Chapter 6
Achievement Gap in Mexico: Present and Outlook

Armando Sanchez-Martinez

It is better to light one candle than to curse the Darkness.
Adage (cited by Carl Sagan in *The Demon-Haunted World).*

Mexico is an expansive country with enormous inequality and this is reflected in education no matter the government efforts, which are summarized in a former section. At the end of the chapter, two successful experiences at schools in poor communities, constructed from the bottom, are discussed and two more, the first one of the Mexican Academy of Science and the other an innovative proposal of technology in the classroom, are presented. All of them point out what else there is to do. The conclusions are a series of reflections to foster the discussion, mainly about the need to innovate and promote the autonomous curricular development, considering learning achievements as the fundamental educative purpose and viewing the school as a learning community in interaction with the neighborhood.

Mexican Education Consultant, with teaching experience in the superior level and Master's degrees on education, and on teachers' training for all education levels. He worked in the Federal Public Education Ministry (SEP) in curriculum design, held training programs, coordinated national textbooks and educative materials of Science for Basic Education from 1993 to 2004, and participated in international meetings. Since 2005, he has been working in Editorial Santillana where he is the textbook High School Manager since 2008.

A. Sanchez-Martinez (✉)
Mexican Education Consultant, Editorial Manager, Santillana, Mexico, North America
e-mail: amartinezs@santillana.com.mx

J. V. Clark (ed.), *Closing the Achievement Gap from an International Perspective,*
DOI 10.1007/978-94-007-4357-1_6,

What Kind of Country is Mexico?[1]

Mexico is a country situated in North America, just south of the USA, and it is organized into 32 federative states.

According to the 2010 Population Census (INEGI 2011), Mexico is the 11th most populated country, with 112,336,538 inhabitants[2], 51.22 % women, 76.9 % in urban and 23.1 % in rural population, 38.8 % (43,541,908) aged 0–15 years, and 6.2 % over the age of 65 (6,938,913).

Approximately 20.1 million people live in the metropolitan zone of Mexico Valley (16 districts in Mexico City—called Federal District—, 59 municipalities in Mexico State, and one in the state of Hidalgo), whereas 10.5 million live in localities of less than 500 inhabitants. As much as 13.8 % of the total population is concentrated in 11 of the 2,456 municipalities and districts. In 1930, Mexico's population was about 16,552,722; some 80 years later, it has increased sevenfold. Approximately, 52 million people or 46.2 % of the total population live in poverty; of these, 11.7 million or 10.4 % live in extreme poverty (Coneval 2010).

In the global context, Mexico has the 14th largest GDP (FMI 2010), and ranks 57th on the world human development index (HDI), with a value of 0.77 (UNDP 2011) and a life expectancy of 77 years. In conclusion, Mexico is an expansive country with enormous inequality.

Education in Mexico

Approximately, 4.8 % of the GDP is allocated to educational expenditures. Mexico's education system is organized into: *basic education* [preschool or kindergarten (1, 2, and 3), primary (1–6), and secondary (7–9)], *middle education* (10–12), *superior or tertiary education*, and *training for the workforce*.

From 1990 to 2010, the population grew from 25,091,966 students to 34,384,971—an annual growth rate of 1.6 %. The percentages of growth in decreasing order per level were as follows: middle 99.3 %, training for work 74.7 %, preschool 69.7 %, secondary 46.5 %, superior 38.1 %, and primary 3.4 % (SEP 2011a). Information about the Mexican education system by level is shown in Table 6.1.

Of the country's 32 federative states, 12 enroll more than a million students or 66.4 % of the total. Of these 12, only 4 have more than 2 million students (see Table 6.2).

[1] For a wider, more critical and propositional vision of Mexico, I recommend "Mexico frente a la crisis: hacia un nuevo curso de desarrollo" (Cordera et al. 2009), a document written by 16 academics, investigators, intellectuals, and first-level politicians with the participation of ten guest expositors, with the same profile as the former.

[2] *International Human Development Indicators* (UNDP 2011) reports for Mexico 114,793 thousand inhabitants in 2011, with 78.1 % in urban towns or cities.

Table 6.1 Students, teachers, and schools of the Mexican education system, school year 2010–2011. Source: SEP (2011). Mexican United States Education System, main numbers, school year 2010–2011. Mexico: Planning and Programming General Direction, Public Education Ministry (Dirección General de Planeación y Programación, Secretaría de Educación Pública)

Education level	Roll	% per level	Teachers	Schools
Total education system	34,384,971	100	1,801,793	252,061
Basic education	25,666,451	74.6	1,175,535	226,374
Preschool	4,641,060	13.5	222,422	91,134
Primary	14,887,845	43.3	571,389	99,319
Secondary	6,137,546	17.8	381,724	35,921
Middle education	4,187,528	12.2	278,269	15,110
Technical professional	376,055	1.1	27,557	1,399
High school	3,811,473	11.1	250,712	13,711
Superior education	2,981,313	8.7	308,061	4,689
Technical superior	113,272	0.3	11,121	256
Degree	2,659,816	7.8	366,032	4,127
Postgraduate course	208,225	0.6	38,026	1,906
Training for the workforce	1,549,679	4.5	39,928	5,888

Table 6.2 Students of federative states with more than two million enrollments School year 2010–2011. Source: SEP (2011). Mexican United States Education System, main numbers, school year 2010–2011. Mexico: Planning and Programming General Direction, Public Education Ministry (Dirección General de Planeación y Programación, Secretaría de Educación Pública)

State	Students	% of the total
Mexico state	4,284,974	12.5
Mexico city–D.F.	2,798,110	8.1
Veracruz	2,220,728	6.5
Jalisco	2,196,662	6.4

In contrast, two states have less than 200,000 students: Colima (186,276) and South Baja California (187,640). These data point to the complexity of the Mexican education system because there are striking variations at the federation level (SEP 2011a).

Information on the coverage and terminal efficiency of students is presented in Table 6.3 for preschool, primary, secondary, and middle high education levels.

As shown in Table 6.3, in 15 years, there has been a substantial increase in both the coverage and the terminal efficiency at all education levels, except primary, which was close to 100% in coverage in 1995–1996. Nevertheless, the challenge to widen the coverage in preschool and middle education is more daunting. So, too, is the case of increasing secondary and middle superior terminal efficiency. The national average school grade is 8.7, with differences between Mexico City (D.F.) and Chiapas of 10.6 and 6.3, respectively.

The main modality in preschool and primary is called general, but some schools are indigenous and others communitarian, so they have in general three modalities. Indigenous is for localities with a majority population of native indigenous language speakers, and communitarian is for localities with the smallest populations, so a middle education student is training as a "communitarian teacher" for teaching all

Table 6.3 Coverage and terminal efficiency of students of different education levels School years 1995–1996 and 2010–2011. Source: SEP (2011). Mexican United States Education System, main numbers, school year 2010–2011. Mexico: Planning and Programming General Direction, Public Education Ministry (Dirección General de Planeación y Programación, Secretaría de Educación Pública)

Level	Coverage		Terminal efficiency	
	1995–1996	2010–2011	1995–1996	2010–2011
Preschool[a]	45.6	80.9	n.a.	n.a.
Primary[b]	95.2	100.6	80.0	95.0
Secondary[c]	74.9	95.9	75.8	86.5
Middle education[d]	40.5	66.7	55.5	63.3

[a] Range of 3–5 years
[b] Range of 6–12 years
[c] Range of 13–15 years
[d] Range of 16–18 years. n.a. Information not available

students of the level. In preschool, the general modality takes care of the 86.8% of the roll, indigenous 8.4%, and communitarian 1.4%; the rest 3.4% attend the children development centers (Centros de Desarrollo Infantil – Cendi). In primary, the percentages of the three modalities are 93.6%, 5.7%, and 0.7% (SEP 2011a), and the marginalization conditions increase from the first to the last. If the general regular primary schools were differentiated (with at least a teacher per group and per grade) from those called "multi-grade" (from one to five teachers for the six grades), we would find differences of marginalization.

In secondary, the main modalities are general (51.2%), technical (28.2%), and telesecondary[3] (20.6%) (SEP 2011a). Except for the last one, all groups are taken care of by different teachers, one for each subject. The difference between general and technical is that the latter prepares the students in some technical activity. Although there are communitarian secondary schools and others for workers, its participation is minimal because they respectively take care of just the 0.2% and 0.5% of the total enrollment (INEE 2009, p. 34). However, there are states where the percentage of communitarian schools is larger, such as Guerrero with 10.5% and Campeche with 9.8% of its public schools. These states and those where the percentage of telesecondary schools is larger than the national average provide insight into the educational achievements of the states. Zacatecas, San Luis Potosí, Guanajuato, Veracruz, Puebla, Chiapas, Hidalgo, and Oaxaca stand out as states in which at least seven of each ten public secondary schools are telesecondary, whereas that for Mexico City (D.F.) is only 5% (INEE 2009, p. 35). To further understand the context of telesecondary schools, it is important to know that 64% of its population is

[3] Modality designed to give service to a small rural town; it has operated since 1968 with a printed guide for the student, TV programs via satellite, and teacher's books. In general, they operate with one teacher per group and a monitor, although, in some very small schools, there is only one teacher for the three grades.

Table 6.4 Percentage distribution of secondary schools according to the marginalization level of the locality where they are situated, school year 2007/2008. Source: INEE (2009). Learning in Mexico in the third year of secondary. *Report about the results of Excale 09, 2008 application. Spanish, Mathematics, Biology, and Civical and Ethical Training*

Degree of marginalization	Public secondary				
	General[a]	Technical	Telesecondary	Communitarian	Private secondary
Very high	0.4	2.1	8.5	38	0.1
High	8.3	14.5	52.3	45	0.9
Medium	8.7	11.2	18.1	5.7	2.6
Low	19.9	21	14.2	3.2	10.2
Very low	62.1	50.7	5.8	0.9	85.1
Lost[b]	0.6	0.5	1.1	7.2	1.2

[a] Includes the secondary schools for workers

[b] Corresponds to the schools where it was not possible to identify the marginalization level of the locality in which they are located

registered in the Popular Insurance System[4] and goes to the health-care center, drug store, or clinics[5]; and 7% has no medical care. For the general secondary schools, the percentages are 32 and 10 (INEE 2009, p. 40).

Information related to marginalization, with indicators such as potable water, electricity, telephones, and other kind of services, is generalized in Table 6.4, which presents the percentage distribution of secondary schools according to the marginalization degree of the locality. Such is a reference to understand the later data analysis related to the gap in educational achievement for this level.

The Ministry of Education (Secretaría de Educación Pública in Spanish [SEP]) defines plans and study programs for basic education; therefore, all the students who attend preschool, primary school, and secondary school have the same plan and study programs (SEP 2011b).

Since 1993, secondary education has been obligatory. Nevertheless, universal coverage has yet to be reached. In primary education, however, it was reached at the beginning of this century (SITEAL 2011). In 2010, the National Institute for the Education Evaluation (INEE)[6] estimated that 5% of the primary graduates failed to continue their studies and that approximately 80% of those who do continue their studies finish it in 3 years (INEE 2010a).

Middle education is divided into technical professional and high school; the first one is a medium terminal option, with the possibility of continuing the degree studies, and the second one is basically preparatory. The middle education is complex; it is estimated that there are more than 300 study plans divided in several systems

[4] Program created by the federal government this century for citizens who are not registered in the health government institutions, so they can have the basic services going to the health centers and clinics.

[5] These options are the only possible ones for the most marginalized sectors of society.

[6] All the INEE publications can be consulted in its page http://www.inee.edu.mx/index.php/english-version

Table 6.5 Roll, schools, and study plans for middle education, school year 2010–2011

Roll 4,187,528 & 15,110 schools (More than 300 study plans).	Technical professional: roll 376,055 & 1,399 schools	*National School of Professional Education* [Conalep[a]]: roll 287,927 & 501 schools (42 technical degrees)
		Others: roll 88,128 & 898 schools
	High school (HS): roll 3,811,473 & 13,711 schools	*General*: roll 1,631,003 & 7,390 schools (24 HS public universities & incorporated ones, HS autonomous private universities, private HS DGB-SEP, federative systems & art schools)
		Technological: roll 1,288,749 & 2,798 schools (191 technical degrees)
		High school DGB-SEP [Colegio de bachilleres[b]]: roll 717,733 & 1,463 schools
		TV–high school: roll 173,988 & 2,060 schools

[a] Colegio Nacional de Educación Profesional Técnica

[b] There is one of these high schools in each federative state and they have a lot of schools

and subsystems. Table 6.5 summarizes the composition of the middle education systems as is works up to date as a personal interpretation, in special HS DGB-SEP.

Nevertheless, the Middle Education Integral Reform (RIEMS) has tried to homogenize the study plans of the basic subjects of the most important subsystems such as the National School of Professional Education (Colegio Nacional de Educación Profesional [Conalep]), DGB-SEP (state high schools, and cooperative and private schools incorporated to SEP), and for all the technological high schools.

In 2010, 3.65 million or 53% young people studied the middle education while 3.23 million or 47% did not. This pattern was even more accentuated in rural towns (36.4%) than in urban towns and cities (60.3%). In the extreme, there are the young speakers of indigenous languages, for whom the percentage is only 29.4% (INEE 2011a)[7]. As a matter of fact, in the homes where an indigenous language is spoken, 52% of young people between the ages of 15 and 29 have not finished basic education compared with 27.6% for other homes (INEE 2011b). On February 9, 2012, the Mexican Constitution reaffirmed that middle education is obligatory (DOF 2012). In short, making clear that the State obligation is that of guaranteeing "a place to study it for those who having the typical age[8], would have concluded the basic education and it will be realized in a gradual and growing way starting from the school year 2012–2013, until achieving the total coverage in the country in its different modalities at the latest in the school year 2021–2022" (DOF 2012, second transitory article).

[7] Information taken by INEE (2009) of INEGI (2009).

[8] In Mexico, 80% of EMS students are between the ages of 15 and 17.

The Education Evaluation and the Achievement Gap in Mexico

In Mexico, the issue of institutional evaluation on the education achievement applied to students is recent. Since the end of the twentieth century, Mexico has participated in the Trends in International Mathematics and Science Study (TIMSS) and the Program of National Standards of SEP.

There are three kinds of evaluations applied to students, two national and one international:

- ***Exams of Quality and Education Achievement (Exámenes de la Calidad y el Logro Educativos* [Excale])**: These are administered by the National Institute for the Education Evaluation (Instituto Nacional para la Evaluación de la Educación [INEE]) since 2005, to key school years of the basic education (BE): 3rd year of preschool, 3rd and 6th years of primary, and 3rd year of secondary (INEE 2011c). The periodicity of application for each grade is every 4 years. In preschool, the test evaluates the formative fields of language and communication and mathematical thought, whereas that in primary and secondary evaluates Spanish, mathematics, natural sciences, and social sciences. The tests are based on the curriculum. However, they are administered only to a representative sample of students from each federative stage based on matrices similar to those of the *Programme for International Student Assessment* (PISA). In order to evaluate the most important curricular content, the exams are divided into units.
- ***National Evaluation of Academic Achievement (Evaluación nacional del logro académico* [Enlace]):** This is a standardized test based on the curriculum and with multiple-option questions, administered by the General Direction of Evaluation of SEP's Policies (Dirección General de Evaluación de Políticas de la SEP). Since 2006, this test has been applied to all students from third to sixth grades of primary education and to the students of the third grade of secondary. Beginning in 2008, it will also be applied in the 1st and 2nd years of secondary and in the last year of middle education. In the first three applications, reading comprehension and mathematics were evaluated, but, since 2008, a third subject for basic education was introduced, which is repeated every 5 years (natural sciences in 2008, civical and ethical training in 2009, history in 2010, and geography in 2011, for which sciences have been repeated in 2012).
- ***Programme for International Student Assessment (PISA)*** is an international evaluation based on the concept of literacy, which evaluates reading, mathematical, and scientific skills. It was first applied in 2000, and it is repeated every 3 years. At the beginning, 43 countries participated, with 68 participating in 2012, including OECD members and partner countries/economies[9].

[9] Because this test is internationally known, for bigger affairs related to it, please consult: http://www.pisa.oecd.org/pages/0,2987,en_32252351_32235731_1_1_1_1_1,00.html

In the following, some of the results of the three evaluations concerning Excale will be analyzed with added information published by INEE regarding the sixth grade of primary and third grade of secondary, to compare the information related to the education gap in places with certain marginalization[10]. From Enlace, more information will be presented because it is for everybody and annual, so there are indicators of education achievement since 2006 for basic education and since 2008 for middle education, but with different marginalization indicators regarding Excale. In particular, there is information about middle education presented so that it can be related to PISA results besides those of the 3rd year of secondary of Enlace and Excale. Because PISA has become the international reference of the evaluation of education achievements, we will analyze more information on students of the middle education provided that 72.6% of the students who present the test are in that education level, most of them (71.9%) in the 1st year.

Case-study information about Chiapas and Mexico City (D.F.) are highlighted because the former has the lowest HDI (0.7395)[11] (PNUD 2011), especially with a higher percentage of the young population out of the standard educational level (50.3% in 2008), with minor results of educational achievement and associated with the poorest states in Mexico; however, the latter has the biggest HDI of the country (0.9176; UNDP 2011), the lowest percentage out of the standard educational level (14.8%), the best achievement level, and better opportunities for its inhabitants.

According to the World Economic Forum (WEF 2011, p. 259), Mexico ranks 121th among 142 countries in primary education, 107th in superior education, and 126th in mathematics and sciences. Overall, Mexico ranked 58th in this report (pp. 11 and 15).

Excale

These exams have four levels of achievement: under the basic, basic, medium, and advanced. To illustrate the gap of educational achievement in these exams, only the first level of achievement is used because it measures the students who do not reach the basic level. In Table 6.6, the results of Excale 2007 in mathematics and Spanish for sixth grade of primary are presented.

These data are revealing. For example, in the indigenous stratum, of the biggest marginalization, 42% and 37% of the students do not reach the basic level in Spanish and mathematics, respectively. This is in sharp contrast with the private stratum, where the corresponding percentages are 2% for each.

[10] It is important to clarify that the INEE exams have a higher coverage regarding the main contents of the national curriculum of sciences, Spanish, and mathematics, the reason why there are many elements to analyze. The previous data are the result of its matrix design that has sense because it is applied to student samples. For those who are interested, we recommend consulting http://www.inee.edu.mx/explorator (English) or http://www.inee.edu.mx/explorador (Spanish).

[11] This information is from 2008, although the report from Mexico is from 2011.

Table 6.6 Achievement level percentage for students of sixth grade of primary, according to the school stratum. Spanish and Mathematics Excale 2007. Source: INEE (2008). Comparative study of the learning in sixth grade of primary in Mexico 2005–2007

School stratum	Underneath the basic		Basic		Medium		Advanced	
	Spanish	Mathematics	Spanish	Mathematics	Spanish	Mathematics	Spanish	Mathematics
Indigenous education	42	37	50	53	7	9	1	1
Rural public	21	20	56	56	20	20	3	4
Urban public	11	12	50	51	31	28	8	9
Private	2	2	23	31	45	43	30	23

In Table 6.7, data are presented for Excale 2008 secondary mathematics (INEE 2009) for rural populations, urban of big marginalization, and urban of low marginalization in the general and technical modalities, and for students in private schools.

As shown, there are differences between rural schools and urban schools of high marginalization but they are considerable between the former and urban schools of low marginalization. However, the differences that stand out even more are between the technical ones of the first stratum (rural) and the last one (ULM; 20 points) and more of the technical rural with the privates (42 points). The results for the UHM technical and general are similar to that among ULM schools of both modalities. Nevertheless, the differences between the UHM and the ULM of both modalities are 10 and 11 points, respectively.

On the other side, the percentage of telesecondary students under the basic level for mathematics in Excale 2008 was 62 %. Data were unavailable to differentiate the achievement of students in rural, urban of high marginalization, and urban of low marginalization telesecondary schools, but, according to Table 6.4, 52.3 % of its schools are in towns of high marginalization, and 8.5 % in very high ones; therefore, that 62 % is also an indicator of how the gap in the education achievement is larger regarding the less-favored students.

In Table 6.8, the information focuses on Chiapas and Mexico City (D.F.)

As mentioned earlier, the differences are significant and will be confirmed in subsequent discussions of the Enlace and PISA results.

Enlace Test[12]

The Ministry of Public Education (SEP) warns that the results among the different years of application are not comparable because of technical reasons. Consequently, only the information of the 2011 application will be used, with the clarification that there are four grades of academic achievement defined as unsatisfactory,

[12] The Enlace information comes from www.enlace.sep.gob.mx/ms/estadisticas_de_resultados/

Table 6.7 Percentage of students of the third year of secondary below the basic level for mathematics in Excale 2008, of the stratums in rural populations, urban of high marginalization (UHM), and urban of low marginalization (ULM), for general schools, technical, and private. Source: INEE (2009). Learning in Mexico in the third year of Secondary. *Report about the results of Excale 09, 2008 application. Spanish, Mathematics, Biology, and Civical and Ethical Training*

Education modality	Mathematics		
	Rural	UHM	ULM
Technical	67	57	47
General	57	56	45
Private	–	–	25

Table 6.8 Percentage of students from the third year of secondary below the basic level for Chiapas and Mexico City (D.F.) Spanish, Mathematics, and Biology, Excale 2008. Source: INEE (2009). Learning in Mexico in the third year of Secondary. *Report about the results of Excale 09, 2008 application. Spanish, Mathematics, Biology, and Civical and Ethical Training*

State	Spanish	Mathematics	Biology
Chiapas	48	64[a]	40
Mexico City (D.F)	26	39	16

[a] In this case, Guerrero (68 %), Tabasco (67 %), and Michoacan (65 %) are over that

elementary, good, and excellent, provided the second one represents the basic level established in the curriculum.

Enlace in the Basic Education

Data in Table 6.9 present the percentage of students for basic education in the national level with unsatisfactory results in Spanish and mathematics in 2011.

The high percentages of students with unsatisfactory results in both subjects stand out, but especially in secondary mathematics. The fact that a student has an unsatisfactory result means that the expected achievements established in the curriculum have not been achieved. These data are consistent with the low levels of performance on PISA.

As shown in Table 6.10, the percentages of students with the unsatisfactory level in primary in the state of Chiapas exceed that of Mexico City (D.F.). In secondary, mathematics is in the reversed pattern. This information is inconsistent with the results obtained by both states in Excale.

Some education experts have been critical of the Enlace test (Ramírez 2010). Now that the test is the standardized measure of the curriculum, education authorities and schools direct their actions toward student enhancement tests. Mexico's results in the PISA test suggest that the schools are not achieving the best education results and performance of competencies that are defined in all curriculums. The data regarding primary education in both states in the last three of them public and using the government budget are summarized in Table 6.11.

Table 6.9 Percentages of students with unsatisfactory results at national level in Enlace 2011. Source: http://www.enlace.sep.gob.mx/ba/

Level	Mathematics	Spanish[a]
Primary (3–6)	43	42
Secondary (7–9)	57	42

[a] In specific, reading comprehension is evaluated

Table 6.10 Percentages of students with unsatisfactory and elementary results for Chiapas and Mexico City (D.F.) Enlace 2011. Source: http://www.enlace.sep.gob.mx/ba

Level	Mathematics		Spanish[a]	
	Unsatisfactory	Elementary	Unsatisfactory	Elementary
Chiapas				
Primary (3–6)	23	36	24	40
Secondary (7–9)	48	24	44	36
Mexico City (D.F.)				
Primary (3–6)	14	48	11	40
Secondary (7–9)	52	32	39	40

[a] Reading comprehension is specifically evaluated

Table 6.11 Percentages of primary students with unsatisfactory results for Chiapas and Mexico City (D.F.) Enlace 2011. Source: http://www.enlace.sep.gob.mx/ms/ba

	Private	General	Indigenous	Communitarian
Chiapas				
Mathematics	12	13	41	54
Spanish*	9	13	44	55
(Mexico City) D.F.				
Mathematics	5	16	-	-
Spanish[a]	3	13	-	-

[a] Reading comprehension is specifically evaluated

The results are a finer sample of the education gap because the towns, cities, or villages or each one of these modalities go from a smaller to a larger degree of marginalization. In the case of Chiapas, the results are more striking because it is a state with many indigenous and communitarian schools. The difference in the mathematics grading between the private schools and the indigenous ones is 29 points, whereas, with the communitarian ones, it is 46. For Mexico City (D.F.) the favorable results are evident, and they show a great gap in the education achievements between a state with more opportunities for its inhabitants and a less-favored one.

The information about secondary education is summarized in Table 6.12. These results also show what was stated previously for both federative states. Nevertheless, the information about students with an unsatisfactory performance at telesecondary schools in Chiapas of 36% for mathematics and 35% for Spanish is surprising compared with the high percentages of the other modalities. In general, the performance of these students goes from less to more going from left to right in the modalities, that is, less in private schools, then general and technical ones,

Table 6.12 Percentages of secondary students with unsatisfactory results for Chiapas and Mexico City (D.F.) Enlace 2011. Source: http://www.enlace.sep.gob.mx/ba

	Private	General	Technical	Telesecondary
Chiapas				
Mathematics	46	56	62	36
Spanish	34	49	56	35
Mexico City (D.F.)				
Mathematics	29	59	53	64
Spanish	18	44	41	56

and at the end, with a bigger number of students, the telesecondary schools. This seems like an error if compared with the results of 2007 and 2008: 67% and 59% for mathematics and 70% and 62% for Spanish.

Enlace in the Middle Education

The unsatisfactory results for the middle education students in 2011 are presented in Table 6.13. It is clear that a larger degree of marginalization lowers performance. These are differences between the very high and the very low degrees. The differences are 25 for reading comprehension and 28 for mathematics.

Pisa

The PISA scores for Mexico are presented in Table 6.14. Based on the way in which PISA establishes the score ranks for each level, Mexico has always been in level 2. Nevertheless, when the students' percentages are differentiated according to the performance levels, it is found that, for reading in 2000, 44% of the students were under this level, with 6% of them in level 0; and in 2009 39% of students were also under the level, with a 14% in or under level 1b, the percentage equivalent to the previous level 0 (INEE 2010b; OECD 2010)[13]. If the results for Mexico City (D.F.) in 2009 are analyzed, the previous percentages are 20% and 1%, whereas that for Chiapas is 67% and 36%, respectively (INEE 2010b). It goes without saying that the students of level 0 are not capable of locating a fragment of concrete information in the text, recognizing the main topic, or recognizing simple relationships among close fragments.

For reading in 2000, 49% of the students were in levels 2 and 3, and 7% above level 4, whereas in 2009 the first percentage was 54% and the second 6%. If the re-

[13] Since 2009, the reading performance levels are 8 (0, 1b, 1a, and from 2 to 6), 6 being the highest grade whereas 2 is defined as "the minimum to perform in the nowadays society" (INEE 2010b, p. 37). From 2000 to 2006, the previous levels were from 0 to 5. In mathematics and sciences, they have always ranged from 0 to 6, without differentiating level 1 yet.

Table 6.13 Percentage of middle education with unsatisfactory performance Enlace 2011. Source: http://www.enlace.sep.gob.mx/ms/estadisticas_de_resultados/

Year	Degree of marginalization				
	Very high	High	Medium	Low	Very low
Reading comprehension					
2011	38	24	18	16	13
Mathematics					
2011	59	49	42	37	31

Table 6.14 Mexico in PISA. Source: OECD (2010). *Pisa 2009 Results: What Students Know and Can Do. Students Performance in Reading, Mathematics and Science* (Volume I). Paris: Organization for Economic Co-operation and Development

	2000	2003	2006	2009
Reading	422	400	410	425
Mathematics	387	385	406	419
Sciences	422	405	410	416

sults among the students who present PISA studying secondary or middle education are compared, important differences can be noticed. For the first ones, the percentages in levels above 3 in reading in 2000 and 2009 were 8 % and 13 %, respectively, whereas those of middle education were 41 % and 37 %. The results among public and private schools reflect the education gap because for the first ones; the same data are 19 % and 25 %, whereas that for the second ones were 58 % and 44 %. A possible cause of the decrease in some of the previous results in 2009 (37 and 44 %) could be due to the reading competence having been evaluated more deeply because the integration of what is read was included (INEE 2010b).

Table 6.15 presents the percentages by levels of performance of PISA 2009 in Mexico, Mexico City (D.F.), and Chiapas for sciences and mathematics, compared with the averages of OECD and from Latin America (LA).

The previous data, along with what was revised by Enlace and Excale, are a sample of the low results of the three tests. These results get even lower when the marginalization conditions increase. For instance, in 2009, the percentage of middle education students of a high marginalization with unsatisfactory results in Enlace was 43 % in reading comprehension and 72 % in mathematics, whereas, for those of low marginalization, it was 14 and 42 %, with national averages for this level of 17 and 46 %, respectively.

What Has Been Done in Mexico?

In the first decade of this century, the demographic pressure that kept Mexico in a complicated race during almost all the past century to achieve the universal coverage of the primary education started to decrease. After the education reform in

Table 6.15 Percentages of Mexico for sciences and mathematics in PISA 2009 by levels of performance. Source: INEE (2010). *Mexico in PISA 2009*. Mexico: National Institute for the Education Evaluation (Instituto Nacional para la Evaluación de la Educación)

	Levels ≤ 1		2 ≤ levels ≤ 3		Levels ≤ 4	
	Sciences	Mathematics	Sciences	Mathematics	Sciences	Mathematics
Average OECD	18	22	53	46	29	32
Mexico City (D.F.)	27	32	64	57	8	11
Mexico	47	51	49	44	3	5
Average LA	52	63	43	32	5	5
Chiapas	71	72	28	26	0.4	1

1972, it was not until 1993 that a series of changes in the primary and secondary plans and programs began (e.g., the free text books are updated, secondary is declared obligatory, the education services in the federative states are decentralized, and a teaching degree is created as an incentive program based on evaluations to teachers). Additionally, the normal education was reformed with infrastructure supports for schools, and an aggressive updating program for teachers was encouraged with the creation of more than 600 teaching centers distributed along the country at the end of the last century. These various reforms were introduced in all the curricula based on competencies, and they started in 2004 for preschool, 2006 for secondary, and 2008 for middle school and primary, and they finished up in 2011 with the articulation of the basic education where PISA is explicitly considered as a referent (SEP 2011b).

There are many variables that intervene in the results of the academic achievement with a wide inequality gap:

- The great cultural and socioeconomic diversity of the Mexican population, characterized by the large differences between those more and less marginalized, combined with a very high percentage of population in poverty and a high percentage in extreme poverty, is the reason why the education efforts are not enough and are least with an education system completely centralized in the twelve grades of basic education and with bureaucratic practices of excessive control.
- Since the creation of the Sindicato Nacional de Trabajadores de la Educación (SNTE; National Union of Workers of the Education) in 1943, the government made a pact ceding the control of the teaching positions and those of all the directives (sector chiefs, supervisors, school principals, and teaching chiefs) to the union (Arnaut 1998; Barba and Arnaut 2010). As a result, reaching those positions is part of the political union race of many teachers, based on scales and on looking good with the leaders; therefore, this is not an academic degree. Besides, this situation can favor the climb to other political positions like member of parliament (state or national), senator, political party leader, and, in some cases, even governor. In this sense, for many teachers, the union race is more attractive than the academic one. The union force is such that the key positions in many education secretariats of the federative states are even negotiated with the local

governments. Although there is a democratic movement inside the SNTE with a long tradition of fight (Street 2010), it has also evolved into a political movement, in spite of efforts to encourage a real pedagogical movement (Street 2001).

- The national education system is prescriptive, with detailed study programs, unique and national textbooks in primary and subject of government authorization in secondary. There has not been enough space for the education innovation and for the curricular development to be in the teachers' hands, because of the fact that the bureaucratic and administrative controls and the union politicians have limited the initiative of teachers and schools as a whole.
- Except for the teachers registered in a teaching degree, most of them and most of the directives are not subject to periodic strict evaluations. Besides, when the SEP has had hard information about deficiencies in the basic contents from the teachers, nothing has been done to improve the updating programs. The present pressure to reject the evaluation of all teachers still causes strikes and sit-ins, particularly in states with the lowest educational results. SEP announced the first massive evaluations to 541 thousand teachers of basic education for23 and 24 June and 6 and 7 July, 2012; and since the beginning of June, the CNTE protest marches have increased to the point where in some federative states (mainly Oaxaca, Guerrero, Chiapas, and Michoacan) the application of the Enlace test for this school year is almost being prevented from going forward because the results of this assessment would be part of the teachers' evaluation. This boycott was successful in these states and, as a matter of fact, in June, there were 150,000 lawsuits against the SEP and the SNTE to stop the application of the test (Blancas 2012). Finally, the Ministry of Education recently reported 54 % of attendance to the evaluation.

What Else is There to do?

First of all, there is a necessity for a national educational policy that only defines the achievements and the general standards so that the teachers can develop their curriculum. However, this must be in accordance with the school and community context, which means working in a collaborative way with the schools of all the education levels. This policy could be gradually favored, for instance, first with open contests for those interested teachers who could present projects, receive economic supports, and guarantee that the executions will be done in complete freedom, once they have been selected with transparent mechanisms and strictly academic criteria[14]. All this implies gradually making the national curriculum more flexible so that the study programs stop being "omnimonopolized" or omnicovered (Cordera et al. 2009, p. 35).

It is essential, however, that the federal and state governments rethink their relationship with the National Union so that all academic matters, including of course

[14] Although this kind of contest has existed since the 1990s, their number needs to be increased.

the periodic teachers and directives' evaluation, become an exclusive attribution of the state, just as the appointment of directive posts and all those of the education authorities are.

However, there are successful experiences, especially in schools in poor communities like the following two experiences in secondary, that turn out to be very significant:

- *Telesecondary schools are linked to the community*, in which 14 schools of the Puebla mountain region participate with a model of productive workshops related to the characteristics of each community. All these schools belong to a poor rural environment, and they have high migration. This is why the workshops try to provide young men with a practical and ecological training to take advantage of the land, community resources, and local productions (e.g., vegetables, edible mushrooms or medicinal plants, or elaboration of processed food). In addition, students are taught to acquire technological skills as a possible source of future work. Workshops on blacksmith handicrafts have been organized as well. In all the workshops, the students learn to make budgets. This experience is an example of the connection between theory and practice, because it relates the workshops to the official curriculum, and a part of its success has been that many of the new teachers are "graduates" of this education model, which has its foundation in the pedagogy based in projects. Its founder was Salom (2009), zone coordinator of those telesecondary schools; he created the model in 1994 and coordinated it with its members until his death in August 2011. His work was a great example of collaboration work among teachers, directives, and the community.
- *Educational Coexistence* (Convivencia Educativa) was founded by Gabriel Camara in 1996 with a model of learning communities based on tutorial networks integrated by students but with the freedom of choosing their subject of interest to prepare themselves as peer tutors. The teachers offer students a menu of contents, which the teachers know well[15], and give them personal consultations to form them, give them confidence, and let them rehearse as tutors until they are ready to do it independently and are able to give presentations to parents or other schools, teachers, and principals. This pedagogical model has favored the competence of "Learning to Learn" and that of adequately expressing themselves in different audiences to teach something since the early ages. It first started in few one or two teachers telesecondary schools in Chihuahua, Zacatecas, and San Luis Potosi. Nowadays, it is an SEP's Integral Strategy Program for the Improvement of the Educational Achievement (*Programa de Estrategia Integral para la Mejora del Logro Educativo)*; it exists in all federative states and deals primarily with the 9,000 schools of basic education that obtained the lowest results in the Enlace test, and it also coordinates the training of Spanish and mathematics teachers of the first grade in all secondary schools of the country in the first weeks of the school year 2011, to develop a preparatory course about the tutor relationship. Besides, the tutor relationship gives a new dimension to the secondary

[15] Remember that in telesecondary schools there is only one teacher per grade or even per school.

education reform, along with the redefinition of the technical advisor's functions, and it is already mentioned as part of the educational policy in accordance with the Agreement 592 (SEP 2011b). The participating schools have started to show substantial improvements in the results of the Enlace test (Cámara 2010; Malone 2011).

Both innovative experiences constructed from the bottom have proven to be an alternative to improve the education achievements of poor communities, and that improvement would be even greater if they were supported resolutely and without concealment. It is not a coincidence that, in a centralized, prescriptive, and authoritarian educational system like that of Mexico, the innovations are born in marginalized sectors and at the margin of the system (Barba and Zorrilla 2010). The federal and state governments need to bring about innovation in these sectors in a more compromised way and with more resources.

Moreover, it is important to consider for future actions the science and mathematics programs for basic education developed by the Mexican Academy of Science, such as *Summer in the Scientific Investigation*, *Teaching of Mathematics* and *Science in your School* (AMC 2010a). For instance, the last one was started in 2002, and it links the scientific community with primary and secondary teachers to improve the teaching of science and mathematics through a course. To date, 6,168 professors have been prepared (AMC 2010b).

In this chapter, I did not focus on technology in the classroom. The analysis was made in the basic achievements that are not fulfilled and the inequities between those more and less favored. The need to encourage projects linked to the ICT is unquestionable[16]. With the previous clarification, the proposal of *Classroom of the Future* of the Center of Applied Sciences and Technological Development of the Mexico National Autonomous University (Universidad Nacional Autónoma de México [UNAM]) is mentioned only as an example (Gamboa 2009). The basis of this proposal is the interactive surfaces "in which several users can collaborate without having to use a mouse or a keyboard; it's enough to put, move, or remove physical elements from the surface to do all the actions that are traditionally done with a simulator" to work business and collaborative strategies, "to support and promote the collaborative work among students" (Gamboa 2009). In particular, innovative projects of natural sciences, technology, and mathematics (STEM) should be imposed to transform those in an effective education, just as the teaching of English in the case of Mexico, both using the ICT. For instance, the secondary curriculum contemplates the realization of bimonthly projects that should take into consideration, both by students and teachers, the systematization of the projects made by Harland (2011) in his handbook.

[16] ICT (Information and Communication Technologies) plus LCT (Learning and Knowledge Technologies), and EPT (Empowerment and Participation Technologies); called TIC, TAC, and TEP in Spanish (http://toyoutome.es/blog/tic-tac-tep-las-siglas-del-aprendizaje-aumentado/12734).

Conclusions

The preceding discussion does not deny the need to implement wider state policies that:

- Combat poverty, especially extreme poverty, and not just give compensatory measures.
- Increase the country productivity, especially with communitarian projects that compromise and empower people, mostly involving the young, but with a strict attachment to legality and observance of human rights.
- Raise the education expense regarding the GDP, mainly with labeled budgets to take care of the school infrastructure and improve it, develop innovation and education investigation projects emphasizing the importance of the poorest communities. They are called labeled to differentiate them from those of the current expense, which would imply the betterment of the tax mechanisms to guarantee a good use of these resources.
- Set out to a bigger impulse related to the scientific and technological investigation, both basic and applied, to start with a bigger budget including the incubation of new companies with favorable cost and feasibility studies.
- Involve the scientific community in more SMET programs for basic and middle education with interdisciplinary groups where specialists in the didactics of sciences, mathematics and technologies, besides engineers, of the middle education participate.

Because these matters go far beyond what many educative actors can do, the examples expressed in the previous section must be considered as programs that can be extended. Therefore, it is imperative to foster and implement innovation and autonomous curricular development, considering learning achievements as the fundamental educative purpose and viewing school as a learning community that interacts with the school neighborhood for improving together.

Acknowledgment Special thanks to Minerva Guevara for her readings, which improved the chapter content, and Annette Santos del Real, for her critical revision of the rough draft, especially regarding the presentation of Mexican Education System data and evaluation results.

Translation and later corrections: Nelly Pérez Islas.

References

AMC. (2010a). *Programas*. Mexico: Academia Mexicana de Ciencias. http://www.amc.edu.mx/p5/index.php?option=om_content&view=article&id=72&Itemid=61. Accessed 7 June 2012.

AMC. (2010b). *La ciencia en tu escuela*. Mexico: Academia Mexicana de Ciencias. http://www.lacienciaentuescuela.amc.edu.mx/sobreprograma. Accessed 7 June 2012.

Arnaut, A. (1998). *Historia de una profesión. Los maestros de educación primaria en Mexico, 1887–1994*. Mexico: Secretaría de Educación Pública y Centro de Investigación y Docencia Económicas.

B. Barba, & M. Zorrilla (Eds.). (2010). *Innovación social en educación. Una base para la elaboración de políticas públicas*. Mexico: Siglo XXI y Universidad Autónoma de Aguascalientes.

Barba, B., & Arnaut, A. (2010). Las relaciones SEP-SNTE y el proyecto educativo de Mexico: escenario para comprender a los maestros en la política educativa. In B. Barba, & M. Zorrilla (Eds.), *Innovación social en educación. Una base para la elaboración de políticas públicas* (pp. 106–131).

Blancas, M. D. (2012). La CNTE se resiste a la evaluación con paros… y 150 mil demandas. In *Crónica Nacional*, June 4, p. 3. http://www.cronica.com.mx/nota.php?id_nota=666284. Accessed 5 June 2012.

Cámara, C. G. (2010). Un cambio sustentable. La *comunidad de aprendizaje* en grupos de maestros y alumnos de educación básica. *Perfiles educativos*, *32*(13). Cfile:///Volumes/Trabajos/Trabajos/Art%C3%ADculos%20e%20información%20diversa/Educación/Experiencias%20innovadoras/Perfiles%20educativos%20-%20Un%20cambio%20sustentable:%20La%20comunidad%20de%20aprendizaje%20en%20grupos%20de%20maestros%20y%20alumnos%20de%20educación%20básica.webarchive. Accessed 28 May 2012.

Coneval. (2011). *Medición de la pobreza*. Mexico: Consejo Nacional de la Evaluación de la Política de Desarrollo Social. http://www.coneval.gob.mx/cmsconeval/rw/pages/medicion/index.es.do. Accessed 9 May 2012.

Cordera, C. R., Heredia, Z. C., & Navarrete, L. J. E. (Grupo de redacción) (2009). Mexico frente a la crisis: hacia un nuevo curso de desarrollo. *Economía UNAM, 6*(18), 7–60.

DOF. (2008). *Acuerdo número 442 por el que se establece el Sistema Nacional de Bachillerato en un marco de diversidad*. Mexico: Diario Oficial de la Federación. Secretaría de Gobernación. file:///Volumes/Trabajos/Trabajos/Acuerdos%20oficiales/EMS/RIEMS/Acuerdo%20442%20SNB.webarchive. Accessed 21 May 2012.

DOF. (2012). *Decreto por el que se declara reformado el párrafo primero; el inciso c) de la fracción II, la fracción V del artículo 3º y la fracción I del artículo 31 de la Constitución Política de los Estados Unidos Mexicanos*. Mexico: Diario Oficial de la Federación. Secretaría de Gobernación.

FMI. (2010). *Ranking de países según su economía*. Cited in as the following: http://www.mogilo.com/forum/topics/ranking-mundial-de-economia-de. Accessed 9 May 2012.

Gamboa, R. F. (2009). El Aula del Futuro: Diseñando nuevos ambientes de aprendizaje. *Boletín SUAyED*, *6*. file:///Volumes/Trabajos/Trabajos/Art%C3 %ADculos%20e%20información%20diversa/Educación/Experiencias%20innovadoras/El%20aula%20del%20futuro.webarchive. Accessed 29 May 2012.

Harland, D. J. (2011). *STEM Student Research Handbook*. U.S.A.: National Science Teachers Association.

INEE. (2008). *Estudio comparativo del aprendizaje en sexto de primaria en Mexico 2005–2007: Español y Matemáticas*. Mexico: Instituto Nacional para la Evaluación de la Educación.

INEE. (2009). *El aprendizaje en tercero de secundaria en Mexico. Informe sobre los resultados del Excale 09, aplicación 2008. Español, Matemáticas, Biología y Formación cívica y ética*. Mexico: Instituto Nacional para la Evaluación de la Educación.

INEE. (2010a). *El derecho a la educación en Mexico*. Mexico: Instituto Nacional para la Evaluación de la Educación.

INEE. (2010b). *Mexico en PISA 2009*. Mexico: Instituto Nacional para la Evaluación de la Educación.

INEE. (2011a). *La Educación Media Superior en Mexico. Informe 2010–2011*. Mexico: Instituto Nacional para la Evaluación de la Educación.

INEE. (2011b). *Panorama educativo de Mexico. Indicadores del Sistema Educativo Nacional. 2009. Educación Media Superior*. Mexico: Instituto Nacional para la Evaluación de la Educación.

INEE. (2011c). *Explorador Excale*. Mexico: Instituto Nacional para la Evaluación de la Educación. http://www.inee.edu.mx/explorador. Accessed 23 May 2012.

INEGI. (2009). *Encuesta Nacional de Ingresos y Gastos de los Hogares, 2008*. Mexico: Instituto Nacional de Estadística y Geografía.

INEGI. (2011). *Censo de Población y Vivienda 2010*. Mexico: Instituto Nacional de Estadística y Geografía. http://www.inegi.org.mx/sistemas/olap/proyectos/bd/consulta.asp?p=17118 & c=27769 & s=est#. Accessed 9 May 2012.

Malone, H. J. (Ed.). (2011, November). Q & A with Gabriel Cámara. *Lead the Change Series*, *11*. http://www.aera.net/SIG155/EducationalChangeSIG155/tabid/12179/Default.aspx. Accessed 5 June 2012.

OECD. (2010). *Pisa 2009 Results: What Students Know and Can Do. Students' Performance in Reading, Mathematics and Science (Volume I)*. Paris: Organization for Economic Co-operation and Development.

Gochicoa, E. P., Raimondi y, G. M., & Colectivo docente (2008). Nuestras historias. El lugar del *trabajo en las Telesecundarias Vinculadas con la Comunidad*. Mexico: Universidad Iberoamericana.

PNUD. (2011). *Informe sobre desarrollo humano. Mexico*. Mexico: Programa de las Naciones Unidas para el Desarrollo.

Ramírez, R.. (2010, April 3). La prueba Enlace: contra el sentido de la educación. *Educación UACM. Suplemento de la Universidad Autónoma de la Ciudad de Mexico*. No. 9. *La Jornada*. http://www.jornada.unam.mx/2010/04/03/enlace.html. Accessed 9 May 2012.

Salom, G. (2009). Cómo se ha ido tejiendo mi historia. In *Decisio. Saberes para la acción en educación de adultos*, *23,* 77–85. http://atzimba.crefal.edu.mx/decisio/index.php?option=com_content & view=featured & Itemid=111. Accessed 1 June 2012.

SEP. (2011a). *Sistema Educativo de los Estados Unidos Mexicanos, principales cifras, ciclo escolar 2010–2011*. Mexico: Dirección General de Planeación y Programación, Secretaría de Educación Pública. www.dgpp.sep.gob.mx/Estadi/principales_cifras_2010_2011.pdf. Accessed 5 June 2012.

SEP. (2011b). *Acuerdo 592 por el que se establece la Articulación de la Educación Básica*. Mexico: Secretaría de Educación Pública.

SITEAL. (2011). *Dato destacado 21. El desafío de universalizar el nivel primario*. Sistema de información de tendencias educativas en América Latina (OEI, UNESCO e IIPE). http://www.cedus.cl/files/El%20desaf%C3 %ADo%20de%20universalizar%20el%20nivel%20primario_SITEAL%202011.pdf. Accessed 9 May 2012.

Schmelkes, S. (2010). El papel de la comunidad en el cambio desde la escuela. In B. Barba, & M. Zorrilla (Eds.), *Innovación social en educación. Una base para la elaboración de políticas públicas* (pp. 207–223).

Street, S. (2001). When politics becomes pedagogy: Oppositional discourse as policy in Mexican Teachers' struggles for union democracy. In M. Sutton, & B. A. Levinson (Eds.), *Policy as practice: Howard a comparative sociocultural analysis of educational policy* (pp. 145–166). Westport: Ablex Press.

Street, S. (2010). Contribución del movimiento magisterial democrático al cambio educativo en Mexico. In B. Barba, & M. Zorrilla (Eds.), *Innovación social en educación. Una base para la elaboración de políticas públicas* (pp. 132–156).

UNDP. (2011). *International human development indicators*. New York: United Nations Development Programme. http://hdr.undp.org/en/statistcs/. Accessed 21 May 2012.

WEF. (2011). *The global competitiveness report 2011–2012* Switzerland: World Economic Forum. http://www3.weforum.org/docs/WEF_GCR_Report_2011–12.pdf. Accessed 23 May 2012.