DIRECTORATE FOR EDUCATION

"REFLECTIONS ON THE PERFORMANCE OF THE MEXICAN EDUCATION SYSTEM"

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Preface

In October 2007 the Mexican Authorities asked the OECD to commission a report on the Educational System in Mexico to coincide with the publication of the PISA 2006 report on 4th December 2007. The OECD in turn invited Professor David Hopkins and his colleagues – Elpida Ahtaridou, Peter Matthews and Charles Posner - to prepare such a report.

Although the report has been prepared at very short notice it is based on high quality research, solid evidence and a series of key interviews. We are confident that the analysis is defensible and the direction of travel robust. This report however is the first rather than the last word on the reform of the Mexican educational system. It should provide a secure foundation for a more thorough going and detailed analysis in the light of the 2006 PISA results say in 2008.

We hope that the report will contribute to the important and ongoing debate on enhancing the quality of schooling in Mexico.

David Hopkins

27th November 2007

Executive Summary

This report aims to provide the Mexican Government with an independent, objective and informed overview of the Mexican education system. It describes and provides a comparison of Mexico's results in PISA 2006 with other OECD countries and a brief assessment of performance over time. The report explores a number of key issues arising from Mexico's relatively disappointing performance in the PISA assessments and those arising from reviews of the relevant literature and interviews with key players; and makes a series of recommendations for the improvement of the Mexican system framing them within a 'theory of action'.

It is clear that school age education in Mexico has a number of strengths and weaknesses. On the one hand, the Mexican Authorities understand those strengths and weaknesses and openly communicate them, they also have good ideas for reform and although educational expenditure is low by OECD standards it is increasing. On the other hand, the educational system is highly inefficient, incentives for improvement are weak and the quantity and quality of educational provision is well below OECD standards. In general the Mexican education system needs to rapidly improve human capital development and the reforms already in place, which although are moving in the right direction, need strengthening considerably.

The report consists of four Chapters. The first provides an overview of Mexico's education system and gives a context for our analysis and recommendations.

Chapter 2 discusses the 2006 PISA results which present a picture of relatively low levels of achievement by a large proportion of the school population. The added effect of dropouts from the system is not factored into the results. Functional levels of literacy and mathematics are seriously low, and earlier PISA results paint a similar picture.

Reasons for Mexico's comparatively weak school performance are explored in Chapter 3. We discuss issues which include socio-economic, school and system-level factors which impact on achievement, the level and distribution of financial resources for state education, the effectiveness of the teaching force and school autonomy and accountability.

Finally, in Chapter 4 we offer a theory of action which provides a basis for both strategic and operational responses to the challenges exposed by the PISA 2006 results. This forms the basis of an integrated set of recommendations, which are set out below.

- *Recommendation 1:* Establish a compelling moral purpose for the reform of the Mexican educational system.

- *Recommendation 2:* Establish absolute clarity about the standards expected in key areas (such as literacy, numeracy and information technology) required for students at various levels in the system.

- *Recommendation 3:* Align the curriculum to these key areas and produce high quality and practical materials to support the work of teachers.

- *Recommendation 4:* Develop assessment approaches around the standards that provide regular diagnostic information for formative assessment and monitoring.

- *Recommendation 5:* Invest heavily in enhancing teacher quality.

- *Recommendation 6:* Move quickly to improve the quality of leadership at school and system level.

- *Recommendation 7:* Increase autonomy at key levels within the system – state, regional and school – but maintain strong national frameworks.

- *Recommendation 8:* Intervene positively in those schools and areas that have the greatest challenges and support those students most at risk.

- *Recommendation 9:* Review the organisation of schooling in Mexico in light of the principles being espoused for the reform of the *Bachillerato*.

- *Recommendation 10:* Take immediate steps to expand teacher supply in Mexico.

- *Recommendation 11:* Review the balance of funding of education.

- *Recommendation 12:* Build a 'guiding coalition' among the key stakeholders in education in Mexico.

Chapter 1

An overview of the Mexican education system

This chapter provides an overview of the Mexican education system. In particular it provides a synopsis of the evolution of educational priorities in Mexico over the last 40 years; it describes the organisation and management of its education system; and identifies its strengths and weakness by comparing education in Mexico education with other OECD countries.

A synopsis of the evolution of educational priorities in Mexico

Over the last 40 years, the Mexican educational system has been moving towards the provision of quality universal education for its heterogeneous population and creating an administrative system that allows for innovation rather than impeding it. Traditionally, Mexico has a highly centralised educational system, but the extraordinary growth of enrolments rendered both its functioning and its ability to meet the needs of diverse groups that compose Mexican society difficult (Arnaut, 1998). Until the 1970's, the government's main concern was the expansion of the system, aiming for universal coverage. During the 1970's, efforts were directed mainly at continuing this expansion and restructuring the education system. The 1980's were characterised by a degree of educational decentralisation and the modernisation of the curriculum and pedagogy. These efforts were formalised in 1992 with the *National Agreement for the Modernisation of Basic Education,* signed by the Federal government, State governments and the National Union of Education Workers (SNTE), that committed all parties to a new cycle of reforms based on decentralisation and improving the efficiency and quality of the system. Furthermore, reforms were introduced to incorporate marginal social groups and provide a system that incorporated modern technology. Currently, reforms have gone to a deeper level, focusing on the contents and methods of education and on searching for answers to the important questions of how to embed changes and improve quality across the system.

Underpinning these changes and innovations is a strong belief in the importance of education as enshrined in the Mexican Constitution. Historically, education was regarded as being so important that an entire article of the constitution of 1917, Article 3, is devoted to proclaiming the importance of education and insists that State education in Mexico must be secular, democratic and national in scope and make a significant contribution to improving the lives of all of its citizens. This belief remains strongly held today as evidenced by the fact that Mexican 15-year-olds, despite their relatively poor performance in the PISA 2003 examinations, still have a very strong belief in education, amongst the most positive of all OECD countries.

At the end of 2005, in reflection of its reforming principles, the Mexican Government through its Ministry of Education (Secretaría de Educación Pública [set up in 1921]) set as a goal for the year 2025, the attainment of what was called a "wide, well-organised and diversified system of education, that would provide the means for the full development of its population…" and "… a system that is recognised both nationally and internationally for its quality, constituting the basis for the cultural, scientific, technological, economic and social development of the nation[3]."

An overview of Mexico's education system

The Mexican education system is one of the largest in Latin America. In 2005/06 it catered for over 36.2 million students of school age, the great majority of whom are educated in government schools. Private schools in Mexico account for between 10%-12% of total enrolments, a figure high by international standards, due to a large section of Mexico's middle class parents that choose to educate their children privately as a response to the perceived low quality of public education.

Mexico has three types of public education, administered at four different levels. These are:

(a) Basic education: with almost 25 million pupils (about 78% of all students) and over 1,107,000 teachers working in over 200,000 educational establishments (figures in the beginning of the academic year 2005/2006). Basic education is compulsory and is divided into three levels:

> *(i) Pre-primary education:* that caters generally for children between the ages of 3 and 5 years. It aims to prepare children for primary school and is composed of three grades (or years of schooling). Pre-school education is fast expanding and there should be universal provision by 2008-09.

> *(ii) Primary education:* that consists of six grades (Grades 1-6) during which children are taught the following four subjects: Spanish, mathematics, natural sciences and social sciences. Generally, children are registered when they reach 6 years of age in primary school and finish somewhere at the age of 11. Their exit age depends upon when they first entered school, whether they truanted or had to repeat a year or more.

> There is a range of primary schools, from urban and rural primary schools of a kind found in most countries, to special schools providing education for indigenous groups, community schools and schools where learning is provided through distance learning. Special programmes are also provided for adults who have returned to education.

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[3] Information drawn from the Mexican Education Ministry website.

(iii) *Lower secondary education:* consisting of three grades (Grades 7-9) and serves students between the ages of 12 and 14. Its aim is to provide an education that allows young people to pursue an academic career or enter the labour market successfully. Lower secondary education consists of traditional schools, technical schools, community schools and a number of schools that use distance learning techniques through the use of television, called *telesecondary* schools. *Telesecondaries* exist largely to provide education for those in remote areas or to parts of the country with low population density.

Until recently, basic education did not include pre-primary education. Primary and lower secondary levels have undergone an extraordinary expansion over the last four decades with enrolment rates reaching 99% of the population in 2005 (OECD, 2007).

(b) Upper secondary: lasts three years and the age range of its students is normally between 15 and 17. There are two distinct types of schools at this level. Those that aim to prepare students to move onto higher education and those that cater for students who wish to obtain technical or vocational training. At the beginning of the academic year 2005/2006 about 3,658,000 students were enrolled in upper secondary education and about 255,000 teachers were working in 12,882 schools.

Upper secondary education in Mexico is comprised by a number of schools that differ in nature, provision and quality. The links and the communication between the several subsystems operating at this level are seen as weak and the curriculum content not as relevant to students' interests. The above are considered as the main reasons for the low graduation rates, when comparing Mexico with other OECD countries, in upper secondary.

Current proposals for the reform of upper secondary and the development of a National Baccalaureate system *(Bachillerato)* that preserves the flexibility of State provision (which has been a feature of upper secondary in contrast to the centralised nature of Basic Education) but within a strong National framework aim to rectify the issues that the current system poses. The main proposals of the reform are:
- o An introduction of a common curriculum for the following subjects in all upper secondary schools: Mathematics; Spanish; Foreign Language; Biology; Chemistry; Physics and Natural Geography; history; Political Geography and Political Economy ;
- o A common skills framework for all upper secondary schools with emphasis on interpersonal, intrapersonal and meta-cognitive skills and citizenship;
- o The development of a curriculum that is relevant and interesting for students;
- o The creation of links between upper secondary institutions and the validation of courses of all schools by all other upper secondary schools so as to ensure the smooth transition of students from one upper secondary school to another;
- o Attention to individual student needs through tutorials;

- o Training for teachers to enable them to respond to the demands of the proposed reforms; and
- o Teacher assessment and National testing of students.

(c) Tertiary Education: Tertiary Education offers a range of courses delivered by public universities. In addition, each state has its own university. All universities are publicly funded and are autonomous in terms of their administration and management. Higher education also includes teacher training colleges.

Education establishments are supported by four levels of administration: Federal, state, private and autonomous. The government holds the responsibility for providing free of charge basic education and assumes responsibility for teacher education. It also sets guidelines with regards to the school calendar, the length of the school day and teachers' salaries. Through the *National Agreement for the Modernisation of Basic Education* responsibility for the administration of basic education was devolved to Mexico's 31 States[4]. Thus, most government schools are now administered by Mexico's 31 state governments. However, despite efforts for decentralisation, States are reduced to having more of an administrative role as, in practice, they have little power over educational budgets or curriculum content and pedagogy. This is because most of their financial resourcing is still centrally led and their obligation to adhere to a national curriculum that is prescribed by the government. States must also use textbooks designed and provided to them by national authorities. In the case of lower secondary, the government provides lists of textbooks for each subject from which States and school administrators can choose. School administrators have little autonomy and are not involved in decisions regarding personnel matters or the allocation of resources.

By law, all school personnel belong to the Mexican National Educational Workers Union (*Sindicato Nacional de Trabajadores de la Education, SNTE)*. The SNTE is the most significant teachers' union in the country and one of the main stakeholders in education in Mexico alongside the Federal government. It has a strong influence over decisions such as determining teachers' salaries, hiring teachers and headteachers, and teachers' working conditions and negotiates directly with the Federal government on such matters.

Parental involvement in education is growing but it is still relatively limited. The fact that a larger proportion of the middle class has chosen to absent itself from the State system is perceived to be one of the contributing factors for parents' limited involvement in educational matters.

Strengths and challenges: main findings of Education at a Glance 2007[5]

Although there is an undeniable and consistent gap in national and international examinations in performance between Mexico and most other OECD countries,

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[4] The number of Mexico's States would total to 32 if we were to include the Federal government that is based in Mexico City.
[5] This section is drawn from the OECD (2007) Education at a Glance Briefing Note for Mexico.

some progress has been made. These are some of the key findings of Education at Glance (2007) at the National level.

Overall expenditure

Mexico has made major investments on education. It has consistently increased educational investment, not just in absolute terms, but also in terms of a rising share of GDP being devoted to education. However, spending remains low in absolute terms by international standards.

Between 1995 and 2004, spending on primary education in Mexico increased by 47% , one of the steepest increases among OECD countries after Australia, Greece, Ireland, New Zealand, Poland, Turkey and the United Kingdom. Spending per student increased by 30%, at a somewhat lower rate due to enrolments rising by 14%. Educational spending as a percentage of the GDP in Mexico remains above the OECD average, partly because of Mexico's large youth population. It increased from 5.6% in 1995 to 6.4% in 2004, above the OECD average of 5.8% in 2004.

In 2005, Mexico spent just below USD 2,130,000 on education. This represents 22.5% of its overall public expenditure. At 23.1%, the share of public spending invested in education is the highest among OECD countries and almost twice as high at the OECD average level (13.4%)[6].

However, it is not clear that the apportionment of this high level of educational spending in Mexico represents value for money. This is because most educational spending in Mexico is devoted to current (or revenue) expenses rather than capital projects to improve the educational infrastructure. Most current spending at primary and secondary levels is on salaries for staff, which results in only 5% remaining for other current expenditure, such as instructional materials (OECD average 19.9%) for primary and secondary education. About 3.1% of spending at primary and secondary levels is for capital expenditure, which represents a low level of investment in improving the educational infrastructure (OECD average 9.0%). At the tertiary level, the capital expenditure is, at 3.1%, one of the lowest among OECD countries (OECD average 10.7%).

Furthermore, spending per primary student in Mexico (adjusted for differences in Purchasing Power Parities), is very low (USD 1,694) and is approximately one third of the OECD average (USD 5,832). Spending per student in lower secondary education (USD 1,602) is approximately one third of the OECD average (USD 6,90). Also, spending per 15 year old student is the second lowest among OECD countries, with USD 15,312. At the tertiary level, educational spending increased by 68% between 1995 and 2004 (OECD average 55%). However, since tertiary enrolment rose by 53% over the same period, spending

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[6] Note that private financial contributions come both from households and from other private entities and can go to private as well as government schools. In addition, public scholarships, which have risen significantly during the last seven years, are regarded as private spending.

per tertiary student only increased by 10%; this is still above the OECD average (See Appendix 1 Table B1.5).

It is important to note that in PISA 2003 countries with similar or slightly higher levels of expenditure in education achieved significantly higher results in mathematics and reading (such as the Slovak Republic, Poland, the Czech Republic and Hungary (Guichard, 2005).

Pre-Primary education in Mexico

The OECD's thematic review of early childhood education and care has underlined the importance of a strong start for children. In Mexico, 47% of children under the age of 4 years now participate in pre-primary education. (See Appendix 2 Table C2.1). Although this is significantly below the OECD average (69%), it is similar to other OECD countries, including Australia, Finland, Greece, Ireland, Korea, the Netherlands, Poland, Switzerland and Turkey. The ratio of students to teaching staff has increased in pre-primary education to 29 pupils per teacher.

Primary and Lower Secondary education in Mexico

The ratio of students to teaching staff in primary education is more than 30 students per teacher with the OECD average being 22. In lower secondary education there are over twice the number of students per teacher compared to the OECD average. This high ratio is likely to influence the amount of attention devoted to each student as well as the quality of the outcomes. These ratios raise important challenges for teachers, but they also indicate progress in increasing student participation in lower secondary education.

At the primary level, the teaching load in Mexico, 800 statutory hours per year, is slightly below the OECD average of 803 hours (See Appendix 3 Table D4.1). By contrast, a lower secondary teacher in Mexico is required to teach 1,047 hours per year, the highest number of statutory teaching hours among OECD countries except the United States (OECD average 707 hours).

Instructional time for students amounts to 800 hours per year for students aged 9-11 years (OECD average 814 hours) and 1 167 hours for students aged 12 to 14 (OECD average 898 hours) (See Appendix 4 Table D1.1).

Statutory salaries in Mexico are low by absolute standards (little more than half the OECD average) but among the highest in the OECD when compared with GDP per capita. The ratios of salary after 15 years of experience to GDP per capita in primary and in lower secondary education are respectively 1.58 and 2.01, well above the OECD average of 1.28 and 1.30 (See Appendix 5 Table D3.1). Moreover, since 1996, teachers in Mexico have seen the second steepest increase in salaries, with gains for a teacher with 15 years of experience of 32% over the period at the primary level and 37% in lower secondary education (See Appendix 6 Table D3.2).

Mexico has seen limited progress in ensuring that young people leave school with strong baseline qualifications. Only 24% of 25-to-34-year-old Mexicans have completed a baseline qualification at the upper secondary level, by far the lowest among OECD countries. Also, there has been less progress in raising upper secondary attainment than in most other countries. Mexico ranked 28 from the 29 OECD countries assessed among 45-to-54-year-olds (i.e. those who completed school some 30 years ago), and 29 among 35-to-44 year-olds and 25-to-34-year-olds (i.e. those who completed school a decade ago). In contrast, over the same period, Korea moved from rank 21 to 1 (see Appendix 7 Table A1.2a). Note that the individuals (25-to-34-year-olds in 2005) in this analysis passed the age of sixteen between 1986 and 1996.

Upper secondary education in Mexico

The proportion of students graduating at upper secondary level has risen from 33% in 2000 to 40% in 2005, thus reducing the upper secondary attainment gap between Mexico and other OECD countries (see Appendix 8 Table A2.2). Although graduation rates are low, interestingly, the percentage of 15-year-olds in Mexico who expect to attend a university-level programme is 49% (see Appendix 9 Table A4.1a), with more females than males expecting to complete higher education (56% of females and 42% of males). Even among Mexico's lowest performers, those who perform at or below level 1 on the PISA 2003 mathematics scale, 39% expect to attain a university-level education, compared with the OECD average of 33% (see Appendix 10 Table A4.2a). Among Mexico's top performers, those who reached the highest levels 5 or 6, the expectation rate is 93%, considerably above the OECD average of 78%. The socio-economically most advantaged quarter of students are 2.2 times more likely to complete a university-level qualification (See Appendix 11 Table A4.4).

Tertiary science education in Mexico

The number of science graduates in Mexico has increased. There are 984 tertiary science graduates per 100,000 employed 25-to-34-year-olds, compared with an OECD average of 1 675 (see Appendix 12 Table A3.4). An analysis of the ratio of younger to older age groups with tertiary science degree show an improvement over the last decade, as three times as many young Mexicans who have attained a degree in science compared to the older age group (see Appendix 13 Table A1.5).

The percentage of students in Mexico studying science is similar to the OECD average (11%). This is also true in other fields, with the exception of education, where the proportion is slightly lower and of arts and humanities where the proportion is slightly higher.

A comparison of younger to older age groups with science as a field of study shows an increase in science graduates over recent decades: the ratio of 25-to-34-year-olds with a university qualification plus 30-to-39-year-olds with an advanced research qualification to 55-to-64-year-olds with a university-level or advanced research qualification is similar to the OECD average of 3.0 (see Appendix 13 Table A1.5).

The equity challenge

A long standing and major issue in Mexican education is that of regional and ethnic differences. For example, in 1995, from an average illiteracy rate of 12.44% across the country, the illiterate population in the Federal District (the richest area) was only 4%, while in the poorest States, such as Oaxaca and Guerrero, percentages rose to 27.5% and 26.9%.

Although Mexico has shown a relatively weak relationship between social background and performance in the PISA assessments, according to the PISA 2000 survey, 85% of those who spoke an indigenous language did not attain level 1, and none achieved level 4. In general, 70% of those students who did not reach level 1 had mothers who did not attend or just completed primary school; and 59% of students who achieved level 2 had mothers who completed basic education (OECD, 2007a). Surveys by national bodies, such as the INEE, revealed that students who performed at the lowest levels in PISA 2000 were usually those from schools catering for children with the most disadvantaged backgrounds such as indigenous schools, rural schools and *telesecondaries (*Guichard, 2005).

A number of programmes were set up to deal with these difficulties. The Programa para Abatir el Rezago Educativo (PARE) was established in 1990 to deal with expanding what was on offer was, according to researchers, far from satisfactory (Munoz-Izquierdo and Ahuja, 2000). Its successor Programa para Abatir el Rezago en Educación Inicial y Básica (PAREIB) met with greater success. To interest pupils more in attending school the government introduced in the mid-1990's the Programa para la Educación, Salud y Alimentación (PROGRESA) and later the Oportunidades programme designed to increase the numbers of pupils going to and remaining in secondary schools and again it was met with little success **(**Behrman et al., 2000).

Currently, there are four basic types of compensatory programmes. *Oportunidades, telesecondaries*, bilingual indigenous schools and special education children of migrant parents to the United States. In addition, if preschool has a universal cover, as is planned by the current Education Ministry, this could act as a mechanism of compensation for background disadvantages when children arrive at primary school. However, there is little evidence that

these programmes have contributed significantly either to a reduction in dropouts and repetition rates or to decreasing the disparity between States. Progress was made mostly in primary education and gaps remain high at the lower secondary level. Moreover, there is no pedagogic mechanism to cater for low achievers who are required to repeat a year *(*Guichard, 2005).

Summary

This chapter has provided an overview of the Mexican education system and has clearly indicated Mexico's efforts to improve the efficiency and quality of its education system over the last 40 years. A number of the reforms implemented have met undeniable success. For example, the expansion of primary and lower secondary education has been a major achievement and a step towards a more equitable education system; and so has the introduction of several programmes aimed to increase the participation and performance of pupils in rural and thinly populated areas. Also, the consistent investment in terms of spending in education, the steep increases in teacher salaries and the efforts for decentralisation are all further indications of Mexico's commitment to improving its education system.

However, despite the successes and the range of targeted initiatives there are also some key factors that inhibit improvement. A major problem is the relative cost effectiveness of the high level of educational spending. As we have seen, most current spending in primary and secondary levels is devoted to teachers' salaries leaving a relatively small amount for capital expenditure and educational resources. Thus, there is relatively little investment in improving the educational infrastructure such as school buildings and teaching materials. Such investments are however essential to improving pupils learning environment and supporting teaching and learning which in turn help in improving a student's achievement and enrich her/his learning experience.

There are also worrying indications of the inadequacy of the system to provide Mexican students with baseline qualifications. Thus, it is not surprising that attainment rates in upper secondary education are one of the lowest compared with other OECD countries. Also, the relatively low proportion of students graduating from upper secondary schools, although higher by 7% from 2000 to 2005, hampers Mexican youths from entering higher education and also possess serious issues with regards to the growth of Mexico's economy. The above are indications of the deep seated problems within the system at that level and point towards the need to focus on basic skills, the transition from basic education to upper secondary education, the re-professionalisation of teachers and strong leadership at that level.

Lastly, there are challenges facing the Mexican education system with regard to equity. Although, as mentioned earlier, a number of initiatives have been introduced to provide a more equitable education for all students, the effectiveness of these programmes is in question. The PISA assessments and national assessments have identified pupils who speak an indigenous language; those whose mothers have no or the basic level of schooling; and those

attending indigenous, rural schools and the *telesecondaries* as being the most at risk in terms of low levels of performance.

Chapter 2

A first analysis of PISA 2006[7]

In this Chapter we consider the main outcomes of the PISA 2006 data for Mexico. To its credit, Mexico has engaged fully with PISA over the last six years. The results not only provide international comparisons but can show national trends in performance. Mexico had the largest sample size among OECD countries, with a total of 30,971 students (against a total of 30,000 students in 2003), Iceland was the country with the smallest sample size, with about 3,789 students in 2006. As other countries with characteristic large sampling (e.g. Australia, Belgium, Canada, Germany, Italy, Spain, Switzerland and the United Kingdom), Mexico has administered PISA both at national and regional/state levels, although the State level results were not available to us. The following are some of the main findings concerning Mexico's performance in PISA 2006 at the national level, compared with performance in earlier years where this is possible.

Student performance in Reading from PISA 2006 and earlier

The concept of reading focuses on the ability of students to use written information in situations which they encounter in their life. In PISA, reading literacy is defined as understanding, using and reflecting on written texts, in order to achieve one's goals, to develop one's knowledge and potential and to participate in society (OECD, 2006a). This definition goes beyond the traditional notion of decoding information and interpreting literally what is written towards more applied tasks.

In PISA 2006, the OECD average score for reading is 492 score points; Mexico scored [17%] lower with 410 points. Mexican boys (393 score points) performed less well than girls (427 score points). Mexico has improved slightly relative to the OECD average since 2003, when respective scores were 400 and 494. This is mainly due to some improvement in the performance of girls. General performance in reading in 2006, however, is lower than in 2000 when Mexico's score was 422 points. Reading scores in PISA 2006 are classified in six levels, each representing a range of scores. The proportion of Mexican students who score in each level is compared with the OECD in Figure 2.1.

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[7] This chapter was prepared by the OECD

Figure 2.1 - Percentage of students at each proficiency level on the reading scale
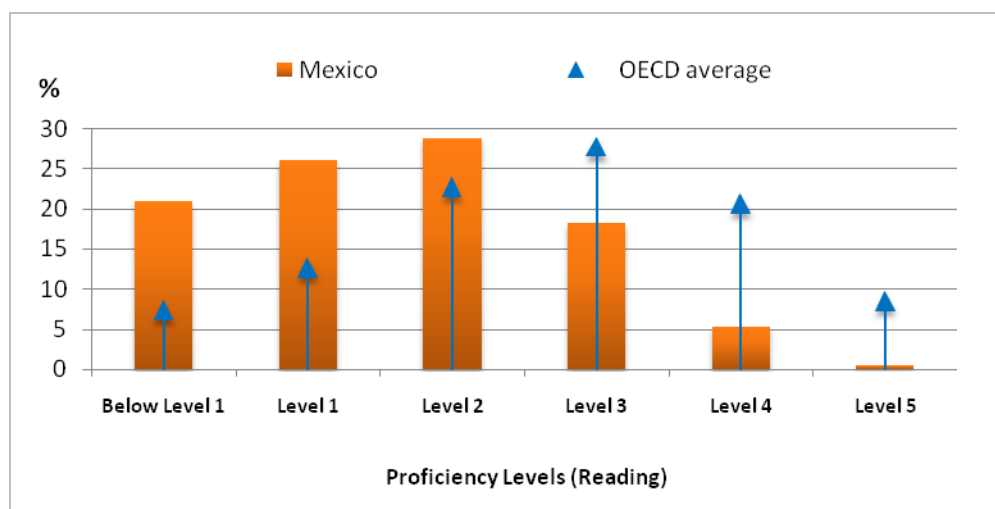
Source: PISA 2006 Science Competencies for Tomorrow's World, Volume 2, Table 6.1a.

The graph shows that the proportion of Mexican students in the lowest levels, < 1 and 1 (47%) is more than double the OECD average at those levels (20%). With only 0.6% of students in level 5, Mexico has the lowest percentage of students at this level among OECD countries.

Male students are more likely to perform at level 1 or below (about 54 %), against 46% of male students in the intermediate levels and only 0.3% of them in level 5. The equivalent proportions for females are: 40% at level 1 or below; 59% in the intermediate levels and about 0.8% in level 5. In the OECD average, although both males and females came higher in the intermediate levels, females show a slightly higher proportion at these levels as well (68% of males and 75% of females; the sex difference is greater in Mexico.

Student performance in Mathematics from PISA 2006 and earlier

The distribution among the different levels in mathematics from PISA 2006, like reading, is strongly skewed towards the lowest levels (see Figure 2.2).

Figure 2.2 - Percentage of students at each proficiency level on the mathematics scale
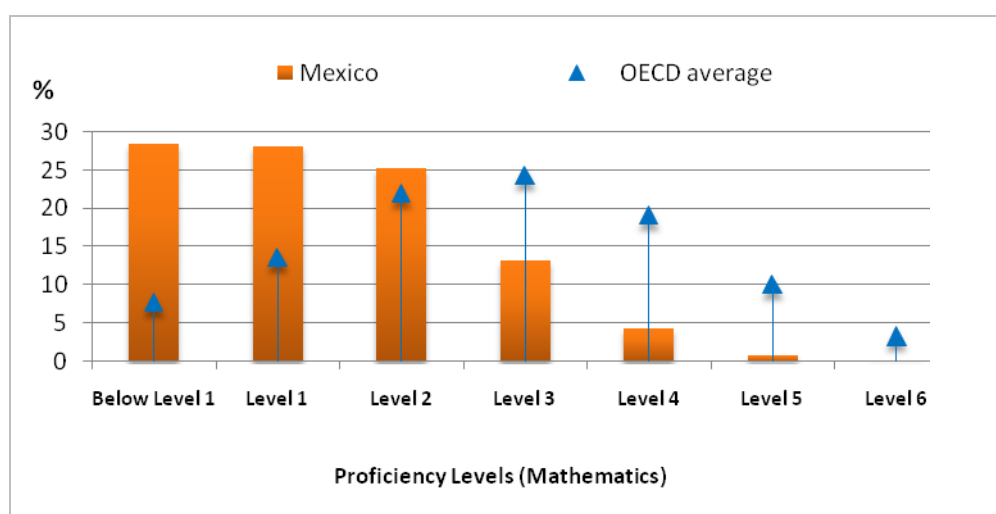
Source: PISA 2006 Science Competencies for Tomorrow's World, Volume 2, Table 6.2a.

The percentage of students between levels < 1 and 1 was more than two-and-a-half times greater than the OECD average (56% in Mexico against 21% in the OECD). Concerning the intermediate levels, the difference is slightly larger, with about 23% of Mexican students in these levels compared to the OECD average of 65% of students. As in the reading scale, Mexico has the lowest percentage of students attaining or exceeding level 5 (0.8%).

Although changes can so far only be traced over a relatively short, three-year period, significant changes have been noted of which Mexico within the OECD and the partner country Indonesia have shown the most marked improvement. In both of these countries, the great majority of students were at Level 1 or below in PISA 2003, but both have begun to reduce this proportion: from 66.0% to 56.5% in Mexico and from 78.1% to 65.8% in Indonesia.

Concerning the trends in mathematics since 2003, Mexico shows a performance 21 score points higher in PISA 2006 than in PISA 2003, although at 406 score points it is still well below the OECD average. Both males and females performed significantly higher, with very similar increases, which means that there are no significant gender differences in performance between 2003 and 2006.

Focusing on the performance of the sexes, males do slightly better than females in mathematics. Males score 410 points, while females only scored 401 points. In mathematics, the higher percentages for both males and females are in levels one or below. About 54% of males were in level 1 or below, while 44.8% could perform at intermediate levels. As for females, 59% of them performed at level 1 or below and only 41% attained the intermediate levels. Of the students who attained at least level 5, about 1.2% were male but only 0.5% female. On average, in the OECD countries, females came out slightly higher than males in

mathematics at the intermediate levels (67% and 64%), although the difference is smaller than in reading.

Science performance in 2006

Proficiency levels are defined for the purpose of describing what scientific competencies students obtaining scores at each level demonstrate. Student scores in science are grouped into seven proficiency levels, with Level 6 representing the highest scores (and hence the most difficult tasks) and below Level 1 the lowest scores (and hence the easiest tasks). The comparative 2006 PISA science performance of Mexican and OECD students in terms of the proficiency levels is shown in Figure 2.3.

Figure 2.3 - Percentage of students at each proficiency level on the science scale
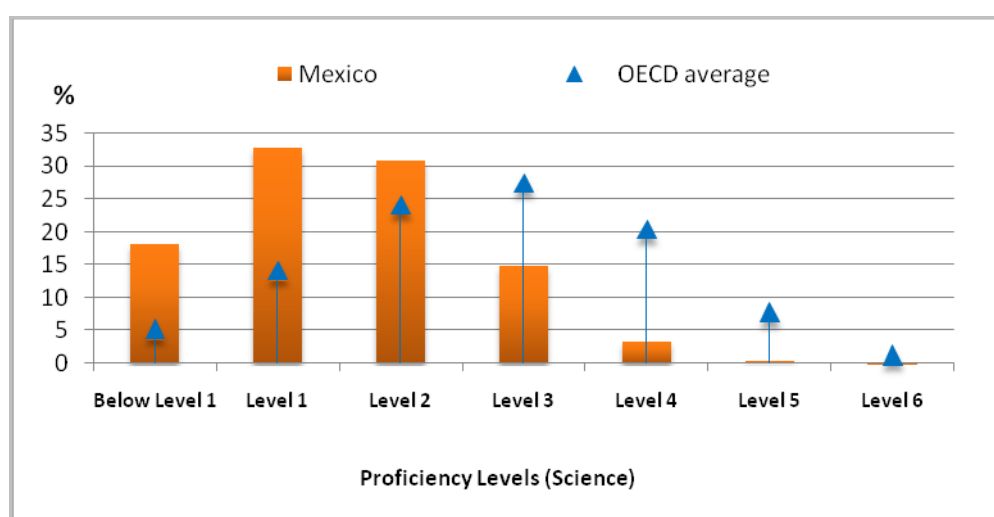
Source: PISA 2006 Science Competencies for Tomorrow's World, Volume 2, Table 2.1a.

PISA 2006 tested a comprehensive range of achievement, defined as *scientific literacy*. In 2007, following a detailed analysis of the questions from the main study, the international PISA Science Expert Group, which guided the development of the science framework and questions, identified Level 2 as the "baseline" proficiency level. This level does not separate scientific literacy and scientific illiteracy. Rather, the baseline level of proficiency defines the level of achievement on the PISA scale at which students begin to demonstrate the scientific competencies that will enable them to participate effectively and productively in life situations related to science and technology. To reach Level 2, for example, requires competencies such as identifying key features of a scientific investigation, recalling single scientific concepts and information to a situation, and using results of a scientific experiment represented in a data table as they support a personal decision. However, students at Level 1 often confuse key features of an investigation, apply incorrect scientific information, and mix personal beliefs with scientific facts in support of a decision. In contrast, students

with high performance levels can link different information sources and explanations and use evidence from those sources to justify decisions. They clearly and consistently demonstrate advanced scientific thinking and reasoning, and they demonstrate use of their scientific understanding in support of solutions to unfamiliar scientific and technological situations.

It should be noted however that, while the mean score is a useful benchmark for the overall performance of countries, it hides important information on the distribution of performance within countries. Policy makers of countries with similar mean scores may be tempted to make similar policy interventions, whereas in fact the countries may have very different profiles of student performance – one country may have performance clustered around the average, with relatively smaller proportions of students at the extremes while another may have relatively large proportions of students at the lower and upper extremes of the scale (OECD, 2007d).

The overall science results from 2006, show that, across the OECD, on average 19.2% of students are below Level 2 (Figure 2.3). However, in Mexico, according to the mean scores, about 51% of students are not proficient at this level. Mexico compares more closely with other Latin American countries participating in PISA 2006 (Argentina, Brazil, Chile, Colombia and Uruguay) where the regional average is 51.7%. This same trend can be observed in the middle levels of performance (2, 3 and 4), where Mexico, with 49% of students on this level, is well behind in the OECD average (72%), but close to the regional average of 48% of students.

Concerning the highest levels of performance, only 0.3% of students in Mexico achieve at least level 5 or above. This performance was very dissimilar to the OECD average of 9% of students, but even regionally, although there was a greater convergence, Mexico's percentage was one of the lowest (only 0.3%, against a regional average of 0.8%), where Chile ranked the highest, (with 1.9% of students) and only Colombia (with 0.2%) ranked lower than Mexico.

PISA 2006 defines *scientific literacy* and develops its science assessment tasks and questions within a framework of four interrelated aspects: the contexts in which tasks are embedded, the competencies that students need to apply, the knowledge domains involved and student attitudes[8].

Performance by scientific competencies

The competencies measured in PISA 2006 science questions are: *identifying scientific issues*, *explaining phenomena scientifically* and *using scientific evidence*. These three competencies were selected because of their importance

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[8] Concerning context, the PISA 2006 science questions were framed within a wide variety of life situations involving science and technology, namely: "health", "natural resources", "environmental quality", "hazards" and "frontiers of science and technology". These situations were related to three major contexts: *personal* (the self, family and peer groups), *social* (community) and *global* (life across the world).

to the practice of science and their connection to key cognitive abilities such as inductive/deductive reasoning, systems-based thinking, critical decision making, transformation of information (*e.g.* creating tables or graphs out of raw data), construction and communication of arguments and explanations based on data, thinking in terms of models, and use of science (OECD, 2007d).

Comparing performance in these three scientific competencies, students in Mexico did relatively better in identifying scientific issues (421 score points), followed by explaining phenomena scientifically (406), and less well in use of scientific evidence (402). In identifying scientific issues, 55.4% of students attained the mid-levels 2, 3 and 4, and 44.1% in level 1 or below. In this area of assessment, both males and females have their largest percentage at the mid-levels: (53% for males and 57% for females). In the other two areas of competence, performance was very similar.

Differences in performance by gender was relatively insignificant and consistent with the overall science trend from OECD countries, where males scored only two points higher than females. Only the United Kingdom, Luxembourg, Denmark, the Netherlands, Mexico and Switzerland show a small advantage for males (between 6 and 10 score points) while Turkey and Greece show an advantage for females (6 and 12 score points). In the Latin American zone, Mexico had the lowest gender gap (7 points) compared to partner countries were this was the case, such as Brazil and Chile, where men scored higher than females (between 9 and 22 points) or Argentina, where females scored higher than men (13 points) (OECD, 2007d).

Performance by content areas

In PISA 2006, *scientific literacy* encompasses both *knowledge of science* (knowledge of the different scientific disciplines and the natural world) and *knowledge about science* as a form of human enquiry. The former includes understanding fundamental scientific concepts and theories; the latter includes understanding the nature of science. Some PISA 2006 science questions assess *knowledge of science* while others assess *knowledge about science*.

Therefore, knowledge of science used three content areas for the PISA 2006 assessment by applying the above criteria to the areas of "Physical systems", "Living systems", and "Earth and space systems." These content areas represent important knowledge that is required by adults for understanding the natural world and for making sense of experiences in the *personal, social* and *global* contexts.

Students in Mexico scored highest in the physical systems aspect, with 414 points. Though, with 86 points below the OECD average, this is still the lowest scoring among OECD countries. This is as well the area where sex difference was the highest for Mexico, where males outscored females by 18 points. The next highest mean score was that of the Earth and Space scale (412 points in the mean score) followed by the Living Systems scale (402 score points). In these two last areas, males performed higher than females with 16 and 13 points of difference.

In terms of the assessment of Knowledge about science – which is concerned with scientific enquiry and scientific explanations, there was no significant sex difference among students in Mexico. Among the OECD countries, this was the only area were females scored over males, with a difference of 10 points. Mexican students attained a mean score of 413 points, which the lowest among OECD countries.

Students attitudes to learning in mathematics (PISA 2003) and science (PISA 2006)

In PISA 2003, the attitudes of students in Mexico were amongst the most positive of all OECD countries in their approach to school with 87% saying that they were interested in the things that they learn in mathematics, compared to the OECD average of 53%. Students in Mexico were also convinced of the usefulness of studying mathematics to a much greater degree than their counterparts in other countries with 95% of them believing that the mathematics they study at school will help them later on in their jobs. Across the OECD, 70% of students had this belief.

In 2006, despite the low scoring of Mexico in science, students' attitudes concerning this domain were very positive with few gender differences. Overall, Mexico students were well above the OECD average concerning matters such as their interest in learning science topics and the importance accorded to students to doing well in science, mathematics and reading at school (where it scored the highest among OECD countries). Mexico scored among the highest in the support for scientific enquiry as well (where it scored the third, after Turkey and Portugal among OECD countries).

Therefore, the question that arises is, if students have positive attitudes towards mathematics and science in Mexico, how can these be most effectively used to improve their science performance?

Performance according to socio-economic background

Student level

Variation in student performance within countries can have a variety of causes, including: the socioeconomic backgrounds of students and schools; the ways in which teaching is organised and delivered in classes; the human and financial resources available to schools; and system-level factors such as curricular differences and organisational policies and practices. Identifying the characteristics of those students, schools and education systems that perform well in a disadvantageous socio-economic context can help policy makers design effective policy levers to overcome inequalities in learning opportunities. The social and financial costs of educational failure are high, as those without the competencies to participate in today's society generate higher costs for healthcare, income support, child welfare and security.

Catering for the needs of a diverse student body and narrowing the gaps in student performance represent formidable challenges for all countries. Even in comprehensive school systems, there may be significant variation in

performance levels between schools, due to the socioeconomic and cultural characteristics of the communities that are served or due to geographical differences (such as between regions, provinces or states in federal systems, or between rural and urban areas). For each country, a distinction is made between the variation attributable to differences in student results attained by students in different schools (between-school differences) and that attributable to the range of student results within schools (within-school differences).

The relative success in provision of appropriate and equitable opportunities for a diverse student body is therefore an important criterion for judging the performance of education systems and PISA devotes significant attention to equity-related issues. To do so, it uses the extent to which socio-economic background relates to successful student and school performance as a criterion for assessing equity in the distribution of learning opportunities. Where students and schools consistently perform well, irrespective of the socio-economic context, learning opportunities can be considered to be more equitably distributed. In turn, where successful student and school performance strongly depends on socio-economic background, large inequalities in the distribution of learning opportunities remain and the potential of students remains under-utilised.

To what extent is this relationship an inevitable outcome of socio-economic differences, as opposed to an outcome that is amenable to public policy? One approach to answering this question lies in examining to what extent countries succeed in moderating the relationship between socio-economic background and student performance.

The results from PISA 2006 show that poor performance in school does not automatically follow from a disadvantaged home background. However, home background remains one of the most powerful factors influencing student performance, explaining an average of 14.4%% of the student performance variation in science in the OECD area (OECD, 2007d).

For mathematics in PISA 2003, on average, in Mexico, a student with a socio-economic background at one standard deviation higher than another student scored 29 points higher in the mathematics assessment. This was significantly lower than the OECD average, which was 45 score points. In this regard, Mexico was similar to countries such as Iceland, Finland and Portugal which had between 29 and 33 score points for a one standard deviation increase in socio-economic background.

In PISA 2006, similar results were found for the Science score, where the slope of the relationship between student performance and socio-economic background (measured by the PISA index of economic, social and cultural status) was significantly lower for Mexico (25 points) than for OECD average (40 score points). Mexico had indeed the lowest gradient among OECD countries, (followed by Portugal, Iceland, Italy, Finland, Spain, Turkey, Korea and Canada). However, in the case of Mexico, there are several exceptions to the trend of this slope (the explained variance, or strength of the relationship, is comparatively low), which could even mean that students with a disadvantaged background achieved good

results, while students from a more advantaged social background did not perform as well as expected.

Although Mexico shows below average performance in science associated with an average impact of socio-economic background, it is important to note that because only around one-half of 15-year-olds are enrolled in school (the smallest proportion among all participating countries) and thus represented in PISA, the impact of socio-economic background on the science performance of 15-year-olds may be underestimated. Furthermore, the percentage of students that fall within the lowest 15% of the international distribution of the PISA Index of Economic, Social and Cultural Status is one of the highest among OECD countries (53% of students). Only Turkey had a higher percentage (63%), as well as the partner countries Brazil (53%), Indonesia (69%), Thailand (70%) and Tunisia (57%). According to the length of the gradient line, which indicates how widely the student population is dispersed in terms of socio-economic background, Mexico has a wide dispersion of socio-economic background in the student population.

School level

Overall, when comparing the performance between schools since 2000, Mexico has experienced a decreasing variance explained by the socio-economic background of students, as well as students and schools.

As for performance within schools, although Mexico's levels had increased from 2000 to 2003, these decreased in 2006, and sometimes to the same levels of 2000. This was the case for reading (observing both "students" alone and "students and schools") and mathematics (concerning the socio-economic status of students). Nevertheless, it should be noted as well that Mexico's variance (both between and within schools) has been relatively weak throughout the PISA assessments in the three subjects, as it has in all cases remained under the OECD average.

To sum up, in Mexico, concerning science, reading and mathematics, the variance between schools has tended to decrease since 2000, both observing "students" only and "students and schools". Concerning variance within schools, variance increased in 2003, but in general has now decreased to 2000 levels. In Mexico, between 2000 and 2006, total variance between schools has had an overall decrease in the three areas: Science (from 41% to 35%), Reading (from 53% to 36%), and Mathematics (from 51% to 36%).

Regarding the students' performance by level of parents' education, there is indeed a difference between those students whose parents have attained tertiary education, against those students whose parents have only attained secondary or lower education. When comparing these two categories, we can observe that the former do perform better in the three areas, being reading the most marked difference (55 points of difference), then mathematics (51 points) and science the last (49 points).

In addition, when observing these two groups against the OECD average, a broadening gap appears. For example, the difference in the mean score between Mexican students whose parents have only attained secondary education and those from the OECD average is of 58 score points for science. Nevertheless, the difference between students whose parents have attained tertiary education in Mexico and the OECD average of students in the same conditions is even greater, with 88 score points. This means that, while the parents' education is a great factor to determine a student's advantage against others in the Mexican context, this advantage last does not translate at the same extent (OECD, 2007d).

Data show as well that, in Mexico, students whose parents attain primary education perform better than those whose parents could not do this. Results show that students whose parents completed secondary education will do even better. These differences particularly relate to the mother's education. For example, in science, there would be a difference of 32 points between those students whose mother did not achieve primary or lower secondary education and those whose mother did (the difference for the father is of only 25 points). This difference grows to 40 points concerning those students whose mother attained a level of upper secondary education. This trend is consistent with the analysis by the occupational status of parents, where the difference of performance in science between students with blue collar and white collar parents ranged from 34 points in 2003 to 52 points in 2006.

It can be observed as well that students in Mexico having at least one parent in the scientific sector perform better than those who do not (difference of 52 points). This is not necessarily the case among OECD countries; where, in average students not having at least one parent in the scientific sector tend to perform better than those that do (difference of 43 points).

Learning environment and organisation at schools

Stakeholders

School education is mainly a public enterprise. Nevertheless, with an increasing variety of educational opportunities, programmes and providers, governments are forging new partnerships to mobilise resources for education and to design new policies that allow the different stakeholders to participate more fully and to share costs and benefits more equitably. On average across OECD countries, 4% of 15-year-olds are enrolled in schools that are privately managed and predominantly privately financed (referred to as government-independent private schools). In accordance with OECD standards, these are schools in which principals reported management by nongovernmental organisations such as churches, trade unions or business enterprises and/or have governing boards consisting mostly of members not selected by a public agency. At least 50% of their funds come from private sources, such as fees paid by parents, donations, sponsorships or parental fund-raising, and other non-public sources. There are only a few countries in which such a model of private education is common. Only

in Japan, Korea, Mexico and Spain, and in the partner countries/economies Chinese Taipei, Macao-China, Indonesia, Jordan, Uruguay, Colombia and Thailand, is the proportion of students enrolled in independent private schools greater than 10%. By contrast, in more than one-half of the participating countries either independent private schools do not exist or 3% or less of 15-year-olds are enrolled in such schools.

Relating to the involvement of private and public stakeholders in school matters, Mexico's results compared to other OECD countries are very interesting. School principals report levels of participation in matters such as *staffing, budgeting, instructional content and assessment practices*, which tend to be relatively elevated compared to some other OECD countries.

Concerning staffing matters, regional or national education authorities and the school's governing board tend to be the decision takers most frequently quoted by school principals. These results tend to be among the OECD average. Concerning other stakeholders, although only the principals of 18% of students reported the participation of parents in this matter, this percentage is the highest among OECD countries. In most of the countries (both OECD members and partner countries), these actors were barely quoted as relevant stakeholders (OECD, 2007d).

Regarding budgeting matters, regional or national authorities were quoted as the most important stakeholders, followed by parents' groups. As for instructional content matters 64.9%, of students' principals referred to national and regional stakeholders as instrumental, while 47.1% referred to teachers' groups. School governance boards were only quoted by 28.7% of students' principals.

In these three dimensions, according to the responses in the principals' reports, regional or national authorities tend to have a role in these matters for the greatest number of students. In general, students concerned by these stakeholders would range among 50% for staffing matters and 43% for assessment practices. Curiously, in this last, teachers' groups seem to have a greater influence (46% of concerned students) and external examination boards seem to be the most influential stakeholders in these matters (51% of concerned students). Teachers' groups are perceived as the most relevant stakeholders on instructional content matters (44.9%), slightly more than national or regional state stakeholders with school governing boards well behind.

Concerning parents' participation, as is mentioned above, Mexico ranged the highest among OECD countries in staffing matters, and had as well a relatively high percentage concerning budgeting matters (31.8%), where it ranked third after Denmark (52%) and Turkey (49.5%). Parental pressure for a school to achieve higher standards seems to be weak in Mexico. According to principals' responses, for about 77% of students, only a minority or few parents get involved in these kind of demands, against only 23% of students where many parents get involved. However, when compared with other OECD countries, it is striking to see that in high performing countries, parents' participation is not as high as would be expected. For example, in Finland principals attest to remarkably low levels of parental participation, with 98% of students in schools which perceive

that a minority or very few parents exercise this pressure. Another explanation could be that where there is high and consistent performance across schools, parents may be less concerned about choice between schools than in countries where there are large performance differences between schools.

According to information from principals, achievement data are reported to be tracked over time by an administrative authority for accountability purposes for 91% of students. Eighty-three percent of principals reported that data are used in evaluating teacher's performance, against only 37% of the cases that reported data to be used to assess the principal's performance. These three percentages rank higher than the OECD average, which rated only 65%, 43% and 31.6% respectively. General school achievement data is only reported to be posted publicly for schools with 40% of students, which is about the same as the OECD average. The picture on public reporting of performance data is less clear; some schools say it happens, others do not.

Autonomy

A finding in PISA 2006 was that students in educational systems that give more autonomy to schools in educational matters such as choice of textbooks and courses offered tend to perform better. Greater autonomy has a general impact on schools systems, perhaps deriving from the greater independence of school managers and greater scope to make decisions in relation to local need and context. Similarly, students in educational systems that give more autonomy to schools to formulate the school budget and to decide on budget allocations within the school tend to perform better. It is interesting to observe these variables at the level of the Mexican education system, as it will allow us to know better its functioning.

The degree of autonomy of schools in Mexico is perceived to be less strong than in the average of OECD countries. Concerning those matters which only concern the school, the results show that establishing students' disciplinary policies and deciding on budget allocations within school are the matters which had the largest percentages as being only a school responsibility (with about 89% and 86% respectively), followed by 67% of principals who consider that approving students for admittance to school is an exclusive school responsibility. Only 60% of schools consider that choosing which textbooks are used is an exclusive school responsibility (against 33% who consider this is an exclusive government responsibility). 58% of the principals considered that establishing student assessment policies is an exclusive affair of the school, against 30% who considered this an exclusive government attribution.

It is interesting to note that there was no dominant percentage for compound school and government attributions in the measured indicators. In some cases, the percentages are similar between those who consider a matter as school specific and government specific, such as the responsibility for appointing teachers (50% consider it as an exclusive school matter, against a 47% who consider it as an exclusive government responsibility), and the formulation of the school budget (58% and 39%). The data present a confused picture.

As for those facilities perceived as government specific, the most important are related to determining teacher's starting salaries (77%), salary increases (78%) as well as the facility of dismissing teachers (61%). There is as well a marked consideration concerning the capacity to determine course contents (75%) and decide which courses are offered (80%). This result is consistent with the institutional arrangements determined by the agreement for the Modernisation of the Education Sector signed in 1992, as was explained above. Nevertheless, when comparing it to the OECD countries as a whole, we can see that this responsibility, as well as that of dismissing teachers, tend to be more a school specific responsibility. This result is consistent with the perception of the influence of business or industry in the school curriculum. In this question, results showed that there is a high percentage of students whose principals (almost 80%) consider that there is very little or no influence at all on educational syllabus. Only about 20% considered this was significant.

Infrastructure and resources

Ensuring the availability of an adequate physical infrastructure and supply of educational resources does not guarantee good learning outcomes, but the absence of such resources could negatively affect learning. School principals were asked to report on the extent to which the school's capacity to provide instruction was hindered by the shortage or inadequacy of several types of resources, including: science laboratory equipment, instructional materials such as textbooks, computers for instruction, internet connectivity, computer software for instruction, library materials and audio-visual resources (OECD, 2007d).

Concerning school resources in general, the shortage seems to be teachers, where the student/teacher ratio is the highest among OECD teachers, with 27 students per teacher (this is consistent with the results discussed in section 2 for 2003). In Mexico, according to the index of teacher shortage, school principals more frequently reported that the lack of qualified teachers hinders instruction than is the case on average among OECD countries. Mexico had indeed the highest percentage among OECD countries exhibiting this perception (32%). Mexico was also among the countries (along with the Slovak Republic, Turkey, Mexico, Iceland, Poland, Norway and Hungary), and in many of the partner countries where school principals expressed more concern about the supply of laboratory equipment, and where they considered that shortage or inadequacy of laboratory equipment hindered learning. Unlike countries such as the United Kingdom, Australia, Luxembourg, Austria, the United States and Norway, where five or less students shared one computer, in Mexico, the ratio was of 14 students per computer, which is similar to the ratio of the OECD countries Poland and the Slovak Republic, and the partner countries of Estonia and Thailand. However, Mexico was also one of the countries in which the perceptions of principals concerning educational resources in general varied the most from school to school.

Summary

The 2006 PISA data present a picture of very low levels of achievement by a large proportion of the school population. The effect of dropouts means that the actual position is more serious across the national cohort of 15 year olds. The low functional levels of literacy and mathematics in particular have serious consequences for the growth of the economy. Although these are small signs of gradual convergence with OECD norms, there is no cause of complacency; education in Mexico has more to do to catch up than any other OECD country.

The alarmingly low levels of literacy and numeracy must point to inadequacies in the quality and effectiveness of teaching. Evidence of a poorly trained and qualified teaching force is compounded by the unusually low proportion of pupils who achieve at the highest levels. The achievement data provide a strong call for the re-professionalisation of the teaching force, giving teachers better training and in-school professional development, providing the resources they need to do an effective job, and expecting them to take responsibility and be accountable for the progress their students make.

Limited and variable degrees of school autonomy, inconsistencies between regional states and an apparent lack of focus on school and system leadership are likely to provide contributory factors. Systemic opportunities abound, but the barriers may include inertia, restrictive practices and the lack of sufficient educators with the vision to see how different things could be.

Chapter 3 will now provide us with a number of possible explanations for Mexico's relatively low performance in the PISA assessments in light of the results discussed in Chapters One and Two and from reviews of the relevant literature and interviews with key players.

Chapter 3

An analysis and review of the Mexican education system

The purpose of this chapter is to explore a number of key issues arising from Mexico's relatively disappointing performance in the PISA assessments and those arising from reviews of the relevant literature and interviews with key players. The following are amongst the most important issues arising from the evidence we have gathered:

- the funding of the education system;
- the level of autonomy at the local and at the school level;
- the accountability mechanisms in place;
- the quality of teaching and learning and teachers working conditions and practices;
- the stakeholder involvement in the system; and
- the regional, socio-economic and gender inequalities.

Factors that may contribute to Mexican students' underperformance

The funding of the education system

As seen in Chapter 1, Mexico's public spending in education is the highest among OECD countries as a proportion of GDP and almost twice as high at the OECD average level. However, current spending at primary and secondary levels is on revenue, leaving at the primary and secondary level only 5% for other current expenditure. Also, spending per primary student is very low and even lower for secondary students. This suggests that there is insufficient money going into the infrastructure in its wider sense in the education system in Mexico.

It is easy to say that more money is required for educational human and physical resources but success will only come if money is used efficiently and effectively through a transparent system of accountability. There is a consensus that more financial support for education is required for improving the physical plant of schools in marginal urban and rural areas and localities where the middle class has opted out of the State system. There is also a strong feeling that grants need to be provided for young people from poor families so that the percentage of children remaining in upper secondary education and proceeding to higher secondary education can be increased. Furthermore, many suggest that the main problem is a structural one whereby schools cannot absorb or receive the added resources without major structural reforms.

It is suggested that reforms are required in the allocation of funds, in particular:

- in the accountability of the use of these funds;
- in the relationship between the Federal government and state governments;
- in the relationship between state governments and schools;

- in the number of agencies and organisations that intervene in the management of schools.

However, before one can begin to answer the question of what additional funds are needed and what funds can be re-allocated within the system there is a need for systematic research into the nature of the resources made available, how they are allocated and how successful that allocation is. This will require a considerable increase in audit and evaluation processes.

Our evidence suggests that there are a number of significant issues that must be dealt with. These include:

- The allocation of large amounts of funding to projects like the Enciclomedia, when teachers lack training in pedagogy to use it effectively.
- The financing of teachers who perform few or no duties in relation to education appears a major issue and further research is needed on the financial impact this has on the system as a whole.
- Whether there is a coherent strategy for the increased allocation of resources for schools located in marginal, urban and rural areas.
- There is insufficient information about value for money in relation to different educational priorities. There is a need for a more developed cost benefit analysis of the range of educational interventions currently operating in the system.
- The clarity and efficiency of the administration system. It has been suggested that no section of the government has a clear picture of how many agencies are involved, what they do and what they cost. This involves an enormous expenditure that could be reduced and improved.
- The centralisation of funding. The bulk of resources come from the Federal government through allocations to the States. The States play an increasingly important role in determining their budgetary priorities. However, almost all programmes are financed centrally. These are important because, given that most expenditure is on revenue, there is little left over for innovatory schemes of the kind required to improve the educational performance of pupils.

Many of these issues cannot be addressed without better statistics and data being made available to researchers who can then draw up a set of alternative proposals for how monies can be allocated. This is not an argument against increasing funding, but is an argument that funding should be used more effectively and responsibly, and that spending should be devolved to those who are delivering the education service locally.

The level of autonomy at the local and at the school level

Devolution of responsibility at the local and at the school level is assumed to bring about increased efficiency in educations systems (OECD, 2005a). Most countries that performed higher in PISA 2000 and 2003 are those where States

and schools have substantial autonomy in developing their educational content and managing resources. Similarly, PISA 2006 findings point out that students tend to perform better in education systems where autonomy is given to their schools to:

- choose textbooks
- determine course content, and
- decide which courses to offer
- formulate the school budget and to decide on budget allocations within the school (see Chapter 2 for more details).

PISA 2006 concludes that the degree of school autonomy in Mexico is less strong than in the average of OECD countries particularly in relation to the curriculum and pedagogic practices, and suggests that "in practice, the central government has kept key attributions, such as the determination and evaluation of education contents and through its financial clout has often compelled States to toe the line". Each State can now select those textbooks that it wishes to use but, in practice, it has been found easier to use the materials produced by the SEP. The textbooks used to be published by the Ministry itself. This is now done by private companies, particularly for secondary schools and there is much debate about cost effectiveness and quality control.

Teaching and headship appointments are largely influenced by the SNTE and some States use standardised mechanisms based on academic criteria to fill teaching vacancies. Respondents pointed out that the lack of autonomy in selecting staff prevents head teachers from constructing a team of people that share the same educational goals and are able to work towards the school's priorities for improvement as a whole. They also stressed that most educational decisions are made by individual teachers within the realm of their own classrooms and have no bearing on more general collegial agreements; nor do the teachers necessarily adhere to guidelines for curriculum and pedagogy.

Initiatives such as *Reform of Secondary Schools* (Reforma Integral de la Secundaria) which gives some autonomy to the States and schools to design their curricula, and the *Quality Schools* (Escuelas de Calidad) which encourages further devolution of responsibilities have overall supported the process of decentralisation and have shown positive impact. Nevertheless, Guichard (2005, p.15) argues that the scope of the above programmes is limited both in terms of the number of schools that participate and in the calls for further decentralisation. Other research findings also point to the need for further decentralisation. For example, Muñoz-Izquierdo and Villarreal-Guevara (2005) in their evaluation of Mexico's compensatory programmes concluded that their analysis supported the contention that further decentralisation and school autonomy was needed in order to improve Mexico's education system. Alvarez et al (2007) who used the PISA 2003 student-level achievement database for Mexico to estimate its States' education production functions also agree that increase in school autonomy is needed to improve pupil performance.

The accountability mechanisms in place

Mexico's accountability system is seen as weak in comparison to other OECD

countries. Overall, it appears that this is due to the lack of clarity about:

- standards and clear target setting;
- systematic monitoring of standards;
- access to and availability of assessment and school evaluation data even to schools and certainly the public; and
- strategic planning for improvement based on a wealth of data.

Research evidence has repeatedly shown that strong accountability frameworks have a positive impact on student outcomes. For example, most countries that have scored higher in PISA have strong accountability frameworks in place. Evidence from the United States where research on the impact of State accountability systems reveal that strong accountability systems lead to positive increase in student performance (Hanushek and Raymond, 2005; Jacob, 2005). These countries and States formulate the goals and standards of the education system, they monitor performance and progress, feedback results to all stakeholders and, based upon results and feedback, they plan accordingly.

Assessment at all levels of education in Mexico is a complex issue. In policy terms Mexico is very committed to assessment and has developed a complex system of examinations. There are now 45 different examinations. The main primary and secondary national examinations which have been established within the last 10 years are both advisory in nature so there is no national statutory system of assessment which can provide an overview of the performance of the system as a whole. Teachers set their own tests to determine which pupils will progress to the next level in their education, indicating a lack of standardisation of practice.

Research evidence shows that the existence of State accountability systems in Mexico has a positive and significant impact on pupil outcomes (World Bank, 2004). However, State accountability systems vary in terms of their effectiveness. A research project conducted by the World Bank measured the impact of different State accountability frameworks and identified the ones that had the most positive impact on pupil achievement. The research used five categories of State accountability systems. States that participated in the sample-based national student assessments by the INEE but also have implemented their own student assessments (such as tests in math and reading) (see columns for "local effort" in Figure 3.1). Some of these tests are administered to all students in all grades and others to students in just a few grades. Some States that use the results of their state-wide assessment systems to inform their policy (see columns for "dissemination" in Figure 3.1). Others disseminate the results to the schools and ask for their feedback (see columns for "feedback" in Figure 3.1). Lastly, some of the most advanced, that do all the above and use the feedback to design specific school strategies and interventions (see column for "own evaluations" in Figure 3.1). These States showed the best academic results (ibid. p.35; see also Alvarez et al, 2007).

Figure 3.1 – Type of accountability system and achievement score in PISA 2003 Mathematics
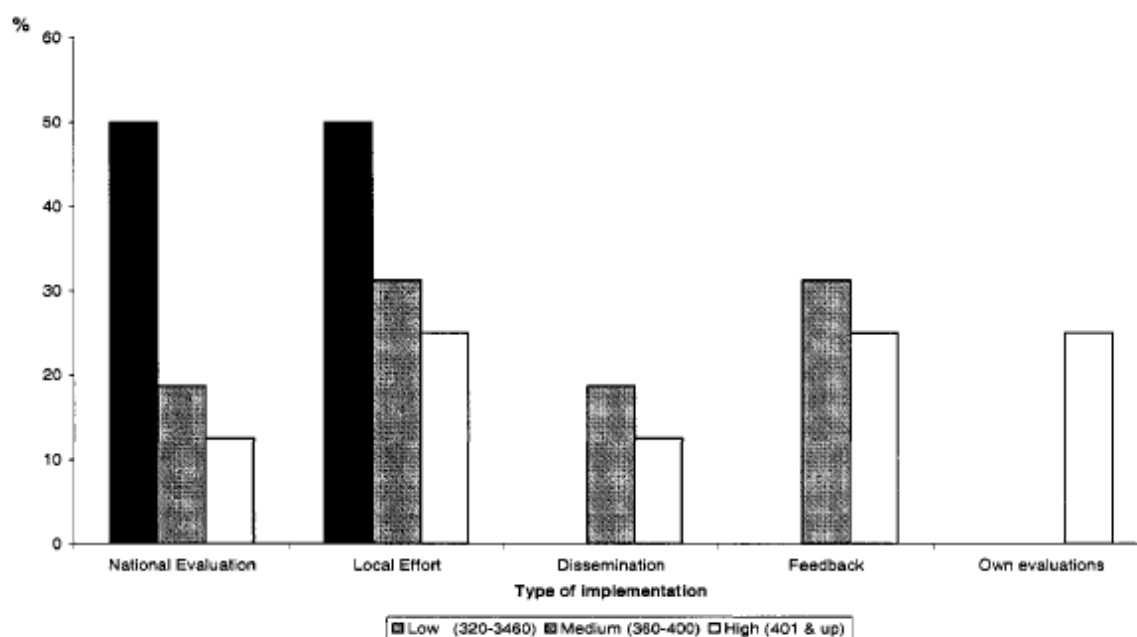
Note: Bars represent % of states scoring by type of assessment they use

Such advanced accountability frameworks are not commonplace in Mexico. Interviewees pointed out that many State officials as well as head teachers and teachers do not have the capacity to develop a sophisticated accountability framework for their State. They also highlighted that training in interpreting assessment data and understanding of how to strategically develop strategies for improvement is lacking.

To support the development of an advanced accountability framework, data on the performance of pupils and schools have to be available. Access to such data is imperative for all States and schools as planning for improvement needs to be based upon them. Although Mexico has been assessing students and evaluating schools and teachers for many years, results have predominantly been used for internal purposes by the Government and the States. However, the creation of the INEE which undertakes evaluations on a sample of schools in the primary and secondary sector and has been publishing its evaluations, is an important step in changing the prevailing culture of concealing results and fostering a culture of positive accountability.

Respondents agreed that transparency and accountability are lacking in the Mexican education system and suggested that accountability should be increased; that all educators should be evaluated; that evaluations should be systematic; and that results should be fed to teachers and leadership teams, parents and the general public. This is also the view of the most relevant and informed literature (Guichard, 2005; Santibañez et al, 2005; World Bank, 2007). Furthermore, respondents felt that many school evaluations are ineffective due to

the lack of training for inspectors.

The quality of teaching and learning and teachers' working conditions and practices

Teacher preparation and professional development

The selection of future teachers and inadequate teacher preparation both in the primary and in the secondary sectors were two of the most cited reasons for the current low level of educational quality in Mexico (see Guichard, 2005; Santibañez, 2004; Tatto, 1999) and in particular for the poor quality of teaching in the country (Santibañez, 2004).

Mexico has recently introduced entry examinations as a selection mechanism for prospective teachers to teacher training colleges (Guichard, 2005). However, in 2004 only 13 States of the 31 States were found to select prospective student-teachers through exams (OECD, 2004). Interviewees applauded efforts to establish a process of selection for future teachers but highlighted the need for investigation of their effectiveness. Taking into consideration that inappropriate selection in teacher training courses can equate up to 40 years of poor teaching (McKinsey and Company, 2007) we can assume that the absence of or inadequate selection processes must have had a negative impact on teaching quality in Mexico for many years.

It is important to note the large proportion of teachers in the Mexican education system that hold no teaching qualifications. OECD (2004) statistics show 70% of secondary teachers to have no teacher training qualifications. Santibanez et al (2005) found about 40% of secondary teachers have never attended a teacher training institution and have never been offered in-service training on how to teach. Importantly, in 2004 the INEE identified 60% of primary teachers as not having a first degree. This comes in contrast with top performing education systems which require their future student-teachers to hold at least a bachelor's degree (McKinsey and Company, 2007).

A further criticism relates to the inadequacy of teacher training in promoting the development of teachers' subject knowledge and skills. In particular, Santibanez et al (2005) refer to the reform of the secondary school teacher college curriculum in 1999 that aimed to develop teachers subject knowledge, pedagogical content knowledge and practice. This was implemented almost six years after the new secondary school curriculum was introduced. Thus, they point to the period between 1993 and 1999 during which there were no formally-trained subject teachers to teach the reformed secondary curriculum. They also note that, after 1999, student-teachers spent only 15% of their time learning about their subject and emphasise the lack of sufficient specialised training particularly given that most of them are only high school graduates and thus, did not have training in the subject they wish to teach.

With regards to the Continuous Professional Development (CPD) of teachers the National program of the Permanent update of the Teacher of Basic Education *(Pronap),* the National Update Courses *(Cursos Nationales de Actualizacion*) and

the General Update Workshops *(Talleres Generales de Actualizacion)* aim to update teachers' skills. These programmes are uniform for all teachers and differentiation in terms of sector, subject, position and individual needs is lacking. Conversely, research participants and literature on effective CPD in schools highlight the importance of differential CPD.

Furthermore, the Professional Programme for Teachers' Professional Development (*Carrera Magisterial*) introduced in 1993 aimed to develop teachers skills and knowledge but also to incentivise and improve their performance and in turn pupil outcomes. The programme established salary differentials, for example to reward teachers working in rural areas, and also introduced salary structures by which teachers could move to higher levels of pay based on a series of assessments. Such assessments included pupil examination results, teachers' skills and knowledge acquired through professional development, years of experience and peer reviews. An evaluation of the programme found that it did not improve teaching and that the "impact analysis" of *Carrera Magisterial* incentives on student test scores suggests that these incentives do not have any discernible effects on student test scores for primary school teachers and very modest positive effects on student test scores for secondary school teachers who are vying for admission into *Carrera Magisterial* (Santibañez et al, 2007 p. xviii). These results highlight the importance of reforming the design and implementation of the programme.

Teachers and the curriculum

It also appears that not all schools are equipped to provide the curriculum prescribed by the government and that the transition between the curricula of primary and secondary schools is wanting as is, indeed, the relationship between subjects in secondary schooling. Moreover, it appears that to a certain extent primary education is based upon the integration of subjects and secondary education is based upon the teaching of individual subjects. This makes pupil transition from one level to the other more problematic. It is also argued that there is too much content that needs to be covered and too much teaching material that is not up to date. Finally, some argue that it is not clear whether secondary schooling should concentrate on educating children to continue in education or provide them with a firm basis to enter the labour market. It could be the case that the rapid expansion of secondary schooling did not immediately lead to the kind of thinking required to make sure that it was providing what pupils needed. It is important to note here that the *telesecondary* schools cannot necessarily provide all of these elements because success here depends on face-to-face contact in classrooms.

Researchers indicate that the biggest problem lies at the secondary level and for that reason the previous government (2000-2006) launched a reform of the secondary school curriculum with the aim of modernising it. There was much criticism of this reform running the gamut from the views of teachers organisations that they had not been carefully consulted and there was no provision of training to teach the new curriculum to groups of concerned citizens

who felt that certain key areas were now neglected. This was particularly the case with history.

The aim of the new curriculum was not only to provide more up-to-date content but to move teaching towards learning by problem solving. Individual State ministries and groups of teachers were consulted in order to construct a more relevant curriculum. However, such efforts are reported to have failed.

It is clear that if teachers do not understand the principles behind the curriculum, do not have access to material, or do not have training in order to teach the revised subjects then they are severely handicapped. Moreover, the problem is not so much the content as the way in which the content is conveyed to pupils, particularly at the secondary level.   If teaching remains based on learning by rote, memorisation and reproduction rather than problem solving no matter how excellent the curriculum content may be the students will not have the learning skills to equip them to join the knowledge economy.

A recent innovation much promoted by the 2000-2006 government is the Enciclomedia, for use in primary schools, an ambitious project designed to overcome the shortage of textbooks and the need for constant modification. The problem here is that teachers by and large do not have the pedagogic repertoire to use the Enciclomedia in a way that promotes successful learning. It is still early days and despite justifiable criticisms of the traditional way it is used it still has the potential to promote successful learning.

Turning now to the bigger picture, it would appear that the curriculum:
- (a) is prescriptive leaving little autonomy and little space for innovation to schools and teachers to develop curricula to fit their pupils' needs;
- (b) promotes learning by rote and ignores comprehension, problem solving and the knowledge and skills that pupils need to be successful in the 21st century (Maria Eugenia de la a Chaussée Acuna, 2005).
- (c) the links between school and work are weak in technical and upper secondary education resulting in students (and parents) failing to recognise the benefits of continuing their schooling.
- (d) promotes the use of a limited teaching and learning methods and thus reducing teachers from professionals to 'technicians'.

Reform in lower secondary education that aims to modernise the curriculum, change the organisation of classes and the organisation of teaching is a step forward but until there is a reorganisation and professionalisation of the array of advisory services that can, in theory, intervene in schools little can be expected. However, upper secondary education poses an even greater problem although the proposed reforms to the Bachillerato are certainly to be encouraged.

Teacher working conditions and practices

A number of factors contribute to the poor quality of teaching in Mexico and inhibit improvement in pupil outcomes. Apart from those discussed in the two previous sections, we have also to include:

- *The organisation of classes and relatively short school day:* Mexican schools operate in two or three shifts with many teachers working more than one shift and a school day for primary teachers lasting only four to five hours. As a result, little time is left to prepare lessons and personalise learning for all pupils and there is little time for extra-curricular activities which are very important in increasing student motivation and contextualising learning. Furthermore, opportunities for teachers to collaborate with colleagues and exchange ideas for improving teaching and learning within the same school are limited. Consequently, developing schools as professional learning communities becomes incredibly difficult and the collaboration between schools almost impossible.
- *Lack of resources to support teaching:* many teachers, especially ones in rural areas have to teach in schools lacking the basic infrastructure. Many schools do not have a library and the availability of books and other reading material, although it has improved considerably within the last six years, is lower than international levels. A study conducted by Fernando Reimers et al (2006) and a recent survey (INEGI, 2007) both stress the importance of the availability of other texts rather than textbooks to improve pupils reading and thinking skills in Mexico. Also, many schools do not have computers and internet access. Interestingly, interviews with teachers in a study conducted in 2002 by Santibanez revealed that some teachers in relatively wealthy areas often themselves bought teaching materials for conducting science experiments and other activities.
- *Teacher absenteeism:* this is a problem especially in rural areas (see for example Ezpeleta and Weiss, 1996; and Velez and López-Acevedo, 2004). Interestingly, usually there are no repercussions for teacher absenteeism.

Stakeholder involvement in the system

The relationship between the State and the SNTE

The main stakeholders in the Mexican education system, as mentioned in Chapter 1, are the government and the SNTE. State involvement and authorisation and the agreement of the SNTE are imperative in all educational matters in Mexico. As such, their effective collaboration is essential.

Alvarez et al (2007) measured union power and its impact on pupil academic outcomes with regards to the level of conflict between the state and the teachers' union. They define conflict as the "result of a lack of political alignment due to credibility and coordination problems that make negotiations difficult". They also refer to the Murillo et al 2002 study conducted in Argentina that concluded that adversarial political alignments was associated with a decrease in the effective numbers of days in which teachers are in the classroom, which had an indirect

negative effect on student performance. In Mexico, between 1998 and 2003 there were 49 strikes, one of the highest numbers in Latin America, which equates to 434 days of teaching lost (Gentili and Suarez, 2004). Alvarez et al found not surprisingly that where there was less conflict between the State and the Union that test results improved overall.

They also measured the allocation of teacher positions by the SNTE and its impact on pupil performance. They devised three categories: low influence which referred to those States where the union allocated less than 50% of teaching positions; medium influence which referred to States where the union allocates 50% of teaching positions and the rest 50% are allocated through prospective teachers' examination results – such exams are imposed by the States; and high influence which refers to States where the union allocates all the teaching positions. The results suggest that in those States classified as having medium union influence there was a negative correlation with overall test results.

Respondents also discussed the negative effects that the relationship between the State and the SNTE have on school culture and pupil learning. They emphasised the need for the development of effective collaboration between the State and the teachers' union and also suggested a shift in SNTE's priorities from raising salaries and expanding and selecting staff to becoming critical partners in improving the quality of the education system and the quality of teaching in particular. These responses are also consistent with discussions and recommendations made in the relevant literature.

Parental involvement

Parental involvement in educational matters and school-based management is highly valued in many high performing countries and research has shown its positive impact on pupil outcomes. In México, although parent groups are growing in popularity and influence, parental involvement is still limited. Areas that would most benefit from parental participation are the poorest and parents generally do not have the means to become involved. Middle-class parents, who could have been involved, for the most part have opted out of the state system of education.

Recent initiatives encourage parental participation in school life and try to increase the influence of parental organisations. For example, the compensatory programme *Support for Educational Management* (Apoyo a la Gestión Escolar, AGEs) designed to promote school-parent cooperation, despite the limited power of the AGEs. Research has shown that they have been effective in improving pupil outcomes (World Bank, 2006) and experiments are now underway in Mexico City through the *It Is Possible* (Es Posible*)* project which is developing a programme to involve coalitions of parents, teachers, heads and local education authorities to work towards higher levels of success in failing schools. Mexico's *Quality Schools Program (*Prograrna Escuelas de Calidad, PEC) that encourages parental involvement in the everyday life of schools was found to promote high levels of local ownership (World Bank, 2006).

Interviewees referred to the potentially positive impact of such programmes on school culture and pupil performance and emphasised the need for such initiatives in Mexico. They also pointed out that "parental involvement is scarce and there are no policies to support it".

Regional, socio-economic and gender inequalities

It is clear from a large body of research that not only is the quality of teaching and learning is very heterogeneous but, it is likely, that children from poorer socio-economic backgrounds, from rural and remote areas from indigenous groups and in some cases girls and particularly indigenous girls do worse in examinations. These students also tend to higher levels of truancy and often have to repeat entire academic years to a greater extent than those who live in urban areas and have a higher socio-economic profile (Muñoz-Izquierdo, forthcoming; María de Ibarola, 1995). As the research did not include an analysis of "added value" it is difficult to estimate the extent of the situation.

However, one study that did use a 'value added' approach focused on the *telesecondary* schools in the State of Puebla (Solórzano, 2007) and found that levels of improvement in student outcome were linked to good facilities and good teaching. The research indicated that this was due to a lack of teacher commitment, resulting from the lack of support given to professionals in those areas. In other words, when there are poor resources and back up, student outcomes suffer and this occurs far more frequently in schools in poor areas.

It is clear, as we have seen, that the most socially and economically disadvantaged pupils perform poorly in national and international studies. It is also clear as Bonilla (2006) points out that the cultural capital of families (defined as an an index composed of three indicators: parents schooling, availability of books at home and attendance to cultural events) is a factor that correlates highly with reading comprehension performance. Sadly, there do not appear to be policies that attemptto redress this situation. It would be possible however, through *Oportunidades* for families and especially mothers, who are part of the programme, to be reached. Also, for those who are illiterate it should be possible —through INEA— to teach them to read and write, or even better, to help them complete their primary schooling.

The government is committed to a programme of expanding distance learning largely through the *telesecondary* system and CONAFE. Until now neither has worked effectively. These are the types of schooling used overwhelmingly in poor and remote communities and there is now evidence that they actually maintain if not enhance the fundamental inequalities in the system. One way forward, as suggested by Cristian Solórzano is to abandon the policy of having relatively large numbers of very small schools in each community. It could be more effective in economic and socio-economic terms to have larger schools situated at a reasonable distance from the scattered communities and then bus the pupils in. This combined with greater involvement of parents in the management of the schools, as has been demonstrated in experiments in the state of Puebla, can lead to better outcomes for students.

Summary

This chapter has identified some of the weaknesses in the education system in Mexico which may have contributed to the underperformance of many of its pupils.

In terms of finance the key weaknesses include the lack of a coherent strategy in the funding of the education system and the lack of systematic monitoring of its cost effectiveness. There is a need for further investment in the physical plant of schools and for more teaching materials as well as further expenditure for poor students and those taught in marginal areas. It would also seem important to redesign and evaluate programmes that target those groups of students who appear to be at risk. The starting point for developing such a strategy should be a review of the cost effectiveness of current and capital spending.

It is also apparent that the relatively low levels of autonomy at local as well as school levels and the relatively low levels of accountability appear to hamper the efficiency and quality of Mexico's education system. Decisions about spending, teacher appointments and the allocation of resources should be increasingly devolved to those who are delivering the education service locally. Also, the involvement of parents in the every day life and management of schools should be further encouraged.

Greater autonomy should however be balanced by increased accountability. Accountability at various levels of the system as well as the distribution and publication of data should increase levels of responsibility and thus efforts to improve the quality of education offered to students. As we have seen in this chapter, research on State accountability frameworks has identified those frameworks that result in increased pupil outcomes. These States could support the development of similar accountability frameworks in other States.

Furthermore, the need to reform the curriculum both at basic and upper secondary education appears to be necessary. A shift from rote learning to the development of students' basic skills, problem solving and meta cognitive skills and better links between the curriculum and the labour market could have a positive impact on preparing pupils to respond to the demands of the 21st century. The proposed reforms for upper secondary education surely envisions such a change.

In order to successfully deliver such a curriculum, greater investment in improving teachers' professionalisation as well as their professional standing is imperative. Teachers should be able to employ an array of teaching and learning methods and tools so as to personalise teaching and learning for their pupils. Efforts to professionalise teachers should also pay attention to the selection of prospective teachers into teacher training colleges; the adequacy of the training offered; and support effective professional development within schools so to incentivise and motivate teachers to improve their practice.

None of the above will materialise without effective collaboration between the State and the SNTE although there needs to be a review of their respective

responsibilities and accountabilities. Both, alongside parents should develop a 'guiding coalition' that aims to provide the best quality of education for all Mexican pupils.

In Chapter 4 we put theses issues into a broader framework and make recommendations as to how the above issues might be addressed.

Chapter Four

A 'theory of action' and recommendations

For a country to succeed it needs both a competitive economy and an inclusive society. This requires an education system with high standards, which transmits and develops knowledge and culture from one generation to the next, promotes respect for and engagement with learning, broadens horizons and develops high expectations. We start from the assumption that all in Mexico want to ensure that each and every young person in their society progressively develops the knowledge, understanding, skills, attitudes and values in the curriculum, and becomes an effective, enthusiastic and independent learner, committed to lifelong learning and able to handle the demands of adult life.

Unfortunately, in Mexico national policy in educational reform has until recently proved insufficient to the challenge of delivering such an education system. As we have seen, there have been significant developments, but they have not gone nearly far enough. For example, the Government is doing much to increase the volume of basic education provision in response to a surge in enrolments, through multiple shift schools and teachers, innovative distance learning – the *Enciclomedia* project*,* and grant aid for low income families – the *Oportunidades* programme. It has also targeted low performing schools, through the *Programa Escuelas de Calidad,* and provided a range of compensatory programmes. But such measures alone are not sufficient to tackle the endemic problems of the system such as low educational standards and low uptake of education in upper secondary schools. These are challenges that have been clearly demonstrated by the performance of the Mexican Educational system in PISA 2006.

As we shall see in this chapter, there is however growing international evidence that initiatives such as those mentioned in the previous paragraph, need to be aligned, both with each other and to a comprehensive theory of action in order to achieve system-wide improvement. To succeed, the theory of action needs to reflect: a coherent and sustained political purpose in raising educational standards, enhancing the quality of teaching and reducing disparities of opportunity; investment in educational leadership; improvement of educators; alignment of educational funding and initiatives, and clarity about accountability and responsibility. It needs to involve the main partners, which range from the World Bank to the Teacher's Union, policy makers to parents. It needs high ambition and expectations, clear principles and priorities, and an unswerving commitment to success.

In this chapter, based upon insights from the global evidence on school reform, as well as the analysis conducted in previous chapters on Mexico's educational system we will propose a series of recommendations for reform within a theory of action that if fully implemented should ensure that Mexico is on a trajectory to fulfil its aspirations for educational transformation.

Before doing so however we need to enter a caveat. As has been already noted this report was prepared at very short notice. Although it is based on high quality research, solid evidence and a series of key interviews there has not been the time to undertake the more detailed field research that we would have normally conducted. We are confident that the analysis in previous chapters is defensible and the direction of travel outlined here is robust. We do however regard this report as the first rather than the last word on the reform of the Mexican educational system. We believe that it provides a secure foundation for a more thorough going and detailed analysis in the light of the 2006 PISA results in say 2008.

Bearing this caution in mind, in this chapter we therefore:
- Identify the crucial policy conundrum facing educational reformers;
- Review policy trends in OECD countries;
- Suggest a model for coherent system reform;
- Make proposals for the reform of the Mexican educational system;
- Summarise the chapter through making a series of recommendations for future reform.

The crucial policy conundrum: centralisation or capacity building?

Over the past half dozen years much understanding has been generated about the nature of large scale / systemic reform (see for example Fullan, 2007). It is in the logic of large scale reform that an early narrow focus on key skills driven rapidly from the centre can produce a rapid increase in standards. To continue to raise achievement however requires a system wide approach that delivers continuous improvement beyond the early gains. It is clear from the analysis so far that Mexico is at a stage where it needs to focus relentlessly on key basic skills but within a strategy that over time leads to a re-balancing of national prescription and schools leading reform. It is this progression that is illustrated in Figure 4.1.

Figure 4.1 – Towards system wide sustainable reform
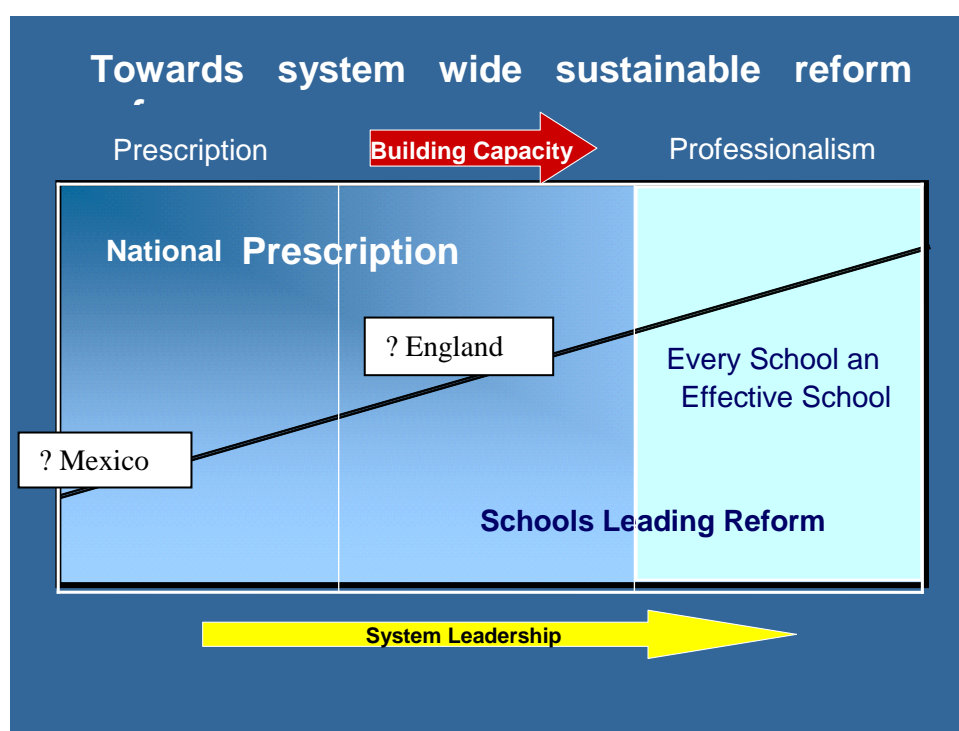
The thinking underlying the diagram is fundamental to an understanding of the argument being made in this chapter. Three points need making.

The first is to emphasise that this not an argument against 'top down' change. It is clear that neither 'top down' nor 'bottom up change' work just by themselves; they have to be in balance – in creative tension.   The balance between the two at any one time will of course depend on context.

Secondly, it is clear that most educational systems such as Mexico need to start in the left hand segment of the diagram and progressively move to the right as gains in student performance are achieved and capacity built.

Third, and for example, in England (where some of us were recently senior policy makers) in the mid 1990s it was obvious that more central direction was needed. This resulted in a significant and rapid rise in standards of literacy and numeracy on which further devolution has been based. So much so, that in the case of England the balance of policy and practice is now currently located in the middle segment of the diagram.

In terms of this analysis it is clear that Mexico is in left hand segment of the rectangle. This is because of the high degree of centralisation by national and state governments, the dominance and institutional position of the Teachers' Union, the central and extra-national determination of funding and the national curriculum arrangements. Schools are not autonomous and have little flexibility. Often their capital plant and human resources are under pressure from a system in which demand for educational provision exceeds supply. Moreover, the growth of knowledge and innovation in the system is hampered by the limited extent of research and evaluation to inform the development of policy and practice.

Before we explore the implications of this analysis for Mexico's reform strategy it is important to locate the narrative within a broader but brief review of policy trends in other OECD countries.

Establishing key policy drivers

In previous policy work with PISA we have identified a number of policy drivers that are being actively debated in OECD countries. They are increasingly being regarded as critical not just to enhancing student outcomes, but also to building capacity in the system overall. These are personalised learning, professionalised teaching, networks and collaboration and intelligent accountability. As seen in the 'diamond of reform' below (see Figure 4.2) these four trends coalesce and mould to context through the exercise of responsible system leadership.

This is not to say that these policy trends are accepted without controversy. In most countries there are barriers to new policy trends that put implementation at risk. Barriers such as complacency, the opposition of teacher unions, over bureaucratisation and policy incoherence among others all militate against the potential power of these trends to positively affect student performance. It must also be realised that these trends are often interpreted differently in different contexts and certainly they are not all reflected in every countries portfolio of policy options. But despite this they are increasingly being regarded as a key aspect of the global curriculum for school reform (Hopkins 2007).

Figure 4.2 – The key drivers underpinning system reform
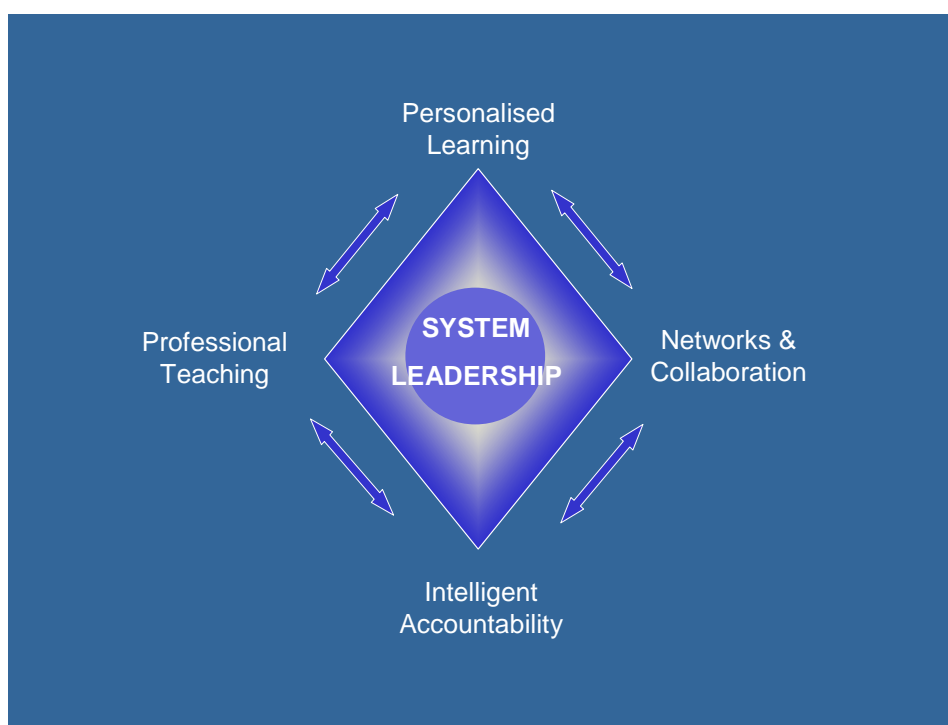
Professionalised teaching – Significant empirical evidence, as indeed this entire report, suggests that teaching quality is the most significant factor influencing student learning that is under the control of the school. The phrase

'professionalised teaching' implies that teachers are not only highly competent but also are on a par with other professions in terms of diagnosis, the application of evidence based practices and professional pride. The image here is of teachers who use data to evaluate the learning needs of their students, and are consistently expanding their repertoire of pedagogic strategies to personalise learning for all students. It also implies schools that adopt innovativ**e** approaches to timetabling, instructional and information technology and the deployment of increasingly differentiated staffing models. Examples of policy options supportive of 'professionalised teaching' would be – teacher selection processes as seen in Finland, highly specified professional development programmes as with the National Literacy Strategy in England, and teacher promotion based on professional competence as in Canada and Sweden.

Personalised learning – The current focus on personalisation is about putting students at the heart of the education process so as to tailor teaching to individual need, interest and aptitude in order to fulfil every young person's potential. A successful system of personalised learning means clear learning pathways through the education system and the motivation to become independent, e-literate, fulfilled, lifelong learners. Obviously the nature of personalised learning will vary according to educational context. In Mexico for example, given the performance in PISA 2006, there needs to be a direct focus on the skills of literacy and numeracy as being the foundation of a personalised learning offer for every students. The drive for high standards applies to all. Examples of policy options supportive of 'personalised learning' would be the emphasis on formative assessment as seen in the recent OECD survey, an approach to curriculum that embraces learning skills as well as content knowledge as seen in Finland, and again the literacy and numeracy strategies in England that resulted in such a rapid rise in standards in the early 2000s.

Networking and collaboration - This relates to the various ways in which networks of schools can stimulate and spread innovation and best practice as well as collaborate to provide curriculum diversity, extended services and community support. The prevalence of networking practice supports the contention that there is no contradiction between strong, independent schools and strong networks, rather the reverse. Nor is there a contradiction between collaboration and competition – many sectors of the economy are demonstrating that the combination of competition and collaboration delivers the most rapid improvements. Effective networks require strong leadership by participating principals and clear objectives that add significant value to individual schools' own efforts. Also distance learning initiatives provide an interesting mechanism for complementing the taught curriculum and compensating for lack of schools. Examples of policy options supportive of 'networking and collaboration' would be – the approaches to schools as community social centres being seen in Sweden, the way in which leading schools are partnering with 'failing schools' leading to rapid improvements in England, and how networks of schools are rapidly disseminating innovative practices as in the KIPP network in the US.

Intelligent accountability – This refers to the balance between nationally determined approaches to external accountability on the one hand and the capacity for professional accountability within the school that emphasises the

importance of formative assessment and the pivotal role of self-evaluation on the other. In any debate on accountability it is important to realise that the balance between the two will depend on context. At the early stage of a reform process external accountability is an important tool to support higher levels of student learning and achievement. Where there are high levels of student achievement and small variations of performance between schools then pressures from external accountability will be modest and there consequently needs to be more focus on internal assessment. In Mexico at present it is clearly the case that there is a need for a more robust form of external accountability. It should however be designed to support teacher professionalism and the school's capacity to utilise data to enhance student performance. Examples of policy options supportive of 'intelligent accountability' would be – the approaches to professional accountability developed in Finland, the use of pupil performance data and value added analyses in England and the approaches to school self evaluation in Denmark.

School and system leadership - One of the key levers for educational reform is the quality of leadership at all levels. The roles and responsibilities of principals need to be aligned with the reform agenda and their performance objectives set accordingly. This is the first step in accountability, which becomes more sophisticated as a professional learning culture is developed in schools and across communities of schools. Principals who develop and thrive in such cultures have the potential to support schools other than their own, as system leaders. Leadership across groups of schools, especially those which are small and perhaps isolated as in Mexico, calls for stronger networking, good electronic communications and a supportive and well-led infrastructure. The disparities between States in Mexico in their readiness and capacity to promote such approaches as well as in the differential resourcing of schools seem quite large, and system organisational decisions will be needed about incremental devolution of resource and responsibilities to schools or networks of schools. System-wide leadership at National and State levels will play a critical part in any reforms. It is important that such leadership is credible, courageous and visionary, promoting system wide learning as well as ensuring the alignment of improvement policies. Examples of policy options supportive of such approaches to 'school leadership' would be – the emphasis on school leader development as seen in the work of the National College for School Leadership in England, the diagnostics for school leadership being developed in Australia, and the emphasis on whole school development in Sweden.

Integrating the policy drivers into a coherent framework

Although the identification of key policy drivers is important, the key question is how to connect the increasing knowledge base about educational outcomes with a clear focus on the choices governments can make. At a basic level, governments must choose how much of their scarce resources to invest in education, but then they need to decide how to focus this spending. Is resource best allocated to increasing the quantum of recurrent funding made available to schools and to enhancing physical capital? Or is reducing class size, paying teachers more and investing in their professional development a better use of

taxpayer's money? Of course both are necessary, but what is lacking is a considered analytic framework in which to consider these questions. The time is right to directly address these and similar questions using the best available evidence and relating it directly to the outcomes of PISA.

Although there are a range of system level policy options available to governments in their efforts to improve outcomes and reduce inequities, the entire set of potential levers is rarely considered at one time. What is therefore needed is a framework to help governments reflect on how best to balance these various strategies in a comprehensive approach to systemic educational reform. The following diagram (see Figure 4.3) provides an example of such a framework. It seeks to identify three key elements of a coherent approach to system design in education:
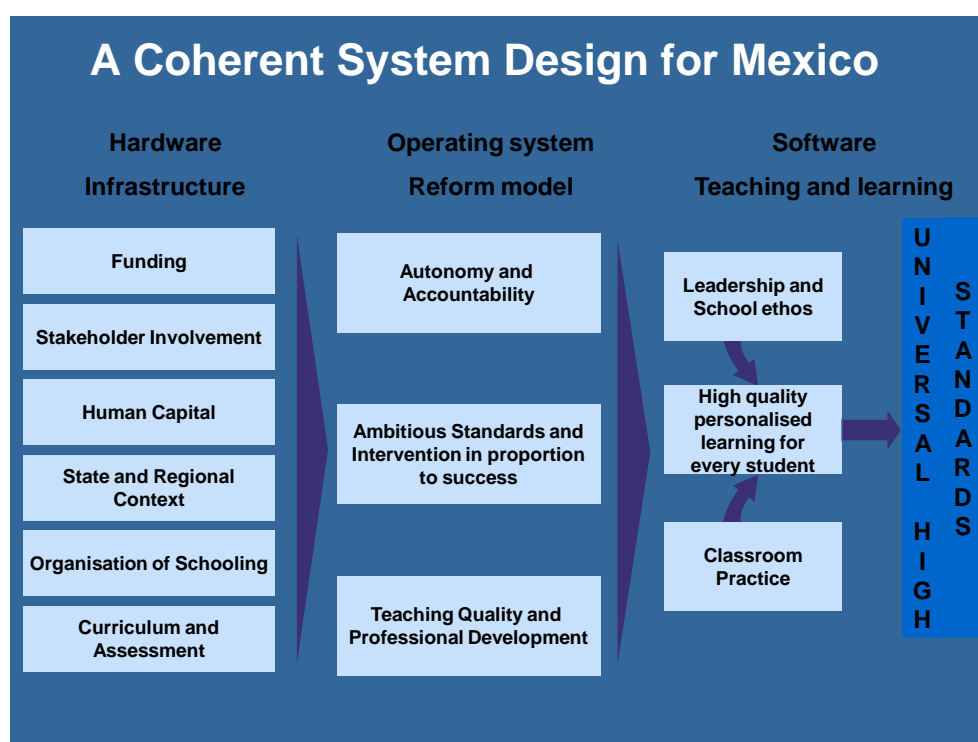
- the infrastructure necessary to sustain an educational system;

- the features of a reform model; and

- the teaching and learning factors most closely related to student learning.

The framework[9] postulates how these three elements may interact and impact on the learning and achievement of students which can then be related to results on PISA. There is the hardware – the infrastructure, the raw materials and so on. For education this is recurrent funding and physical resources as well as human and intellectual capital. There is also the software – the interaction between the provider and the customer. In education this is the school and the student, the process of teaching and learning infused by the leadership of the school. In between the two there is the operating system. In terms of the education system this is the reform model a national government chooses, or not, to employ to develop the system as a whole. Education reform models will vary according to the performance and particular needs of any one educational system.

Many Ministries of Education assume that there is a direct link between the hardware and the software – as long as the resources are in place then student learning will be satisfactory. This is rarely the case and the reason is simple. We need a change strategy to link inputs to outputs, without it student and school outcomes will remain unpredictable. It is clear that countries which perform well on PISA have a deliberate and customised strategy to enable schools to translate their resources more directly into better learning environments and therefore enhanced learning outcomes for their children. What we are proposing below is a reform model or operating system designed to enhance Mexico's current educational performance.

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[9] This educational model was developed by Michael Barber based on the Thomas Friedman's analogy (in his book The Lexus and the Olive Tree) of a nation's economy being compared to a computer system.

Figure 4.3 – A coherent system design framework for Mexico

A Coherent System Design for Mexico

Hardware Infrastructure	Operating system Reform model	Software Teaching and learning	
Funding	Autonomy and Accountability	Leadership and School ethos	UNIVERSAL HIGH STANDARDS
Stakeholder Involvement			
Human Capital	Ambitious Standards and Intervention in proportion to success	High quality personalised learning for every student	
State and Regional Context			
Organisation of Schooling		Classroom Practice	
Curriculum and Assessment	Teaching Quality and Professional Development		

Hardware and Infrastructure

Although the three elements of the framework are equally important, changes to them operate on very different time horizons. It will take a considerable period for changes to recurrent funding and physical capital for example, to significantly impact on student learning. This in fact will be the case with most of the elements of the overall educational infrastructure. However changes to the reform model and to approaches to teaching and learning can have an impact in much shorter time periods possibly within the length of one parliamentary term. This is not an argument for ignoring infrastructural issues. This is particularly the case in Mexico because as we shall see a number of these issues act as considerable barriers to reform and without radical reform will continue to drag down the performance of students in Mexican schools. So in elaborating the framework we will in this section discuss key issues related to the infrastructure of the Mexican system and in the following section those areas over which Education Ministers have most control – such as the 'reform model'. The logic of the diagram is that if a National system gets the infrastructure and reform model right then 'teaching and learning' in schools will improve and have a positive impact on student learning.

We suggest that this view of strategic reform could usefully apply to State and Regional authorities as well as the National government in Mexico. The development of such a framework allows for a more intelligent debate over the policies adopted by the central and State governments in terms of all three

elements – the hardware, the software and the operating system and their combined impact on quality of learning and standards of achievement.

The series of issues discussed under the infrastructure heading have been reviewed in some detail in the previous chapter. The treatment below will of necessity be brief but will highlight areas which either need urgent action or where positive intervention can be particularly productive.

Funding - Mexico's public spending in education is the highest among OECD countries as a proportion of GDP and almost twice as high as the OECD average level. However, the majority of spending at primary and secondary levels is on staffing costs, leaving only 5% for other current expenditure. Also, absolute spending per primary student is very low by OECD standards and even lower for secondary students. This indicates that there is insufficient money going into the infrastructure in its wider sense in the education system in Mexico. There is a conundrum here. Despite the comparatively high levels of funding as a proportion of GDP and relatively high wages of teachers, teacher quality is low, class sizes are high and there also appears to be a teacher shortage.

The policy response should be to review the balance of funding of education, which is disproportionately dominated by teaching staff costs, so as to provide schools with greater opportunity to choose and procure other resources for learning. Where possible, schools should be operated on a full day rather than shift basis, and make provision for on-line learning, extra-curricular education and out-of-hours community education.

Stakeholder Involvement - The main stakeholders In the Mexican education system are the government and the teacher's union the SNTE. It appears that the agreement of the SNTE is necessary in all educational discussions in Mexico. As such, their effective collaboration on proposals such as these would appear essential. However, as seen in Chapter 3 there is evident tension between these two agents. Such Union power is not unusual in underperforming educational systems such as Mexico. In these situations it is also not unusual to find a correlation between high levels of trade union influence and lower than expected student achievement. The financial paradox noted above is an issue of which the teacher union could take positive action as are the educational proposals made in this chapter. Parents are another key stakeholder group. Although parental involvement is as we have seen generally low, they are beginning to have more involvement in education as schools are becoming more 'open' to them. This is a welcome trend, but it needs to be remembered that parental influence in school needs to in the area of management and accountability rather than curriculum and choice.

The policy response should be to develop a 'guiding coalition' among key stakeholders in education to develop a coherent policy direction on a bi-partisan basis that builds on the moral consensus of where the education system should be heading and what it means to be 'educated' at various stages of a student's school career. This may require redefinition of the respective roles of the government and stakeholders particularly the teachers' union.

State and Regional Context – It is clear that Mexico is traditionally a highly centralised and bureaucratic educational system. It is also clear that most successful school systems are becoming increasingly decentralised. We have already discussed the importance of balancing top down and bottom up influence with a presumption to the latter as the performance of the system improves. There appears to be limited collaboration between the national government, the states, schools and the community. This is a complex and culturally determined issue beyond the scope of this report and needs more considered research. However it is clear that in most high and medium performing educational systems in the OECD, more autonomy is exercised by States and Regional authorities than is the case in Mexico.

The policy response should over time be to increasingly devolve authority to States and regions for the implementation of educational practice and reform but within a strong national framework of curriculum and accountability.

Human Capital – Again it is clear from the discussion in previous chapters that the level of investment in human capital in education is far too low. The selection of teachers is inadequate and only 13 states of the 31 states were found by the OECD to select prospective student-teachers through exams. Professional development programmes are uniform for all teachers and differentiation in terms of sector, subject, position and individual needs is lacking. Furthermore, programmes for teachers' professional development do not provide adequate incentives for teachers to enhance classroom practice. There is a need to design a programme that provides incentives (including financial ones) for all teachers and evaluate its impact early on. There also a need to sanction teacher absenteeism. In addition, the roles and responsibilities of school leaders should be reviewed with a view to improving staff development, quality assurance and school improvement. Similarly there should be investment in pedagogical leaders within school districts who would contribute to the development of teachers and effective coverage of the curriculum.

The policy response should be to invest in enhancing teacher quality and professional development opportunities that could include - time for teachers to prepare lessons and teaching material, collaboration and exchange of ideas between teachers and the training of teachers who will support schools with their practice of teaching and learning.

Organisation of Schooling – This issue refers to the way schooling is stratified. We have already seen that basic education from K to 9 is highly regulated by the National Government with a unique syllabus that applies to all schools be they public or private. This leads as we shall re-iterate in the following section to uniform and didactic forms of instruction which are heavily dominated by the use of the text book and lacking in meta-cognitive content. The situation in upper secondary education or the *Bachillerato* is however very different. Here provision is highly decentralised with States being responsible for the provision of education through a variety of services. This leads to a situation where although provision is more flexible, standards are not uniform; there is a lack of focus on building learning capability and poor curriculum coordination and coherence. The links between school and work are weak and result in students (and parents) failing to recognise the benefits of continuing their schooling which accounts for

the high levels of attrition at around age 15. The current proposals for the reform of the *Bachillerato* seem to be in keeping with the best of contemporary practice in OECD countries where there is the establishing of a common national framework of competencies but implementation is left to the States in order to encourage innovation, diversity and responsiveness to context.

The policy response should be to encourage the development of a National Framework for the *Bachillerato,* particularly the emphasis on the development of skills and competencies and within this framework the development of diverse and innovative forms of implementation at the State and local level. This approach should also be considered for Lower Secondary education and possibly for Primary education too.

Curriculum and Assessment - We have inferred in previous chapters that the school curriculum in Mexico is a) prescriptive leaving little autonomy and little space for innovation to schools and teachers to develop curricula to fit their pupils' needs; b) promotes learning by rote and ignores comprehension, problem solving and the knowledge and skills that pupils need to be successful in the 21st century; and, c) promotes the use of a limited teaching and learning methods and thus reducing teachers from professionals to 'technicians'. There is also a need to update textbooks and allocate money for books as seen in Chapter 3. As regards assessment, there is a lack of standardisation of practice as teachers continue to set their own tests to determine which pupils will progress to the following year. It is also appears unlikely that teachers systematically use data to inform their practice. In general the usual accountability infrastructure seen in many OECD countries is missing in Mexico. So in this respect, the recent introduction of the National Exam of Academic Achievement in Schools *(Examen Nacional du Logro Académico en Centros Escolares, ENLACE)* is to be welcomed. This is a diagnostic test applied to all students annually at Grades 3 to 9 that test reading skills as well as some math and science skills. The focus is more on the application of skills rather than knowledge recall and in that respect follows PISA.

The policy response should be to encourage the further development of ENLACE to embrace a wider range of trans-disciplinary competencies, relate it clearly to National Standards for literacy and numeracy and enhance its diagnostic power for assessment for learning. As regards the curriculum this is obviously difficult and contentious to reform. A start however would be to introduce a focus on learning competency at each grade level.

Whilst many of these issues are hard to effect it is clear that in Mexico many of them present considerable barriers to progress. Despite the political difficulty in doing so we are clear that unless they are tackled by a reforming government the achievement of Mexican students will lag behind those of similar countries where the level of investment in education is nowhere near as great. We phrase them as recommendations in the final section of this chapter.

**Operating System and Reform Model**

We now turn to a discussion of those series of integrated strategies that can translate the inputs of the system described above into higher levels of achievement for students in Mexican schools. In the argot used here we are referring to a 'reform model' or 'operating system'. In proposing a reform model for the contemporary Mexican educational system there are, however, two further implications that need to be noted. Both of these are amply seen in high performing (PISA) educational systems.

The first is progressively to devolve first line responsibility for the quality of educational provision to the point of delivery. This implies investing in local leadership and teacher development and progressively devolving resources and responsibility for them to local management. We realise that this can only be done incrementally in such a centralised system, ideally guided and informed by pilot projects.

The second is to incorporate feedback systems which provide information about the effectiveness of processes and trends in outcomes. Feedback is likely to include performance indicators, stakeholder surveys and professional evaluation, in order that the progress of reforms is monitored, barriers quickly identified and inputs and processes adjusted in response to feedback information.

In addition, our analysis of the educational challenges in Mexico can be reduced to the two principles underpinning system improvement: raising levels of achievement and reducing the achievement gap (see Figure 4.4).

Figure 4.4 – Two principles underpinning system reform
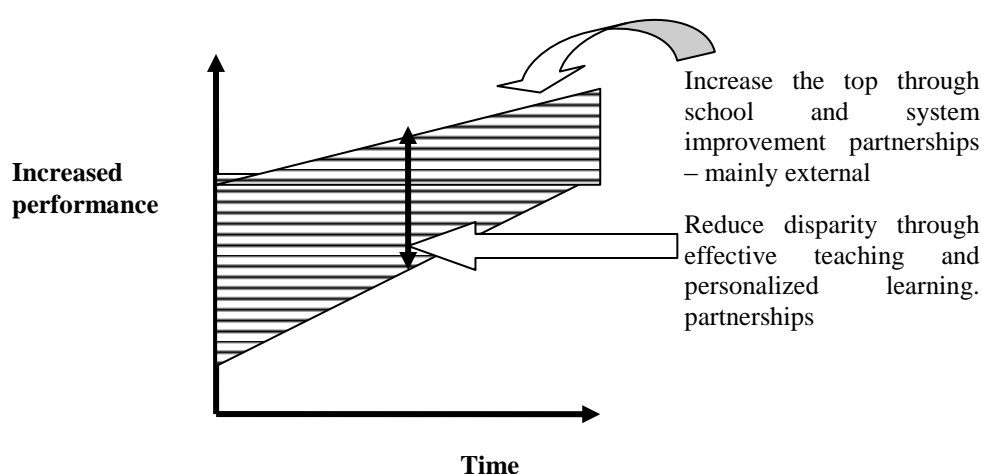
The challenge of raising achievement begins with ensuring that the fundamentals are in place. This starts by ensuring that all teachers have the knowledge, understanding and pedagogic skills to teach the Mexican curriculum and to support the expanding distance learning provision. This may require a skills

audit, teacher by teacher, school by school and state by state, to map the distribution of competence and insufficiency. This will enable teacher support and development programmes to be targeted on needs. These programmes should be fit for purpose and may incorporate: direct retraining; distance learning for teachers; the identification of advanced skills teachers who can work across a group of schools providing direct support and development and other approaches. One need is probably for training in the use of formative assessment to monitor the relative progress of individual pupils so as to identify their readiness for new challenges, barriers to learning and successful learning which are essential to increased personalisation of learning for individual children and groups.

Next, teachers need the tools to do the job. The issue of standard school books is only part of the solution. The commitment of a very high proportion of the budget to teachers' pay reduces or precludes expenditure on educational materials and equipment of the sort that make learning more effective and attractive. We cannot assess particular needs accurately from a distance, not least the impact on teachers' effectiveness of working extra shifts in multiple shift schools.

Both of these perspectives inform our view of the policy mix required for Mexico. In terms of our analysis of system reform earlier, it reflects best the assumptions underpinning the left hand side of the rectangle in Figure 4.1. Below we pull together recommendations for Mexico based on the overall system design concept and the specifics of the 'left hand operating system'. As seen in Figure 4.5 the policy framework that drives the left hand (prescriptive) side of the rectangular diagram contains a complementary cocktail of policies that link together:

- Accountability with increasing devolution of responsibility;
- Teaching quality with professional development;
- High standards with intervention in proportion to success;
And all need to be driven by;
- The moral purpose to raise standards in literacy and numeracy.

Figure 4.5 – A Reform Model for Mexico
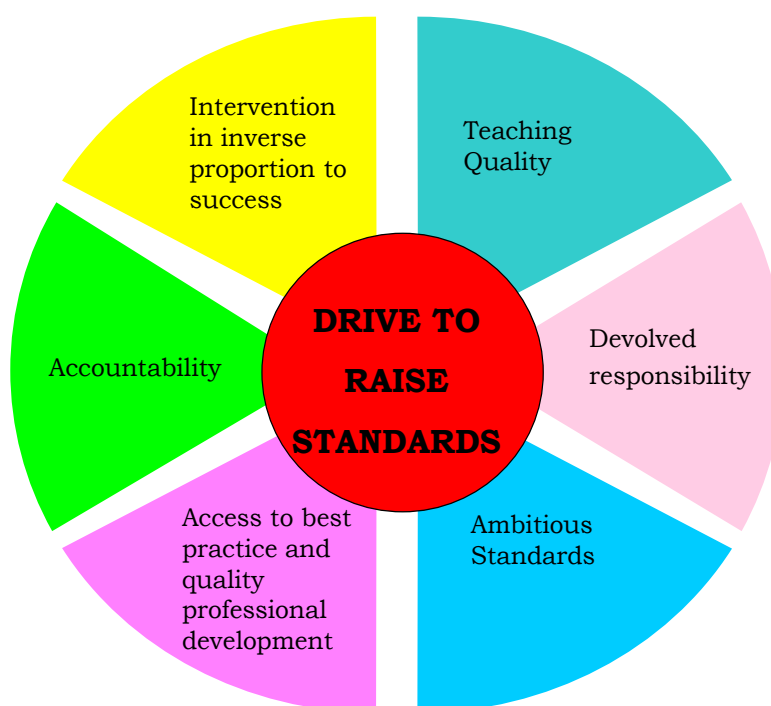
The policies for each segment are set out in the chart below. The important point is that the policy mix is complementary and mutually supportive.

Table 4.1 – Complementary policies to drive school improvement

TEACHING QUALITY	ACCESS TO BEST PRACTICE AND QUALITY PROFESSIONAL DEVELOPMENT
- Curriculum knowledge and pedagogic skill - Assessment of learning - Performance management	- Universal professional development in national priorities (literacy, numeracy, ICT) - Development of highly specified teaching materials in key areas e.g. Literacy and Numeracy - Leadership development as an entitlement
ACCOUNTABILITY	DEVOLVED RESPONSIBILITY
- National inspection of schools and States - Targets established for schools and States - Individual pupil level data collected nationally	- School as unit of accountability - Devolution of resources and employment powers to schools - Increasing State autonomy within National frameworks

AMBITIOUS STANDARDS	INTERVENTION IN INVERSE PROPORTION TO SUCCESS
• National standards in key curriculum areas e.g. Literacy and Numeracy • National Tests at age 7, 11, 14, 16 • Benchmarking against other countries e.g. Spain and PISA	• school improvement grants for schools in challenging circumstances • monitoring of school performance by State / Region • Increased funding for students most at risk

At present this operating system is indicative only – outlining a direction of travel rather than a blueprint. Obviously more research is needed to establish it in detailed policy terms. It does however give a clear indication of what is required to address the pressing educational concerns in Mexico. Also such a cocktail of complementary policies has a good track record of impact on student achievement and learning in similar settings. In the following section we turn to more specific recommendations based on this analysis.

Recommendations

The following set of twelve recommendations link together the implications from the previous discussion of the reform model. The starting point for this analysis was Mexico's performance on PISA 2006. This as we have already seen in Chapter Two suggests that Mexico:

- Presents a picture of very low levels of achievement by a large proportion of the school population. The effect of dropouts means that the actual position is more serious across the national cohort of 15 year olds. The low functional levels of literacy and mathematics in particular have serious consequences for the growth of the economy.
- Has alarmingly low levels of literacy and numeracy which points to inadequacies in the quality and effectiveness of teaching. Evidence of a poorly trained and qualified teaching force is compounded by the unusually low proportion of pupils who achieve at the highest levels. The achievement data provide a strong call for the re-professionalisation of the teaching force, giving teachers better training and in-school professional development, providing the resources they need to do an effective job, and expecting them to take responsibility and be accountable for the progress their students make.
- Exhibits limited and variable degrees of school autonomy, inconsistencies between regional states and an apparent lack of focus on school and system leadership which are likely to provide contributory factors. Systemic opportunities abound, but the barriers may include inertia, restrictive practices and the lack of sufficient educators with the vision to see how different things could be.

These recommendations focus directly on improving Mexico's PISA performance, but by the same token should also be appropriate to addressing the general underperformance of the Mexican educational system. This set of

recommendations is greater than the sum of their individual items. Simply introducing individual policy initiatives is not an option – singular approaches will no longer suffice. It is the systemic impact of an integrated set of policies that will make the difference. It is this idea that is expressed in the diagram below – Figure 4.6. This diagram serves two purposes. First it illustrates the interactive nature of this series of policy recommendations and how they depend for their success in raising student achievement on each other. Second it gives an indication of which policies will have the most direct impact on student achievement and suggests a sequence for implementation. The first six recommendations are largely pedagogical and last six mainly structural. Although they are interactive this distinction in itself begins to suggest a timetable for implementation.

There is then a logic to setting out the recommendations in the way we have below. Although the first group will need to be implemented together there is a narrative in the sequencing which should assist in the process of implementation. This is also not to say that many of these recommendations are not being done already. There are many outstanding policy initiatives currently being discussed and implemented in Mexico. It is the integrated approach that is critical for success. Obviously these recommendations, as is inevitable in such a relatively brief report, are insufficiently detailed for immediate operational implementation. What they do however is to give a very clear direction of travel that can be debated and on the basis of which further work commissioned that can lead more rapidly to actionable plans.

Figure 4.6 – An integrated series of policy recommendations for Mexico

***Recommendation 1:* Establish a compelling moral purpose for the reform of the Mexican educational system.**

Moral purpose in educational reform has two great virtues. First it is important in and of itself; and second it establishes a direction for change that can harmonise competing interests within the system. In Mexico in light of the PISA 2006 results the moral purpose of reform should be crystal clear:

- Raising standards in basic skills such as literacy, numeracy and information technology; and,
- Narrowing the achievement gap.

These objectives need to be communicated widely and expressed in social and moral terms – this is what we need for the current and next generation of students in Mexico. They should also be used as a basis of establishing a 'Guiding Coalition' of a small number of key leaders in the country who consistently communicate among themselves and with other stakeholders. They should all have the same message which is not just about raising standards but also focuses on capacity building and policy alignment that is both horizontal and vertical.

***Recommendation 2:* Establish absolute clarity about the standards expected in key areas (such as literacy, numeracy and information technology) required for students at various levels in the system.**

Moral purpose is necessary but not sufficient. It needs to be underpinned by clear and operational standards of what success looks like at various stages of a student's career in school. Standards refer to the expected level of performance of a student at the end point of the various stages of schooling. The identification of a standard is important for two reasons. First it enables the student and his/her teachers to know the level they are performing at and to plan accordingly. Most students in high performing educational systems now know the level they are working at as well as the level they are working towards. As a result they are able to take more control over their own learning. This is personalisation. The second aspect of standards is that they are educationally meaningful rather than arbitrary. So for example, in England the expected standard in English at the end of Primary education at age 11 is level 4. 'Level four-ness' reflects the level of performance necessary to access the secondary curriculum; without reaching this standard the student would struggle in secondary education. Seen in this light, standards become an important tool for personalised learning and for ensuring equity. If the focus is to be on literacy, numeracy and information technology than standards statements need to be developed at least for students around the ages of 7, 11 and 14. As this work progresses it is also important to prepare concrete and practical curriculum statements of what it means 'to be educated' at various phases of a student's life.

Recommendation 3: **Align the curriculum to these key areas and produce high quality and practical materials to support the work of teachers.**

If a clear goal for schooling has been established as in the previous two recommendations then the curriculum needs to be aligned so as to support the realisation of these educational goals. There are two aspects to this.

- First to ensure adequate progression between grades and phases of education and to place learning at the heart of the curriculum process, there needs to be a clear match between standards, curriculum and assessment. In particular, curriculum standards need to be sharpened and clarified at the key stages noted above.
- Second curriculum materials need to be developed that combine, curriculum content, teaching strategies, the development of learning capabilities and forms of assessment. These need to provide a meaningful and useful educational support to teachers. They need to be more detailed in pedagogic terms than the current textbook approach so that teachers can more effectively target learning to the range of levels and groups of pupils within the classroom.

Recommendation 4: **Develop assessment approaches around the standards that provide regular diagnostic information for formative assessment and monitoring.**

Assessment is the process by which the attainment of a standard is measured. This is commonly of two types - internal and external assessment. The former usually relates to assessment undertaken by the teacher, commonly referred to as teacher assessment; and the latter to a national standardised exam, externally marked. Both can be used in a formative or a summative way.

Formative assessment is commonly understood as *Assessment **for** Learning* and this has a clear focus on the improvement of learning. In terms of formative assessment there is a need to develop increasingly precise methods of assessment for learning, pupil progress data, value added and school profiles. These can become tools not just for personalising learning and enhanced teacher professionalism, but also, for assisting school self evaluation and holding schools open to public scrutiny.

Summative assessment on the other hand is commonly understood as *Assessment **of** Learning* whose uses are certification, selection, standard-setting, and accountability. In terms of summative assessment there is a case for considering random national sampling which can be a more effective means of monitoring National standards than full cohort testing which is onerous, expensive and has too wide a margin of error.

The operational clarity between formative and summative assessment enables each to more effectively support their core purpose, particularly when techniques most often associated with either internal or external assessment can be used for both formative and summative purposes. This will include:

- Establishing rigorous standards at key stages and authentic testing annually for all students at these levels;
- Targets for student performance at each of these grades;
- Performance management at each level of the system;
- A system of annual school reviews.

Recommendation 5: **Invest heavily in enhancing teacher quality.**

It is clear from analyses of PISA results across participating countries that the key predictor of student success is the quality of teaching in schools. The enhancing of teacher quality therefore needs to be of highest priority. Teacher development programmes should focus on knowledge and understanding of the curriculum to a higher level than that expected of students, the principles of formative assessment, curriculum leadership and the evaluation and quality assurance of teaching and learning. This will need to involve:

- Developing courses within teachers' training for basic education in curriculo, pedagogy, management and administration.
- Developing specific programmes with sufficient backup and which take into account the needs and possibilities of a very heterogeneous population to raise the level of results.
- Assigning the most experienced teachers to the first years of schooling
- Revising the programmes for the training and in-service training of teachers, heads, supervisors, advisors and inspectors.

As this work develops, schools will need to ensure that every lesson counts, by instituting quality assurance of teaching and learning, led by the principal to include:
- Internal audit of the quality and effectiveness of teaching across the school, with external corroboration or validation;
- Systematic monitoring of the progress of every pupil, reviewed regularly;
- Annual objectives and performance review of everyone in the system;
- Identify and appoint 'excellent' or 'advanced skills' teachers and give them a developmental outreach function.

Recommendation 6: **Move quickly to improve the quality of leadership at school and system level.**

Current research across OECD countries is clear that the quality of principal leadership is pivotal to the raising of standards of learning and teaching. Although structural conditions in Mexico militate against the levels of principal autonomy seen in many OECD countries it is still important to develop standards of performance for principals and high quality training opportunities. In addition school management and the relation of the school to the community and other schools need to be monitored. The most effective school leaders should be encouraged to support other schools or networks as 'system leaders' and trained, remunerated and supported in this role. It is also clear that 'system

leadership' needs to be expanded at regional, state and National levels.

Recommendation 7: **Increase autonomy at key levels within the system – state, regional and school – but maintain strong national frameworks.**

Again this is a challenging recommendation given the current arrangements in Mexico and the long tradition of centralisation. It does however appear vital to change the *Ley General de Educación* so that schools have greater control over their *currículo*, pedagogies and work plans in accordance with the possibilities and needs of their pupils. It is necessary to provide teachers' centres with the means to provide the backup the schools in their districts require. Initially it may be best to establish pilots to evaluate the effectiveness of alternative models in a variety of regional conditions with different characteristics of the population (rural zones, marginal urban zones, areas with a high percentage of indigenous populations, frontier zones).

Recommendation 8: **Intervene positively in those schools and areas that have the greatest challenges and support those students most at risk.**

There is already a strong tradition in Mexico of compensatory programmes to address the needs of different types of schools in a variety of challenging circumstances. What is required now however is a more systemic response. We have not had the opportunity to explore this issue in detail and it requires significantly further research. There are however three issues at stake here.

- The first is to establish some form of National support agency whose purpose is to design, develop and push programmes of the kind described. This would subsume existing organisations and have branches in every State and work with State ministries.
- In addition teachers need professional support so that they can take decisions within the classroom, have their own independent and representative organisations and that these organisations are in full support of the agreements made through the national and local system of education. Their advisers and supervisors need to be professionally trained and have professional status. Also a confusing overlay of organisations that can intervene in the school need to be avoided.
- That despite financial constraints some form of differential funding for students most at risk is introduced.

Recommendation 9: **Review the organisation of schooling in Mexico in light of the principles being espoused for the reform of the Bachillerato.**

The centralised nature of the Mexican system is a continuing theme of this report. Just because it has been so for some time does not necessarily mean that such an organisation is immutable. The proposed reforms to the *Bachillerato* are far more in keeping with the structural arrangements in those

educational systems that do well on PISA. Local autonomy within a strong national framework of curriculum and assessment would seem to be a model worth developing not just for the *Bachillerato* but also further down the system.

Current proposals for the reform of upper secondary and the development of a the *Bachillerato,* also mentioned in Chapter 1, can be summarised as follows:

- o An introduction of a common curriculum for the following subjects in all upper secondary schools: mathematics; Spanish; Foreign Language; Biology; Chemistry; Physics and Natural Geography; history; Political Geography and Political Economy ;
- o A common skills framework for all upper secondary schools with emphasis on interpersonal, intrapersonal and meta-cognitive skills and citizenship;
- o The development of a curriculum that is relevant and interesting for students;
- o The creation of links between upper secondary institutions and the validation of courses of all schools by all other upper secondary schools so as to ensure the smooth transition of students from one upper secondary   school to another;
- o Attention to individual student needs through tutorials;
- o Training for teachers to enable them to respond to the demands of the proposed reforms; and
- o Teacher assessment and National testing of students.

Recommendation 10: **Take immediate steps to expand teacher supply in Mexico.**

Again this is another structural issue beyond the scope of this report. We have already noted the relatively high class sizes in Mexico as compared with other OECD countries and the percentage of GDP being devoted to education. Although there are obvious financial constraints on expanding teacher supply it is important to seriously explore this issue.

In developing this thinking it may also be helpful to consider other structural changes, for example:

- ▪ Establishing links between teachers' training colleges, the UPN (National Pedagogic University) through the development of research and training facilities shared by State Ministries and established State Universities. These can provide the research-development programmes needed particularly an effective classroom practice and monitor results.
- ▪ Putting the relationship between teachers, heads, supervisors, inspectors and advisers on a firm footing. It is vital that school heads be selected according to merit and not be named by the SNTE.
- ▪ Ensuring that the administration of education is completely independent of politics and corporativist networks. It needs to be permanent and based on performance rather than connections.
- ▪ That schools do not operate on a shift system and that they work a full day.   That the school be in good repair and be well equipped.

Recommendation 11: **Review the balance of funding of education.**

We have noted in this and previous chapters the paradoxes of funding in the Mexican educational system. This is a critical issue that will require strong political will and economic acumen to resolve. Again it is an issue too large to be addressed by a report of this nature and requires much further specific research. At this point we can do no better than to re-iterate the points we have already made about the funding of the Mexican educational system.

- Mexico's public spending in education is the highest among OECD countries as a proportion of GDP and almost twice as high at the OECD average level. However, current spending at primary and secondary levels is on revenue, leaving at the primary and secondary level only 5% for other current expenditure. Also, spending per primary student is very low and even lower for secondary students.
- The financing of teachers who perform few or no duties in relation to education appears a major issue and further research is needed on the financial impact this has on the system as a whole.
- There is insufficient information about value for money in relation to different educational priorities. There is a need for a more developed cost benefit analysis of the range of educational interventions currently operating in the system.
- The centralisation of funding. The bulk of resources come from the Federal government through allocations to the States. The States play an increasingly important role in determining their budgetary priorities. However, almost all programmes are financed centrally.

Recommendation 12: **Build a 'guiding coalition' among the key stakeholders in education in Mexico.**

We started this list of recommendations by stressing the importance of moral purpose in terms of clear goals for the learning and achievement of Mexican students in key areas and at various age levels. We connected this recommendation with a proposal for the establishing of a guiding coalition to drive the reform programme in Mexico. In our experience one of the striking characteristics of successful reform efforts is many OECD countries is the establishing of such a coalition from among the key stakeholders in the system. It is apparent from the evidence collected for this report that many feel that stakeholders should have greater direct involvement in the management of schools and have greater opportunities to support learning. Again this report can do little more than stress the point and further scoping work needs to be done. But in considering the importance of stakeholder involvement it is important also to consider:

- Involving parents institutionally in school management by moving as quickly as possible to a system of local school management through school governors of whom a large number are parents.

- As the structure of education results from strong social movements in which the lynchpin is an independent middle class, they should be more centrally involved in State education.
- At some point consider the appointment of Boards, filled largely by election, to run schools or federations of schools.
- The above is only possible through the de-politicisation of the educational sector, an end to a bevy of conflicting and overlapping agencies and agents who can intervene in education and a clear system of accountable and responsible management.

The adoption and implementation of these recommendations will result in a rapid raising of standards in Mexican schools. This is not a text book solution; it is not possible to start with a clean sheet of paper.   This report and these recommendations are only a first step in a concerted process of reform.   If following dissemination, discussion and debate this general direction of travel is endorsed then more research and a systematic implementation plan needs to be commissioned. As they stand the aim of these proposals is to lay the basis for an effective and equitable system of education and this can only be done by the establishment of a transparent and clear system of management that itself is an important factor in making schools more effective in terms of what they provide for the community and individuals.   Without changes of this type, it is difficult to imagine how Mexican children can play an important role in the knowledge society and in the defence of their culture.

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Appendices

Appendix 1 – Table B1.5 Change in expenditure on educational institutions for all services per student relative to different factors, by level of education (1995, 2004)

Table B1.5.
Change in expenditure on educational institutions for all services per student relative to different factors, by level of education (1995, 2004)
Index of change between 1995 and 2004 (GDP deflator 1995=100, 2004 constant prices)

	Primary, secondary and post-secondary non-tertiary education				Tertiary education		
	Change in expenditure	Change in the number of students	Change in expenditure per student		Change in expenditure	Change in the number of students	Change in expenditure per student
Australia	150	109	138	Australia	132	131	101
Austria	108	m	m	Austria	126	103	122
Belgium	m	m	m	Belgium	m	m	m
Canada	m	m	m	Canada	m	m	m
Czech Republic	111	89	124	Czech Republic	145	210	69
Denmark[1]	130	108	121	Denmark[1]	133	107	123
Finland	135	111	122	Finland	128	116	110
France	m	m	m	France	m	m	m
Germany	106	101	105	Germany	112	105	107
Greece[1,2]	172	90	192	Greece[2]	312	207	151
Hungary[3]	142	90	157	Hungary[3]	159	218	73
Iceland	m	m	m	Iceland	m	m	m
Ireland	174	96	181	Ireland	174	137	126
Italy[2,3]	104	98	105	Italy	144	111	130
Japan[1]	105	82	127	Japan[1]	125	124	101
Korea	m	91	m	Korea	m	150	m
Luxembourg	m	m	m	Luxembourg	m	m	m
Mexico	147	114	130	Mexico	168	153	110
Netherlands	143	106	136	Netherlands	115	113	101
New Zealand[2]	162	m	m	New Zealand[2]	109	m	m
Norway[2]	129	118	109	Norway[2]	117	113	103
Poland[2,3]	152	83	183	Poland[2,3]	202	224	90
Portugal[3]	133	86	154	Portugal[3]	143	146	98
Slovak Republic[1]	140	90	155	Slovak Republic[1]	210	190	111
Spain	107	79	136	Spain	162	97	167
Sweden	139	119	117	Sweden	144	145	99
Switzerland[2,3]	113	108	105	Switzerland[2,3]	176	131	134
Turkey[2,3]	243	115	211	Turkey[3]	191	106	181
United Kingdom	149	124	120	United Kingdom	122	130	93
United States	140	107	130	United States	163	124	132
OECD average	*139*	*101*	*138*		*155*	*141*	*109*
EU19 average	*134*	*98*	*137*		*158*	*148*	*107*
Brazil[1,2,3]	148	123	122	Brazil[1,2,3]	129	176	73
Chile[4]	207	118	175	Chile[4]	206	192	107
Estonia	m	m	m	Estonia	m	m	m
Israel	124	118	105	Israel	137	150	91
Russian Federation	m	m	m	Russian Federation	m	m	m
Slovenia	m	m	m	Slovenia	m	m	m

1. Some levels of education are included with others. Refer to "x" code in Table B1.1a for details.
2. Public expenditure only.
3. Public institutions only.
4. Year of reference 2005.
Source: OECD. See Annex 3 for notes (www.oecd.org/edu/eag2007).
Please refer to the Reader's Guide for information concerning the symbols replacing missing data.
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Appendix 2 – Table C2.1 Enrolment rates by age (2005)

Table C2.1.
Enrolment rates, by age (2005)
Full-time and part-time students in public and private institutions

		Ending age of compulsory education	Number of years at which over 90% of the population are enrolled	Age range at which over 90% of the population are enrolled	Students aged:					
					4 and under as a percentage of the population aged 3 to 4	5 to 14 as a percentage of the population aged 5 to 14	15 to 19 as a percentage of the population aged 15 to 19	20 to 29 as a percentage of the population aged 20 to 29	30 to 39 as a percentage of the population aged 30 to 39	40 and over as a percentage of the population aged 40 and over
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
OECD countries	Australia	15	12	5-16	41.6	99.1	82.5	33.2	14.0	6.2
	Austria	15	13	5-17	67.5	98.4	80.3	19.4	3.3	0.3
	Belgium[1,2]	18	15	3-17	125.2	99.6	94.0	29.4	8.4	3.5
	Canada	16	m	m	m	m	m	m	m	m
	Czech Republic	15	14	4-17	83.7	99.8	90.4	20.2	3.8	0.3
	Denmark	16	13	3-16	92.3	97.1	84.9	37.7	7.8	1.6
	Finland	16	13	6-18	42.3	95.1	87.5	42.6	13.1	3.0
	France[1]	16	15	3-17	112.9	101.3	86.2	20.1	2.6	n
	Germany	18	12	6-17	78.8	98.3	88.8	28.2	2.5	0.1
	Greece	14.5	13	6-19	28.9	97.5	97.4	23.7	6.1	n
	Hungary	16	14	4-17	81.7	100.3	86.8	24.4	5.8	0.6
	Iceland	16	14	3-16	94.7	98.9	85.0	37.3	11.9	3.2
	Ireland	15	12	5-16	23.9	101.1	88.5	20.9	4.0	0.1
	Italy[1]	15	13	3-15	105.0	101.2	80.2	20.0	3.2	0.1
	Japan	15	14	4-17	82.0	100.7	m	m	m	m
	Korea	14	12	6-17	22.5	94.1	85.6	27.3	2.0	0.5
	Luxembourg	15	12	4-15	80.7	96.7	72.1	5.9	0.5	0.1
	Mexico	15	9	5-13	46.6	99.9	48.2	10.8	3.2	0.5
	Netherlands	18	12	5-16	37.1	99.0	86.0	25.6	2.7	0.7
	New Zealand	16	12	4-15	90.5	100.9	73.9	30.4	12.3	5.1
	Norway	16	13	5-17	85.9	98.4	85.8	29.5	6.9	1.6
	Poland	16	13	6-18	34.6	94.6	91.8	30.9	4.6	x(8)
	Portugal	14	10	6-15	72.5	103.9	73.4	21.9	3.8	0.7
	Slovak Republic	16	12	6-17	77.5	97.1	84.7	16.0	2.8	0.4
	Spain[1]	16	14	3-16	120.5	101.4	80.5	22.1	3.6	1.1
	Sweden	16	14	5-18	86.5	99.5	87.3	36.4	13.3	3.0
	Switzerland	15	12	5-16	26.1	99.6	83.4	21.7	3.6	0.4
	Turkey	14	7	7-13	3.7	81.8	40.9	10.3	1.5	0.2
	United Kingdom	16	13	4-16	90.6	101.0	78.5	29.0	15.8	7.8
	United States	17	11	6-16	50.0	97.7	78.6	23.1	5.2	1.4
	OECD average	*16*	*13*		*68.5*	*98.4*	*81.5*	*24.9*	*6.0*	*1.6*
	EU19 average	*16*	*13*		*75.9*	*99.1*	*85.2*	*25.0*	*5.7*	*1.3*
Partner economies	Brazil	14	10	7-16	29.4	93.2	79.5	22.5	8.8	2.4
	Chile	14	8	9-16	32.7	88.3	74.0	m	m	m
	Estonia[1]	15	12	6-17	117.1	104.6	87.5	27.3	9.8	n
	Israel[3]	15	13	5-17	79.1	96.0	65.3	20.2	5.2	0.9
	Russian Fed.	15	9	7-15	m	81.5	73.5	18.7	0.7	n
	Slovenia	15	12	6-17	71.4	96.5	91.0	32.4	6.2	0.7

Note: Ending age of compulsory education is the age at which compulsory schooling ends. For example, an ending age of 18 indicates that all students under 18 are legally obliged to participate in education. Mismatches between the coverage of the population data and the student/graduate data mean that the participation/graduation rates for those countries that are net exporters of students may be underestimated (for instance, Luxembourg) and those that are net importers may be overestimated.
1. The rates "4 and under as a percentage of the population aged of 3-to-4-year-olds" is overestimated. A significant number of students are younger than 3 years old. The net rates between 3 and 5 are around 100%.
2. Excludes the German-speaking Community of Belgium.
3. Excludes programmes for children younger than 3, resulting in substantially lower figures in comparison to previous years.
Source: OECD. See Annex 3 for notes (www.oecd.org/edu/eag2007).
Please refer to the Reader's Guide for information concerning the symbols replacing missing data.
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Table D4.1.
Organisation of teachers' working time (2005)
Number of teaching weeks, teaching days, net teaching hours, and teacher working time over the school year

	Number of weeks of instruction			Number of days of instruction			Net teaching time in hours			Working time required at school in hours			Total statutory working time in hours		
	Primary education	Lower secondary education	Upper secondary education, general programmes	Primary education	Lower secondary education	Upper secondary education, general programmes	Primary education	Lower secondary education	Upper secondary education, general programmes	Primary education	Lower secondary education	Upper secondary education, general programmes	Primary education	Lower secondary education	Upper secondary education, general programmes
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Australia	40	40	40	197	198	198	888	810	810	1 209	1 233	1 233	a	a	a
Austria	38	38	38	180	180	180	774	607	589	a	a	a	1 792	1 792	a
Belgium (Fl.)	37	37	37	179	180	180	806	720	675	931	a	a	a	a	a
Belgium (Fr.)	37	37	37	163	181	181	722	724	664	a	a	a	a	a	a
Czech Republic	40	40	40	196	196	196	813	647	617	a	a	a	1 659	1 659	1 659
Denmark	42	42	42	200	200	200	640	640	560	1 306	1 306	m	1 680	1 680	1 680
England	38	38	38	190	190	190	a	a	a	1 265	1 265	1 265	a	a	a
Finland	38	38	38	188	188	188	677	592	550	a	a	a	a	a	a
France	35	35	35	m	m	m	918	639	625	a	a	a	a	a	a
Germany	40	40	40	193	193	193	808	758	717	a	a	a	1 742	1 742	1 742
Greece	40	38	38	195	185	185	780	583	559	1 500	1 425	1 425	1 762	1 762	1 762
Hungary	37	37	37	185	185	185	777	555	555	a	a	a	1 864	1 864	1 864
Iceland	36	36	35	180	180	175	671	671	560	1 650	1 650	1 720	1 800	1 800	1 800
Ireland	37	33	33	183	167	167	915	735	735	1 036	735	735	a	a	a
Italy	40	38	38	167	167	167	735	601	601	m	m	m	a	a	a
Japan	35	35	35	m	m	m	578	505	429	a	a	a	1 960	1 960	1 960
Korea	37	37	37	220	220	220	810	570	553	a	a	a	1 613	1 613	1 613
Luxembourg	36	36	36	176	176	176	774	642	642	1 022	890	890	a	a	a
Mexico	41	41	36	200	200	173	800	1 047	848	800	1 167	971	a	a	a
Netherlands	40	37	37	195	180	180	930	750	750	a	a	a	1 659	1 659	1 659
New Zealand	39	39	38	197	194	190	985	968	950	985	968	950	a	a	a
Norway	38	38	37	190	190	187	741	656	524	m	m	m	1 680	1 680	1 680
Poland	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m
Portugal	36	36	36	171	171	171	855	564	513	855	616	564	1 540	1 540	1 540
Scotland	38	38	38	190	190	190	893	893	893	a	a	a	1 365	1 365	1 365
Slovak Republic	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m
Spain	37	37	36	176	176	171	880	713	693	1 140	1 140	1 140	1 425	1 425	1 425
Sweden	a	a	a	a	a	a	a	a	a	1 360	1 360	1 360	1 767	1 767	1 767
Switzerland	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m
Turkey	37	a	37	180	a	180	639	a	567	870	a	756	1 808	a	1 808
United States	36	36	36	180	180	180	1 080	1 080	1 080	1 332	1 368	1 368	a	a	a
OECD average	*38*	*38*	*37*	*187*	*186*	*184*	*803*	*707*	*664*	*1 151*	*1 163*	*1 106*	*1 695*	*1 687*	*1 688*
EU19 average	*38*	*38*	*37*	*184*	*183*	*182*	*806*	*668*	*643*	*1 157*	*1 092*	*1 054*	*1 660*	*1 660*	*1 646*
Brazil	40	40	40	200	200	200	800	800	800	m	m	m	m	m	m
Chile	40	40	40	192	192	192	873	873	873	m	m	m	m	m	m
Estonia	35	35	35	175	175	175	770	770	700	a	a	a	1 225	1 225	1 225
Israel	43	42	42	183	175	175	1 025	788	665	1 221	945	945	a	a	a
Russian Fed.	34	35	35	164	169	169	656	946	946	m	m	m	m	m	m
Slovenia	39	39	39	192	192	192	697	697	639	a	a	a	a	a	a

OECD countries (left margin label)
Partner economies (left margin label)

Source: OECD. See Annex 3 for notes (www.oecd.org/edu/eag2007).
Please refer to the Reader's Guide for information concerning the symbols replacing missing data.
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Appendix 4 – Table D1.1 Compulsory and intended instruction time in public institutions (2005)

Table D1.1.

Compulsory and intended instruction time in public institutions (2005)

Average number of hours per year of total compulsory and non-compulsory instruction time in the curriculum for 7-to-8, 9-to-11, 12-to-14 and 15-year-olds

	Age range at which over 90% of the population are enrolled	Average number of hours per year of total compulsory instruction time					Average number of hours per year of total intended instruction time				
		Aged 7 to 8	Aged 9 to 11	Aged 12 to 14	Aged 15 (typical programme)	Aged 15 (least demanding programme)	Aged 7 to 8	Aged 9 to 11	Aged 12 to 14	Aged 15 (typical programme)	Aged 15 (least demanding programme)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
OECD countries											
Australia	5-16	952	979	970	966	952	952	979	1 014	1 022	1 008
Austria	5-17	690	767	913	1 005	960	735	812	958	1 050	1 005
Belgium (Fl.)	3-17	a	a	a	a	a	835	835	960	960	450
Belgium (Fr.)[1]	3-17	840	840	960	m	m	930	930	1 020	1 020	m
Czech Republic	4-17	661	774	902	970	396	661	774	902	970	396
Denmark	3-16	671	763	880	840	a	671	763	880	840	a
England	4-16	880	900	900	760	a	890	900	933	950	a
Finland	6-18	530	654	796	858	a	530	673	815	858	a
France	3-17	918	894	959	1 042	a	918	894	1 053	1 147	a
Germany	6-17	627	777	872	897	m	627	777	872	897	m
Greece	6-19	864	928	998	1 089	926	864	928	998	1 307	1 144
Hungary	4-17	555	624	717	763	763	611	718	921	1 106	1 106
Iceland	3-16	720	792	872	888	a	720	792	872	888	a
Ireland	5-16	941	941	848	802	713	941	941	907	891	891
Italy	3-15	990	957	1 016	1 069	m	990	1 023	1 082	1 069	m
Japan	4-17	707	774	869	m	a	707	774	869	m	a
Korea	6-17	612	703	867	1 020	a	612	703	867	1 020	a
Luxembourg	4-15	847	847	782	750	a	847	847	782	750	a
Mexico	5-13	800	800	1 167	1 058	a	800	800	1 167	1 124	a
Netherlands	5-16	940	1 000	1 067	m	a	940	1 000	1 067	m	a
New Zealand	4-15	a	a	a	a	a	985	985	962	950	950
Norway	5-17	599	713	827	855	a	599	713	827	855	a
Poland	6-18	m	m	m	m	m	m	m	m	m	m
Portugal	6-15	855	849	880	821	m	855	866	905	872	m
Scotland	4-16	a	a	a	a	a	a	a	a	a	a
Slovak Republic	6-17	m	m	m	m	m	m	m	m	m	m
Spain	3-16	793	794	956	979	978	793	794	956	979	978
Sweden	5-18	741	741	741	741	a	741	741	741	741	a
Switzerland	5-16	m	m	m	m	m	m	m	m	m	m
Turkey	7-13	720	720	791	959	a	864	864	887	959	a
United States	6-16	m	m	m	m	m	m	m	m	m	m
OECD average		*769*	*814*	*898*	*911*	*812*	*793*	*839*	*931*	*968*	*881*
EU19 average		*785*	*826*	*893*	*892*	*789*	*799*	*845*	*931*	*965*	*853*
Partner economies											
Brazil	7-16	m	m	m	m	m	m	m	m	m	m
Chile	9-16	m	m	m	m	m	m	m	m	m	m
Estonia	6-17	752	910	1 073	1 190	980	752	910	1 073	1 190	980
Israel	5-17	666	749	971	919	a	944	990	971	919	a
Russian Federation	7-15	m	748	884	m	m	m	748	884	m	m
Slovenia	6-17	621	721	791	908	888	621	721	791	908	888

1. Aged "12 to 14" covers aged 12 to 13 only.

Source: OECD. See Annex 3 for notes *(www.oecd.org/edu/eag2007).*

Please refer to the Reader's Guide for information concerning the symbols replacing missing data.

StatLink http://dx.doi.org/10.1787/068453733667

Appendix 5 – Table D3.1 Teachers' salaries (2005)

Table D3.1.
Teachers' salaries (2005)

Annual statutory teachers' salaries in public institutions at starting salary, after 15 years of experience and at the top of the scale by level of education, in equivalent USD converted using PPPs

		Primary education				Lower secondary education				Upper secondary education			
		Starting salary / minimum training	Salary after 15 years of experience / minimum training	Salary at top of scale / minimum training	Ratio of salary after 15 years of experience to GDP per capita	Starting salary / minimum training	Salary after 15 years of experience / minimum training	Salary at top of scale / minimum training	Ratio of salary after 15 years of experience to GDP per capita	Starting salary / minimum training	Salary after 15 years of experience / minimum training	Salary at top of scale / minimum training	Ratio of salary after 15 years of experience to GDP per capita
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
OECD countries	Australia	30 858	44 423	44 423	1.30	31 092	44 526	44 526	1.30	31 092	44 526	44 526	1.30
	Austria	27 094	35 823	53 938	1.04	28 379	38 805	56 139	1.13	28 589	39 531	59 151	1.15
	Belgium (Fl.)	29 270	41 007	50 001	1.24	29 270	41 007	50 001	1.24	36 327	52 451	63 054	1.59
	Belgium (Fr.)	27 754	38 901	47 452	1.18	27 865	39 335	48 190	1.19	34 729	50 601	61 039	1.53
	Czech Republic	18 654	24 423	29 078	1.19	18 654	24 423	29 078	1.19	18 955	24 868	29 663	1.21
	Denmark	34 517	38 911	38 911	1.14	34 517	38 911	38 911	1.14	33 902	47 374	47 374	1.39
	England	29 992	43 835	43 835	1.33	29 992	43 835	43 835	1.33	29 992	43 835	43 835	1.33
	Finland	27 806	32 406	32 406	1.05	32 273	38 159	38 159	1.23	34 681	43 346	43 346	1.40
	France	23 212	31 224	46 071	1.03	25 711	33 723	48 692	1.11	25 960	33 974	48 967	1.12
	Germany	40 125	49 930	52 062	1.62	41 630	51 240	53 493	1.66	45 022	55 195	57 671	1.79
	Greece	25 823	31 439	37 772	1.06	25 823	31 439	37 772	1.06	25 823	31 439	37 772	1.06
	Hungary	11 818	15 622	20 682	0.89	11 818	15 622	20 682	0.89	13 706	19 541	25 508	1.12
	Iceland	24 134	27 295	31 925	0.75	24 134	27 295	31 925	0.75	25 952	31 966	33 917	0.88
	Ireland	28 198	46 709	52 930	1.20	28 198	46 709	52 930	1.20	28 198	46 709	52 930	1.20
	Italy	24 224	29 301	35 641	1.04	26 108	31 917	39 135	1.14	26 108	32 813	40 917	1.17
	Japan	25 593	47 855	61 054	1.56	25 593	47 855	61 054	1.56	25 593	47 863	62 865	1.56
	Korea	30 183	51 641	82 915	2.34	30 058	51 516	82 790	2.33	30 058	51 516	82 790	2.33
	Luxembourg	49 219	67 779	100 314	0.96	70 908	88 634	123 187	1.26	70 908	88 634	123 187	1.26
	Mexico	12 753	16 784	27 824	1.58	16 351	21 347	35 286	2.01	m	m	m	m
	Netherlands	32 195	41 835	46 734	1.19	33 298	45 960	51 207	1.31	33 630	61 511	67 848	1.75
	New Zealand	19 071	36 894	36 894	1.42	19 071	36 894	36 894	1.42	19 071	36 894	36 894	1.42
	Norway	31 382	35 058	39 044	0.74	31 382	35 058	39 044	0.74	33 589	37 778	40 950	0.80
	Poland	m	m	m	m	m	m	m	m	m	m	m	m
	Portugal	19 704	32 275	50 634	1.62	19 704	32 275	50 634	1.62	19 704	32 275	50 634	1.62
	Scotland	30 213	48 205	48 205	1.47	30 213	48 205	48 205	1.47	30 213	48 205	48 205	1.47
	Slovak Republic	m	m	m	m	m	m	m	m	m	m	m	m
	Spain	31 847	37 056	46 623	1.35	35 840	41 588	51 904	1.52	36 611	42 552	53 120	1.55
	Sweden	26 234	30 802	35 750	0.96	26 756	31 585	36 153	0.98	28 387	34 108	38 785	1.06
	Switzerland	40 657	52 743	63 899	1.48	46 751	60 061	72 706	1.68	54 973	70 300	83 900	1.97
	Turkey	17 909	19 577	21 623	2.54	a	a	a	a	18 179	19 847	21 893	2.57
	United States	33 521	40 734	m	0.97	32 225	41 090	m	0.98	32 367	41 044	m	0.98
	OECD average	*27 723*	*37 603*	*45 666*	*1.28*	*29 772*	*40 322*	*48 983*	*1.30*	*31 154*	*43 239*	*51 879*	*1.41*
	EU 19 average	*28 311*	*37 762*	*45 739*	*1.19*	*30 366*	*40 177*	*48 332*	*1.25*	*31 655*	*43 629*	*52 263*	*1.36*
Partner economies	Brazil	m	m	m	m	m	m	m	m	m	m	m	m
	Chile	m	m	m	m	m	m	m	m	m	m	m	m
	Estonia	m	m	m	m	m	m	m	m	m	m	m	m
	Israel	14 716	18 055	25 131	0.70	14 716	18 055	25 131	0.70	14 716	18 055	25 131	0.70
	Russian Federation	m	m	m	m	m	m	m	m	m	m	m	m
	Slovenia	25 148	29 766	31 664	1.30	25 148	29 766	31 664	1.30	25 148	29 766	31 664	1.30

Source: OECD. See Annex 3 for notes *(www.oecd.org/edu/eag2007).*

Please refer to the Reader's Guide for information concerning the symbols replacing missing data.

StatLink http://dx.doi.org/10.1787/068520240747

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Appendix 6 – Table D3.2 Change in teachers' salaries (1996 and 2005)

Table D3.2.
Change in teachers' salaries (1996 and 2005)

Index of change[1] between 1996 and 2005 in teachers' salaries at starting salary, after 15 years of experience and at the top of the salary scale, by level of education, converted to 2005 price levels using GDP deflators (1996=100)

	Primary education			Lower secondary education			Upper secondary education, general programmes		
	Starting salary / minimum training	Salary after 15 years of experience / minimum training	Salary at top of scale / minimum training	Starting salary / minimum training	Salary after 15 years of experience / minimum training	Salary at top of scale / minimum training	Starting salary / minimum training	Salary after 15 years of experience / minimum training	Salary at top of scale / minimum training
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
OECD countries									
Australia	130	103	103	131	103	103	131	103	103
Austria	106	109	105	107	113	102	102	105	96
Belgium (Fl.)[2]	106	110	113	103	103	103	103	103	103
Belgium (Fr.)[2]	100	105	107	98	99	100	99	100	100
Czech Republic	w	w	w	w	w	w	w	w	w
Denmark	121	112	109	121	112	109	109	107	102
England	123	106	106	123	106	106	123	106	106
Finland	134	118	114	138	117	112	143	127	120
France	w	w	w	w	w	w	w	w	w
Germany	w	w	w	w	w	w	w	w	w
Greece	116	118	121	112	115	118	112	115	118
Hungary	206	201	206	206	201	206	187	202	211
Iceland	m	m	m	m	m	m	m	m	m
Ireland	107	114	110	102	108	108	102	108	108
Italy	111	111	112	110	110	111	110	110	110
Japan	107	117	104	107	117	104	107	117	104
Korea	m	m	m	m	m	m	m	m	m
Luxembourg	m	m	m	m	m	m	m	m	m
Mexico	133	132	133	133	137	140	m	m	m
Netherlands	105	112	102	103	113	102	103	109	101
New Zealand	102	115	115	102	115	115	102	115	115
Norway	114	104	114	114	104	114	112	109	110
Poland	m	m	m	m	m	m	m	m	m
Portugal	104	113	103	104	113	103	104	113	103
Scotland	120	115	115	120	115	115	120	115	115
Slovak Republic	m	m	m	m	m	m	m	m	m
Spain	95	94	93	m	m	m	94	93	93
Sweden	w	w	w	w	w	w	w	w	w
Switzerland	101	98	104	m	m	m	m	m	m
Turkey	w	w	w	a	a	a	w	w	w
United States	m	m	m	m	m	m	m	m	m
Partner economies									
Brazil	m	m	m	m	m	m	m	m	m
Chile	m	m	m	m	m	m	m	m	m
Estonia	m	m	m	m	m	m	m	m	m
Israel	m	m	m	m	m	m	m	m	m
Russian Federation	m	m	m	m	m	m	m	m	m
Slovenia	m	m	m	m	m	m	m	m	m

1. The index is calculated as teacher salary 2005 in national currency * 100 / Teacher salary 1996 in national currency * GDP deflator 2005 (1996=100). See Annex 2 for statistics on GDP deflators and salaries in national currencies in 1996 and 2005.

2. Data for 1996 based on Belgium as a whole.

Source: OECD. See Annex 3 for notes *(www.oecd.org/edu/eag2007).*

Please refer to the Reader's Guide for information concerning the symbols replacing missing data.

StatLink ⌨ http://dx.doi.org/10.1787/068520240747

Appendix 7 – Table A1.2a population that has attained at least upper secondary education (2005)

Table A1.2a.
Population that has attained at least upper secondary education[1] (2005)
Percentage, by age group

		Age group				
		25–64	25–34	35–44	45–54	55–64
OECD countries	Australia	65	79	66	61	50
	Austria[2]	81	87	84	78	70
	Belgium	66	81	72	60	48
	Canada	85	91	88	84	75
	Czech Republic	90	94	93	88	83
	Denmark	81	87	83	78	75
	Finland	79	89	87	78	61
	France	66	81	71	60	51
	Germany	83	84	85	84	79
	Greece	57	74	65	51	32
	Hungary	76	85	81	76	61
	Iceland	63	69	67	63	49
	Ireland	65	81	70	55	40
	Italy	50	66	54	46	30
	Korea	76	97	88	60	35
	Luxembourg	66	77	68	60	55
	Mexico	21	24	23	20	12
	Netherlands	72	81	76	69	59
	New Zealand	79	85	82	78	66
	Norway	77	83	78	74	73
	Poland	51	62	50	47	43
	Portugal	26	43	26	19	13
	Slovak Republic	86	93	92	85	68
	Spain	49	64	54	41	26
	Sweden	84	91	90	82	72
	Switzerland	83	88	85	82	77
	Turkey	27	36	25	21	15
	United Kingdom[2]	67	73	67	65	60
	United States	88	87	88	89	86
	OECD average	*68*	*77*	*71*	*64*	*54*
	EU19 average	*68*	*79*	*72*	*64*	*54*
Partner economies	Brazil[3]	30	38	32	27	11
	Chile[3]	50	64	52	44	32
	Estonia	89	87	95	92	80
	Israel	79	86	82	75	69
	Russian Federation[4]	89	92	95	90	72
	Slovenia	80	91	84	75	69

1. Excluding ISCED 3C short programmes.
2. Including some ISCED 3C short programmes.
3. Year of reference 2004.
4. Year of reference 2003.
Source: OECD, See Annex 3 for notes *(www.oecd.org/edu/eag2007)*.
StatLink ⫘ http://dx.doi.org/10.1787/068015451617

Appendix 8 – Table A2.2 trends in graduation rates at upper secondary level (1995-2005)

Table A2.2.
Trends in graduation rates at upper secondary level (1995-2005)
Percentage of upper secondary graduates to the population at the typical age of graduation (1995, 2000, 2001, 2002, 2003, 2004, 2005)

		Typical Age	1995	2000	2001	2002	2003	2004	2005
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
OECD countries	Australia	18-20	m	m	m	m	m	m	m
	Austria	18	m	m	m	m	m	m	m
	Belgium	18	m	m	m	m	m	m	m
	Canada	m	m	m	m	m	m	m	m
	Czech Republic	18-19	78	m	84	83	88	87	89
	Denmark	19-20	80	90	91	93	87	90	86
	Finland	19	91	91	85	84	90	95	m
	France	17-20	m	m	m	m	m	m	m
	Germany	19	101	92	92	94	97	99	100
	Greece	17-18	80	54	76	85	96	93	102
	Hungary	18	m	m	m	m	m	m	84
	Iceland	20	m	67	67	79	79	84	80
	Ireland	17-18	m	74	77	78	91	92	91
	Italy	19	m	78	81	78	m	82	82
	Japan	18	91	94	93	92	91	91	93
	Korea	17-18	88	96	100	99	92	94	93
	Luxembourg	17-19	m	m	m	69	71	69	76
	Mexico	18	m	33	34	35	37	39	40
	Netherlands	18-20	m	m	m	m	m	m	m
	New Zealand	17-18	72	80	79	77	78	75	72
	Norway	18-19	77	99	105	97	92	100	93
	Poland	18-20	m	90	93	91	86	79	86
	Portugal	17	67	52	48	50	59	53	m
	Slovak Republic	18-20	85	87	72	60	56	83	84
	Spain	17	62	60	66	66	67	66	72
	Sweden	19	62	75	71	72	76	78	78
	Switzerland	18-20	86	88	91	92	89	87	89
	Turkey	16-17	37	37	37	37	41	55	48
	United Kingdom	18	m	m	m	m	m	m	86
	United States	18	74	74	70	72	75	74	76
	OECD average		*77*	*76*	*77*	*77*	*78*	*80*	*82*
	OECD average for countries with 1995 and 2005 data		*77*						*84*
	EU19 average		*78*	*76*	*79*	*79*	*82*	*82*	*86*
Partner economies	Brazil	17-18	m	m	m	m	m	m	m
	Chile	18	46	63	m	61	64	66	73
	Estonia	m	m	m	m	m	m	m	m
	Israel	18	m	m	m	90	89	93	89
	Russian Federation	17	m	m	m	m	m	m	m
	Slovenia	m	m	m	m	m	m	m	83

Source: OECD. See Annex 3 for notes (www.oecd.org/edu/eag2007).
Please refer to the Reader's Guide for information concerning the symbols replacing missing data.
StatLink http://dx.doi.org/10.1787/068023602135

Appendix 9 – Table A4.1a Percentage of students expecting to complete different levels of education (2003)

Table A4.1a.
Percentage of students expecting to complete different levels of education (2003)

	Highest level students expect to complete									
	ISCED 2		ISCED 3B, 3C		ISCED 3A, 4		ISCED 5B		ISCED 5A, 6	
	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
Australia	2.7	0.2	3.7	0.2	22.8	0.6	8.0	0.3	62.8	0.8
Austria	3.6	0.3	27.5	1.4	28.1	1.0	16.6	0.8	24.3	1.3
Belgium	6.7	0.4	7.5	0.4	27.8	0.9	22.7	0.7	35.3	1.0
Canada	0.7	0.1	6.5	0.3	7.5	0.3	22.7	0.6	62.5	0.8
Czech Republic	0.8	0.1	11.6	0.7	39.7	1.1	10.7	0.6	37.2	1.1
Denmark	9.6	0.5	12.3	0.6	34.8	0.7	17.8	0.7	25.5	0.9
Finland	2.8	0.3	a	a	45.7	0.9	a	a	51.5	0.9
France	1.7	0.2	24.4	1.0	22.2	0.9	17.1	0.8	34.7	0.9
Germany	43.4	1.6	3.4	0.3	32.2	1.0	1.9	0.2	19.1	0.9
Greece	0.8	0.1	8.1	0.7	7.6	0.7	19.0	1.5	64.5	1.9
Hungary	0.3	0.1	9.5	0.8	28.2	1.1	8.8	0.5	53.2	1.4
Iceland	1.6	0.2	8.2	0.5	38.6	0.8	15.6	0.6	36.1	0.8
Ireland	3.6	0.4	7.5	0.5	21.3	0.8	14.1	0.6	53.5	1.1
Italy	2.4	0.4	5.6	0.6	35.8	0.9	4.2	0.4	52.1	1.2
Japan	a	a	13.1	1.1	14.3	0.8	21.9	1.1	50.7	1.3
Korea	0.1	0.0	4.0	0.4	1.0	0.2	16.6	0.8	78.3	1.0
Luxembourg	5.7	0.4	19.4	0.6	18.9	0.6	13.4	0.5	42.6	0.6
Mexico	11.7	1.3	6.7	0.6	19.3	0.8	13.2	0.5	49.1	1.5
Netherlands	30.3	1.6	a	a	28.9	1.2	a	a	40.8	1.5
New Zealand	1.7	0.2	12.1	0.6	34.2	0.7	13.3	0.5	38.8	0.9
Norway	1.0	0.2	25.2	0.8	18.2	0.7	29.8	0.7	25.8	0.9
Poland	6.7	0.5	23.1	0.9	25.9	0.9	14.2	0.6	30.1	1.0
Portugal	12.0	0.9	10.4	0.7	25.4	0.7	a	a	52.2	1.4
Slovak Republic	3.8	0.5	8.5	0.9	39.1	1.2	5.6	0.4	43.0	1.3
Spain	13.8	0.9	11.8	0.6	14.2	0.5	11.9	0.4	48.4	1.2
Sweden	4.2	0.3	23.0	0.7	15.3	0.7	24.3	0.7	33.2	1.1
Switzerland	8.7	0.6	48.7	1.7	17.9	0.7	7.0	0.5	17.6	1.4
Turkey	1.9	0.7	0.9	0.2	11.1	1.0	9.4	0.9	76.7	1.8
United States	0.8	0.1	a	a	22.8	0.7	12.0	0.5	64.4	0.9
OECD total	*6.4*	*0.2*	*8.7*	*0.2*	*21.7*	*0.3*	*12.5*	*0.2*	*50.7*	*0.3*
OECD average	*6.2*	*0.1*	*12.1*	*0.2*	*24.5*	*0.2*	*12.6*	*0.1*	*44.5*	*0.2*
United Kingdom[1]	3.1	0.3	29.4	0.8	28.6	0.7	7.4	0.5	31.5	1.2

(Left margin label: OECD countries)

1. Response rate too low to ensure comparability.
Source: OECD PISA 2003.
Please refer to the Reader's Guide for information concerning the symbols replacing missing data.
StatLink http://dx.doi.org/10.1787/068053630540

Table A4.2a.
Percentage of students expecting to complete ISCED levels 5A or 6, by mathematics performance level (2003)

	All levels		Level 1 and below		Level 2		Level 3		Level 4		Levels 5 and 6		Difference between maximum and minimum expectation rates	Mathematics scores	
	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.		Mean score	S.E.
Australia	62.8	(0.8)	33.0	(1.8)	46.0	(1.6)	60.8	(1.3)	74.2	(1.4)	88.4	(1.0)	55.5	524	(2.1)
Austria	24.3	(1.3)	5.4	(1.1)	8.6	(1.2)	19.6	(1.6)	38.7	(2.4)	58.4	(2.5)	53.0	506	(3.3)
Belgium	35.3	(1.0)	7.7	(1.2)	12.5	(1.3)	24.8	(1.6)	41.3	(1.7)	65.2	(1.3)	57.4	529	(2.3)
Canada	62.5	(0.8)	35.2	(1.6)	44.9	(1.5)	58.2	(1.7)	71.4	(1.3)	83.2	(1.1)	48.0	532	(1.8)
Czech Republic	37.2	(1.1)	6.5	(1.2)	15.1	(1.8)	30.6	(2.3)	50.2	(2.0)	75.7	(1.7)	69.2	516	(3.5)
Denmark	25.5	(0.9)	8.0	(1.4)	14.5	(1.6)	22.5	(1.8)	33.7	(2.0)	49.9	(2.5)	41.9	514	(2.7)
Finland	51.5	(0.9)	35.7	(2.7)	36.8	(2.3)	44.9	(1.8)	53.9	(1.6)	71.1	(1.7)	35.4	544	(1.9)
France	34.7	(0.9)	6.5	(1.1)	17.7	(1.9)	32.2	(2.2)	49.0	(2.5)	68.8	(1.9)	62.3	511	(2.5)
Germany	19.1	(0.9)	3.0	(0.8)	6.2	(1.1)	13.4	(1.3)	27.3	(1.8)	48.3	(1.9)	45.3	503	(3.3)
Greece	64.5	(1.9)	38.4	(1.9)	69.8	(2.5)	85.4	(1.6)	93.6	(1.5)	98.5	(1.1)	60.1	445	(3.9)
Hungary	53.2	(1.4)	15.7	(1.6)	41.1	(2.1)	62.6	(2.3)	80.1	(1.7)	93.1	(1.2)	77.4	490	(2.8)
Iceland	36.1	(0.8)	13.7	(1.9)	21.4	(1.9)	33.0	(1.9)	48.6	(2.2)	63.4	(2.6)	49.7	515	(1.4)
Ireland	53.5	(1.1)	24.8	(2.0)	41.2	(2.3)	58.2	(2.5)	69.9	(2.0)	79.7	(2.3)	54.9	503	(2.4)
Italy	52.1	(1.2)	34.5	(2.6)	50.5	(1.9)	60.4	(1.8)	68.2	(1.9)	78.3	(2.3)	43.8	466	(3.1)
Japan	50.7	(1.3)	14.7	(1.9)	26.5	(2.0)	43.4	(2.4)	60.4	(2.1)	82.6	(1.9)	67.9	534	(4.0)
Korea	78.3	(1.0)	39.7	(3.2)	61.1	(2.1)	76.3	(1.8)	88.6	(1.4)	96.3	(0.8)	56.6	542	(3.2)
Luxembourg	42.6	(0.6)	11.9	(1.4)	28.2	(1.7)	47.7	(1.7)	62.8	(2.2)	80.7	(2.5)	68.8	493	(1.0)
Mexico	49.1	(1.5)	38.6	(1.3)	64.4	(1.8)	74.7	(2.1)	82.0	(4.2)	92.7	(4.3)	54.0	385	(3.6)
Netherlands	40.8	(1.5)	9.3	(2.0)	14.0	(2.3)	22.2	(2.2)	49.7	(2.3)	78.0	(1.6)	68.7	538	(3.1)
New Zealand	38.8	(0.9)	18.9	(1.9)	23.1	(1.9)	33.1	(1.8)	45.4	(2.0)	66.3	(1.8)	47.4	523	(2.3)
Norway	25.8	(0.9)	11.2	(1.2)	16.2	(1.7)	26.2	(2.0)	38.0	(2.1)	50.5	(2.7)	39.3	495	(2.4)
Poland	30.1	(1.0)	7.7	(1.2)	18.8	(1.3)	33.3	(1.7)	49.6	(1.9)	64.8	(3.2)	57.0	490	(2.5)
Portugal	52.2	(1.4)	22.4	(1.5)	47.7	(2.1)	66.3	(1.8)	82.4	(2.1)	92.5	(2.4)	70.2	466	(3.4)
Slovak Republic	43.0	(1.3)	8.7	(1.3)	24.8	(1.7)	45.8	(2.2)	68.3	(2.1)	85.1	(2.1)	76.4	498	(3.3)
Spain	48.4	(1.2)	15.6	(1.8)	37.2	(2.0)	56.3	(1.8)	75.6	(2.0)	88.2	(2.3)	72.7	485	(2.4)
Sweden	33.2	(1.1)	19.1	(1.6)	21.9	(1.9)	30.9	(1.7)	42.4	(2.2)	55.2	(2.2)	36.1	509	(2.6)
Switzerland	17.6	(1.4)	3.8	(0.8)	5.0	(1.1)	10.5	(1.4)	19.9	(1.8)	42.9	(2.9)	39.1	527	(3.4)
Turkey	76.7	(1.8)	63.5	(2.4)	84.8	(1.8)	94.4	(1.5)	97.1	(1.7)	99.3	(0.4)	35.8	423	(6.7)
United States	64.4	(0.9)	43.9	(1.6)	59.6	(1.7)	70.7	(1.7)	79.5	(1.5)	86.7	(2.3)	42.8	483	(2.9)
OECD total	*50.7*	*(0.3)*	*32.9*	*(0.6)*	*42.9*	*(0.7)*	*52.1*	*(0.7)*	*63.0*	*(0.6)*	*77.7*	*(0.7)*	*44.9*	*489*	*(1.1)*
OECD average	*44.5*	*(0.2)*	*24.8*	*(0.4)*	*33.4*	*(0.4)*	*44.0*	*(0.4)*	*56.6*	*(0.4)*	*72.5*	*(0.4)*	*47.7*	*500*	*(0.6)*
United Kingdom[1]	31.5	(1.2)	8.2	(1.4)	15.6	(1.7)	28.8	(1.7)	44.0	(2.1)	68.7	(2.2)	60.5	m	m

OECD countries

1. Response rate too low to ensure comparability.
Source: OECD PISA 2003.
Please refer to the Reader's Guide for information concerning the symbols replacing missing data.
StatLink http://dx.doi.org/10.1787/068053630540

Appendix 11 – Table A4.4 Odds ratios that students expect to complete ISCED levels 5A or 6 by socio-economic status (2003)

Table A4.4.
Odds ratios that students expect to complete ISCED levels 5A or 6 by socio-economic status (2003)

	(A) Odds before taking into account the mathematics score	S.E.	(B) Odds after taking into account the mathematics score	S.E.	Difference (A)-(B)/(A)
Australia	2.2	(0.10)	1.8	(0.08)	0.186
Austria	3.0	(0.17)	2.4	(0.13)	0.211
Belgium	3.0	(0.13)	2.2	(0.09)	0.274
Canada	2.2	(0.06)	1.9	(0.06)	0.129
Czech Reublic	2.9	(0.11)	2.2	(0.09)	0.247
Denmark	2.2	(0.13)	1.8	(0.11)	0.192
Finland	1.8	(0.06)	1.7	(0.06)	0.104
France	2.3	(0.15)	1.7	(0.12)	0.264
Germany	3.2	(0.21)	2.3	(0.16)	0.280
Greece	3.0	(0.17)	2.3	(0.13)	0.206
Hungary	4.0	(0.22)	2.7	(0.15)	0.313
Iceland	2.1	(0.09)	1.8	(0.09)	0.111
Ireland	2.2	(0.11)	1.8	(0.10)	0.183
Italy	2.5	(0.11)	2.2	(0.10)	0.119
Japan	2.5	(0.15)	2.1	(0.12)	0.168
Korea	2.5	(0.11)	2.0	(0.08)	0.211
Luxembourg	2.5	(0.11)	1.8	(0.09)	0.250
Mexico	2.2	(0.10)	1.8	(0.07)	0.174
Netherlands	2.2	(0.12)	1.5	(0.10)	0.309
New Zealand	2.0	(0.10)	1.6	(0.08)	0.197
Norway	2.4	(0.12)	2.0	(0.11)	0.146
Poland	2.8	(0.11)	2.2	(0.09)	0.202
Portugal	2.3	(0.09)	1.8	(0.07)	0.233
Slovak Republic	3.1	(0.14)	2.3	(0.10)	0.279
Spain	2.5	(0.11)	2.0	(0.09)	0.197
Sweden	2.1	(0.10)	1.8	(0.08)	0.129
Switzerland	3.1	(0.24)	2.5	(0.21)	0.213
Turkey	2.2	(0.17)	1.6	(0.12)	0.241
United States	2.2	(0.08)	1.9	(0.08)	0.167
United Kingdom[1]	2.4	(0.10)	1.8	(0.07)	0.265

Notes: Bold indicates odds ratio is statistically significantly different than 1. The calculations in this table compare the odds ratio for students whose scores on the ESCS index are within one standard deviation of the mean value for the country and those that are not. This was to make the analysis more comparable with that for immigration status.

1. Response rate too low to ensure comparability.

Source: OECD PISA 2003.

Please refer to the Reader's Guide for information concerning the symbols replacing missing data.

StatLink http://dx.doi.org/10.1787/068053630540

Appendix 12 – Table A3.4 Science graduates by gender (2005)

Table A3.4.
Science graduates, by gender (2005)
Per 100 000 employed 25-to-34-year-olds

	Tertiary-type B			Tertiary-type A and advanced research programmes			All tertiary education		
	M + F	Males	Females	M + F	Males	Females	M + F	Males	Females
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
OECD countries									
Australia	408	562	214	2 141	2 580	1 589	2 549	3 142	1 803
Austria	350	565	98	788	1 051	479	1 139	1 617	577
Belgium[1]	479	732	179	816	1 006	591	1 295	1 738	772
Canada[2]	m	m	m	1 163	1 406	888	m	m	m
Czech Republic	77	95	50	928	1 111	647	1 005	1 206	697
Denmark	295	337	246	1 307	1 634	928	1 602	1 970	1 174
Finland[2]	n	n	n	2 290	2 936	1 506	2 340	2 997	1 540
France	874	1 334	313	2 043	2 465	1 527	2 917	3 799	1 840
Germany	257	432	38	1 045	1 341	676	1 302	1 773	713
Greece	355	381	318	991	952	1 047	1 346	1 333	1 365
Hungary	75	94	48	620	734	456	695	828	505
Iceland	42	67	13	1 240	1 442	1 009	1 282	1 509	1 022
Ireland	1 233	1 758	596	1 789	2 078	1 440	3 022	3 836	2 036
Italy	n	n	n	1 401	1 509	1 249	1 401	1 509	1 249
Japan	453	640	183	1 143	1 662	390	1 596	2 302	573
Korea	1 942	2 317	1 365	2 072	2 384	1 592	4 014	4 701	2 957
Luxembourg	m	m	m	m	m	m	m	m	m
Mexico	116	134	85	868	927	774	984	1 061	859
Netherlands	n	n	n	948	1 424	410	948	1 424	410
New Zealand	521	717	287	1 777	2 005	1 504	2 298	2 722	1 791
Norway	24	36	10	985	1 380	546	1 009	1 416	556
Poland	a	a	a	1 746	1 981	1 445	1 746	1 981	1 445
Portugal	301	404	184	996	1 080	901	1 381	1 568	1 171
Slovak Republic	4	7	n	1 515	1 670	1 297	1 520	1 677	1 297
Spain	501	712	220	874	982	730	1 375	1 694	950
Sweden	161	237	76	1 495	1 824	1 120	1 656	2 061	1 195
Switzerland	736	1 242	143	994	1 426	488	1 730	2 668	631
Turkey	506	508	501	556	484	790	1 062	992	1 291
United Kingdom	348	474	205	1 935	2 493	1 298	2 283	2 967	1 503
United States	301	437	132	1 100	1 306	844	1 401	1 742	976
OECD average	*384*	*527*	*204*	*1 295*	*1 561*	*971*	*1 675*	*2 080*	*1 175*
EU19 average	*295*	*420*	*143*	*1 307*	*1 571*	*986*	*1 610*	*1 999*	*1 136*
Partner economies									
Brazil	m	m	m	m	m	m	m	m	m
Chile	m	m	m	m	m	m	m	m	m
Estonia	m	m	m	m	m	m	m	m	m
Israel	m	m	m	m	m	m	m	m	m
Russian Federation	m	m	m	m	m	m	m	m	m
Slovenia	m	m	m	m	m	m	m	m	m

Note: Science fields include life sciences; physical sciences, mathematics and statistics; computing; engineering and engineering trades, manufacturing and processing, architecture and building.
1. Excludes the German-speaking Community of Belgium.
2. Year of reference 2004.
Source: OECD. See Annex 3 for notes (www.oecd.org/edu/eag2007).
Please refer to the Reader's Guide for information concerning the symbols replacing missing data.
StatLink ⏱ http://dx.doi.org/10.1787/068037263103

Appendix 13 – Table A1.5 Ration of 25-to-34-years-olds with ISCED 5A and 30-to-39-year-olds with ISCED 6 levels of education to 55-to-64-year-olds with ISCED 5A and 6 levels of education, by fields of education (2004)

Table A1.5.
Ratio of 25-to-34-year-olds with ISCED 5A and 30-to-39-year-olds with ISCED 6 levels of education to 55-to-64-year-olds with ISCED 5A and 6 levels of education, by fields of education (2004)

	Education	Arts and Humanities	Social sciences, business and law	Science	Engineering	Agriculture	Health and welfare	Services	Other fields	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Australia	1,9	2,2	3,4	3,9	2,3	2,7	1,9	x(10)	2,9	2,6
Austria	1,0	1,8	2,0	4,8	1,8	1,6	1,4	x(10)	0,5	1,9
Belgium	x(10)	3,4	3,9	2,1	2,0	x(10)	2,4	x(10)	2,7	2,6
Canada[1]	1,1	2,1	3,2	4,4	2,3	2,1	1,9	5,3	0,0	2,3
Czech Republic	m	m	m	m	m	m	m	m	m	m
Denmark	0,8	2,3	2,5	3,3	0,8	0,6	1,2	x(10)	0,0	1,4
Finland	1,3	1,3	1,6	1,6	1,9	1,4	3,9	2,0	0,0	1,8
France	0,6	3,0	4,7	3,3	2,4	2,0	1,1	4,9	2,8	2,8
Germany	0,6	1,4	1,8	2,1	0,9	1,0	1,3	1,6	1,1	1,2
Greece	m	m	m	m	m	m	m	m	m	m
Hungary	1,9	2,7	2,4	6,2	0,8	0,9	1,4	1,3	0,0	1,7
Iceland	x(10)	x(10)	x(10)	x(10)	x(10)	x(10)	x(10)	x(10)	x(10)	2,7
Ireland	1,5	3,4	7,3	6,8	4,2	1,6	3,9	11,5	3,0	4,3
Italy	2,1	1,4	4,0	2,0	3,1	4,4	2,1	3,7	0,0	2,5
Japan	m	m	m	m	m	m	m	m	m	m
Korea	m	m	m	m	m	m	m	m	m	m
Luxembourg	x(10)	x(10)	x(10)	x(10)	x(10)	x(10)	x(10)	x(10)	x(10)	2,4
Mexico	x(10)	3,9	2,2	3,0	2,4	2,8	1,4	2,9	6,5	2,7
Netherlands	0,7	1,7	3,2	1,8	1,4	1,9	1,7	1,6	5,7	1,7
New Zealand	m	m	m	m	m	m	m	m	m	m
Norway	1,0	0,9	2,4	3,0	0,8	0,7	1,2	x(10)	9,0	2,2
Poland	m	m	m	m	m	m	m	m	m	m
Portugal	3,9	2,7	7,3	10,0	4,3	10,3	4,9	8,5	0,6	5,3
Slovak Republic	1,5	2,8	3,9	2,9	2,0	1,5	2,4	3,5	0,0	2,3
Spain	2,0	4,0	7,8	8,8	3,5	6,0	3,8	5,2	3,5	4,7
Sweden	0,9	1,9	1,7	4,3	4,7	2,5	1,3	x(10)	1,2	1,7
Switzerland	m	m	m	m	m	m	m	m	m	m
Turkey	m	m	m	m	m	m	m	m	m	m
United Kingdom	0,8	2,5	3,0	2,8	1,9	x(10)	2,8	x(10)	1,6	2,2
United States	m	m	m	m	m	m	m	m	m	m
OECD average	1,0	2,2	3,5	3,0	1,9	2,2	1,9	3,1	4,5	2,3

OECD countries

Note: Science includes life sciences, mathematics and statistics, computer science and use.
1. Year of reference 2001. Only ISCED 5A of educational attainment.
Source: OECD, Network B special data collection, Supply of Skills working group.
Please refer to the Reader's Guide for information concerning the symbols replacing missing data.
StatLink ⌐ᵍᔆ▜ http://dx.doi.org/10.1787/068015451617

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