	469	Lithuania	534
Scotland	520	458	Russian Federation	532
England	513	456	England	531
Cyprus	502	430	Hungary	529
Norway	502	421	United States	518
New Zealand	499	440	Cyprus	510
Greece	492	428	Moldova, Republic of	504
Portugal	475	425	Italy	503
Iceland	474	410	Australia	499
Iran, Islamic Rep	429	378	New Zealand	493
Australia	546	483	Scotland	490
Austria	559	487	Slovenia	479
Latvia	525	463	Armenia	456
Netherlands	577	493	Norway	451
Slovenia	552	488	Iran, Republic of	389
Hungary	548	476	Philippines	358
Israel	531	---	Morocco	347
Kuwait	400	---	Tunisia	339
Thailand	490	444		
International Average	529	470		495

Similar to the year 8 students the year 4 students are cellar-dwellers and their average achievement is 358 which is worse than the average achievement of those in year 8 (Mullis *et al*, 2000 pp. 24 and 28; Mullis *et al*, 2004 p. 35). The higher Year 8 average achievement was explained by the presence of participants from science high schools. Most science high schools students undergo rigid training in mathematics and science. The fruit of this training can be verified by the fact that the average achievement of the participants from science high schools is significantly higher than the average achievement of students from Australia, England, USA, India, Malaysia, and Russia (Cristobal, 2004).

CONCLUSION AND RECOMMENDATION

DepEd claimed that the 2002 BEC was 16 years in the making and then Secretary Raul Roco insists it went through 7 years of intensive consultation (Vargas, 2002). Interactions with cabinet officials, education planners and business leaders started as early as 1995 but the teachers were only given three to five day seminars on the new curriculum; the possible changes in the subject matter and teaching style was believed to remedied through school-based training during the school year (Vargas, 2002). This lack of consultation with the teachers translates to lack of grassroots training which is crucial in handling the curriculum changes.

The new curricula was criticized for the disappearance of Science in years 1 and 2 and the inclusion of Makabayan. The latter was one of the reasons pointed out for the loss of contact time for Science. One could not blame DepEd for having this learning area since taking away learning areas

means unemployment for a number of teachers. For subjects with increase contact time like mathematics jumping from the old curriculum to the new one guarantees continuity or even a slight overlap in the topics and the slower pace could be beneficial.

A solution to address the learning gaps were the HSRT and the Bridge Program. The program could work provided these students are at the boundary of passing and failing but if the problem is with failing to learn the fundamentals that are taught in six years of elementary education then it cannot be covered by a year of remedial classes (Arao, 2004). This could be a wrong solution to the problem that could possibly be the result of a flawed elementary education curriculum and teaching approaches (Calipayon and Largo, 2004). The so-called learning gap is not merely a product of an ambitious and difficult curriculum. This is also because of a conveyor-belt education which means automatic promotion in the sense that once children enter public education they get carried from year to year for 10 years with nobody caring if they learned anything or not (*Conveyor-belt Education*, 2004). Similar to the new curriculum DepEd claimed that the Bridge Program went through a lot of planning. This claim is again opposite the fact that the memorandum (DepEd Memorandum No. 147) pertaining to its implementation came out on March 18, 2004 while the memorandum (DepEd Memorandum No. 165) for the training of teachers and facilitators came out on April 2, 2004 while the first HRST was on May 24, 2004 (Arao, 2004).

This program was actually two years in the making. If that is the case then the discussion for this program started when they pilot-tested the new curriculum. Those who took the HSRT had their first 4 years courtesy of the old curriculum and their last two years courtesy of the 2002 BEC and 2003 RBEC respectively. It seems like the learning gap DepEd tried to address was not only because of the old curriculum but by the sudden changes in the curricula as well.

The HSRT seems a late reply to the decline in Mathematics, Science and English proficiency that have been shown by the result of the NEAT and NSAT By the time the HSRT was given the damage has been too big and nobody took responsibility anymore. Even the result of TIMSS 95 was not enough to convince whoever was at DepEd then to make an assessment into Mathematics and Science proficiency.

On top of an embarrassing TIMSS 95 outcome was the revelation that a significant number of our participants were overage which led to disqualification (Lee-Chua, 2002). The average of the participants in the upper grade was 14.0 while among the countries who have met every procedure the average was as high as 14.6 courtesy of the Iran. In the lower grade the average was 12.9 while Iran again gave the maximum age average of 13.6. The average age of the participants in TIMSS 99 from our country was 14.1 while in TIMSS 2003 the average was 14.8. Although these facts seem to contradict that revelation it still does not help our languishing reputation.

Although other countries had problems with not satisfying the guidelines for sample participation such as not meeting age/grade specification and unapproved sampling procedures at the classroom level these countries still had their results included in the main body although it was indicated that these countries violated some procedures.

Other countries like Colombia, Germany, Romania and Slovania have most 13-year-olds with

less than 7 or 8 years of formal education but still chose in year 7 and 8 as participants even though this led to their participants being older than those from other countries. We should have done the same since the number of years spent in school is a better indicator of the knowledge acquired than the age of the student.

As much as the desire to do well in these assessments is wanted this should not be our barometer for an educational system that works. Let these assessments be a guide as what and where we should be going in producing functionally literate individuals. Let us look deeper into the results; the organizers can definitely help shed light regarding the details of our performance. Surely a measure of our achievement does depend on one number alone.

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