

# MACROECONOMICS OF DEVELOPMENT

## Decentralized provision of education

Methodological suggestions for analysis,  
with application to Mexico

Giorgio Brosio



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## Decentralized provision of education

Methodological suggestions for analysis,  
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UNITED NATIONS



NORWEGIAN MINISTRY  
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## Abstract

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A large part of disparities in Latin America derive from inequalities of opportunities in access and continuation to education. In turn, education determines access to labor market and to the most valuable segments of it. Important results have been achieved by allowing access to secondary education by children of poor families and/or living in remote areas, while access to tertiary education remains still insufficient and selective.

Public support to education is crucial to reduce personal and territorial inequalities, because talent is not linked to the socio-economic status and/or to the residence of families, while access to education is.

Decentralization is credited to be a crucial component of an improving education national strategy. At the same time, decentralization of education, when not properly structured, can simply shift the same old problems to levels of government less capable of solving them. Similarly, decentralization of education finance can end up reinforcing preexisting inequities. Indications from actual experiences are extremely important and empirical analysis of reform strategies becomes crucial. At the same time, this assessment, particularly in the case of international comparisons, is constrained by analytical problems and information constraints about the effective outcomes of education.

The paper provides a methodological approach to the comparative analysis of decentralized systems with a view also to extracting valid suggestions for reform. Given its exploratory character, the paper is focused on a small number of issues. They are: a) the selection of proper variables for measuring education outcomes and the success of educational policies; b) the meaning of decentralization and its measurement; c) concomitant reform; d) the links between general and vocational education, and the possibility of expanding the role of the latter.

To test its analytical validity and its feasibility in terms of information the proposed approach is applied to the case of Mexico.





## Introduction

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Education fosters personal advancement and economic growth by increasing human capital. Personal and social returns on education are generally high. At a societal level, improvement of education can contribute substantially to overcome the middle-income trap that afflicts many Latin American countries. This is a situation, where lack of competitiveness impedes furtherance of growth and in turn derives from insufficient innovation and low labor productivity. According to IADB estimates (BID, 2016) the average productivity in Latin America barely reaches 50 per cent of its potential and is situated largely below the level observable in the EU countries and, more importantly in terms of competition on global markets, in India and China. Expansion of human capital is a necessary condition to escape the middle-income trap.

Public support to education is crucial to reduce personal, territorial and also global inequalities, basically because talent is not linked to the socio-economic status and/or to the residence of families, while access to education is. Education improves personal and social conditions, and, at the same time, these conditions constrain educational attainment.

A large part of disparities in Latin America derive from inequalities of opportunities in access and continuation to education. In turn, education determines access to labor market and to the most valuable segments of it. “Education represents today the lever of inequality and, at the same time, a multiple link to development” (CEPAL, 2010, page 224).

Important results have been achieved, in many Latin American countries, by allowing access to secondary education by children of poor families and/or living in remote areas, while access to tertiary education remains still insufficient and selective. Also, improvements in student scores have improved in Latin America, but scores remain in general at insufficient levels, below those of OECD countries, as observable in table A1 in the Annex. There is, obviously, a problem in education policy, when the number of pupils in schools increases, but their achievement in terms of skills developed does not increase correspondingly, implying that effective opportunities do not expand.

Another pending problem is the weak link existing between the demand of skills coming from the economy and the supply provided by the education sector, commonly known as the education-occupation mismatch. Business firms lament that they are very frequently not able to encounter the skills that they require, while unemployment remains high, even with people with formal education. As a matter of fact,

as estimated by Unesco (2017) 36% of business firms operating in the formal sector have difficulties in recruiting people with the needed skills. This compares unfavorably with a corresponding figure of 21% at the world level and with the 15% observed for the OCDE countries. Gaps are especially wide in sectors operating with modern, complex technologies (OECD, 2014).

Another issue, worth more analysis, is the link between education and the informal sector. The obvious question is whether proper structuring of education can contribute to the downsizing of the informal sector. The answer in the literature is generally negative, based on the consideration that the choice between the formal and the informal sector is mostly determined by tax and labor regulations. As a consequence, human capital building, however derived from, has a very limited role to play and only in the long term. However, things are not that simple. Levy (2008) shows, for example, that people with lower educational attainments have a higher chance to stay in the informal sector, rather than in the formal one. Hence, if for example vocational training leads to lower attainments, investing in it could work in favor of continuation of the informal economy.

Education includes, traditionally, two main and frequently poorly related components. The first is general education to which most analysis and policy options refer; the second is vocational education. The latter component operates as a direct link between students (with different achievements in general education) and the labor market and builds also on participation by firms. It also helps building a more specific human capital than that provided by general education. The borders between the two components are continuously shifting and scholars and policy-makers frequently question their existence, meaning the separateness of general and vocational education. This applies also to Latin America, where vocational education has been traditionally neglected in favor of general education, but is presently asked to play a more active role in the absorption of unemployment and growth of the economy.

Improving education requires crucial, strategic choices, concerning, for example, the level of schools where to concentrate effort. A huge societal effort is needed to increase resources dedicated to education and this involves all levels of government and all sectors of the society and all stakeholders including, first of all, families.

This is shown by the experiences of Korea, Japan, Singapore and Taiwan. These countries show the highest student scores in the world along with acceptable levels of equality. They have strongly emphasized primary education as a beginning, and have built a strong commitment to improve education on behalf of the whole society. They have also a fairly high level of public and private expenditure, and show a huge direct involvement of families.

Decentralization is widely credited to be a crucial component of an improving education national strategy. In its broad meaning it implies reallocating decision-making power and resources to lower levels of government and also to schools. Major overhauls of the incentive structures of all stakeholders, including schools and teachers, are needed and can be reached following different strategies, going from devolution of power to subnational governments to school-based management.

At the same time, decentralization of education, when not properly structured, can simply shift the same old problems to levels of government that are less capable of resolving them. Similarly, decentralization of education finance—that is, increased reliance on more local and parental financial contributions—can end up reinforcing preexisting inequities.

Given the complexity of the issues involved and the variety of strategies available, indications from actual experiences are extremely important. Empirical analysis of the reform strategies becomes crucial. At the same time, this assessment, particularly in the case of international comparisons, is constrained by analytical problems and information constraints about the effective outcomes of education.

Happily, the huge work done at the OECD, in the last two decades, with the PISA scores provides an enormous quantity of information on education attainments and in particular on student scores. These scores measure responses to a set of questions asked to students of similar age and provide information allowing comparisons between and inside countries, including personal levels. Student scores show effective outcomes of the learning process and provide a better measure of educational attainments than other frequently used indicators, such as attendance rates, rates of repetition, or length of stay in school.

It is a trivality to say that simply sitting on a school bench, however protracted, does not imply automatic learning. Also, OECD provides not only national and regional average of student scores, but also information on their distribution inside countries, allowing analysis of different types of inequality.

Analytical issues include the singling out of a (or a few) goal of education policies, including decentralization. These goals could, however, also be non-coincident with the goals pursued by individual governments. This can also be the case of Latin America. In turn, information about outcomes of education has to be available and comparable among countries and individuals and inside countries, allowing analysis of its impact on personal and territorial equity. Even more complex and problematic is to give adequate consideration to all the factors that, in addition to decentralization, can impact on outcomes. These factors include the policies conducted at the same time by other levels of government and agencies. This latter problem is referred to in the literature as the “concomitant reform problem”.

With all these opportunities, problems and limitations in view, the aim of the present paper is to elaborate a methodological approach to the comparative analysis of decentralized systems and of decentralization processes applicable in American Latin countries with a view also to extracting valid suggestions for reform. Given the exploratory character of the paper, it is focused selectively on a small number of issues. They are: a) the selection of proper variables for measuring education outcomes and the success of educational policies; b) the meaning of decentralization and its measurement; c) concomitant reform; d) the links between general and vocational education and the possibility of expanding the role of the latter.

To test its analytical validity and its feasibility in terms of information the proposed approach is applied to the case of Mexico. The emphasis is on the impact of education on territorial and personal disparities in outcomes policies and resources. Given the small number of observations at the territorial level (there are 32 states in Mexico) and information constraints, the statistical analysis performed here will make use of simple indicators. Obviously, reference to a sample of countries, rather to a single one, would allow more sophisticated analysis, but the present availability of data for Latin American and the Caribbean countries does not yet allow it.



## I. Analytical issues

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### A. Outcomes of education

In very general terms, a simple production model can represent the education process, where schooling outcomes are determined by a large number of diversified inputs.

In a comparative analysis, both between and within countries, it is useful to regroup inputs into a few categories. Analysis of their single impact (i.e. *ceteris paribus*) and of the interactions between them allows to extract a better insight on issues and to reach meaningful policy considerations.

The output of the educational process —scores achieved by individual students— is directly although in complex ways related, first, to inputs that are controlled by policymakers. This is the case of the characteristics of schools, such as class sizes, school facilities and their location, quality and number of teachers, and quality and content of curricula. To a large extent these characteristics are dependent on financial resources. They are dependent, to an even larger extent, on regulation, meaning the legal and institutional framework. The second category of inputs, the institutional/regulatory context, determines the incentives guiding the behavior of teachers, principals, other personnel and officials involved. Here, institutional arrangements, such as devolution or school-based management, are meant to be crucial in creating the proper incentive structure.

The third category of inputs refers to the users of education and includes characteristics of families, such as parental education, income, social status, family size, student health conditions and motivations.

The impact of these inputs on outcomes can be strengthened by public policies improving incentives and/or altering the context in which families and students operate. The growing awareness of the importance of these inputs is demonstrated by the increasing public intervention aimed at correcting the negative impact of characteristics of family on student achievement. Allocations to poor families, such as Conditional Cash Transfers (CCTs), have an impact, although not necessarily on the positive side, as argued in a short while. Scholarships, a more traditional instrument, may increase motivation of families. Many of these policies do not emanate from education authorities, some of them are targeted to non-education goals, but they can impact substantially on education. They are usually referred to in the literature as the concomitant reform.

An equation of the following kind summarizes the production process:

$$EO = S (FR, I, Z, CR) \varepsilon, \quad (1)$$

Where: EO means effective outcomes, FR are financial resources, I depict the institutional/regulatory context, Z describes the family/individual context, CR is concomitant reform, and  $\varepsilon$  is an estimation error. All dependent and independent variables can be single, or vectors of, variables. Moreover, some elements of vectors FR, I, Z and CR are endogenous variables, requiring the solution of a system of equations.

Historically, the most frequently employed measure of schooling outcomes has been attainment, or simply years of schooling completed. This is a rough measure of individual skills, whose impact on labor market outcomes has been the object of a number of studies (summarized by Hanushek, 2008). However, there are problems with this type of indicators of education outcomes, since they assume that the same number of years of staying in schools produces everywhere the same amount of human capital, or skills. In other words, these indicators do not consider the process of learning and its results.

More recently, the attention has turned to cognitive achievement, as measured by the OECD sponsored PISA program<sup>1</sup> student scores. Student scores are now available for most Latin American countries as refers to the national level. For some countries, notably Mexico, scores are also available at the regional level. Countries, such as Colombia, have started the collection of similar data with their own programs (Saber)<sup>2</sup>, or with joint initiatives at the national and international level as in the case of SERCE and TERCE.<sup>3</sup>

Recent literature shows that differences in achievement impact on access and success in the labor market, on personal income and, consequently, on national or regional growth rates. For example, Lazear, 2003; Mulligan, 1999; Murnane et al., 2000 demonstrate that quality differences in schools have a dramatic impact on productivity and national growth rates.

The production function is a tool for checking the impact on outcomes of policies and of changes in other inputs. If, for example, the goal is to assess the impact of decentralization, the analyst has to keep all other inputs constant and vary the variable measuring decentralization and then observe the results on outcomes. Defining the variable measuring decentralization becomes crucial.

## B. The meaning and effectiveness of decentralization

This paper considers decentralization as the transfer of decision-making authority from higher level to lower level governments and to autonomous bodies. The focus is on decision-making power and not necessarily on transfer from higher to lower levels of government of resources to spend, or to collect, as normally implied by the literature on (particularly fiscal) decentralization (see Ahmad Brosio and Tanzi, 2008).

Recognition that this shift in decision-making power is essential to decentralization is crucial for identifying and using proper indicators of decentralization (see Behrman Deolalkar Lee-Ying Soon, 2002; Brosio, 2014). For example, a simple reassignment of health expenditure from the central to regional budgets does not imply per se an increase in the degree of decentralization, if it is not accompanied by the transfer of some decision-making power relating to this expenditure to subnational levels.

If tied transfers finance the reassignment, regional budgets would show a higher amount of expenditure, but because regions have to follow centrally set instructions for the use of these resources, no decentralization takes place. Regions would act simply as hierarchical subordinated agents of the central government. Similarly, the devolution of the responsibility of paying teachers' salaries—which the literature usually considers an example of fiscal decentralization, because it shifts expenditure from a higher to a lower level of government—cannot be considered a manifestation of education decentralization, no matter the size of the amounts involved,

<sup>1</sup> PISA evaluates how students of 15 years of age, concluding their basic compulsory education, did effectively acquire the knowledge and the skills enabling them to fully participate in a modern society. Valuation is focused on three topics: science, reading and mathematics. It also aims at evaluating whether students have acquired the ability to apply what they have learnt to unforeseeable and unknown circumstances inside and outside the schooling system. This is a reflection of the fact that modern economies reward individuals not on the basis on what they know, but rather on the basis on what they can do with what they have learnt.

<sup>2</sup> <http://www.icfes.gov.co/estudiantes-y-padres/pruebas-saber-3-5-y-9-estudiantes>.

<sup>3</sup> See, for example, Unesco, 2008.

if hiring (and firing) of teachers, managing their career and the determination of their salary scales are still done at the central level.

Conversely, there can be real decentralization, when more decision-making power concerning the existing resources is devolved to regions, even if there is no change in the share of regional expenditure, or revenues. This situation poses a difficulty for empirical work, because the extent to which a spending assignment can be treated as a local responsibility depends on the financing arrangements, in particular whether tied transfers are involved.

The ample use in the literature of subnational expenditure and revenue shares as indicators of decentralization is due to the larger availability of this kind of data and to the difficulty of representing the distribution of decision-making power among levels of government.

An example of correct apprehension of the meaning of decentralization for analytical purposes is the work of Barankay and Lockwood (2007) on education in Switzerland, which is worth a short summary. The authors analyze the relationship between educational outcomes and decentralization. The main results they reach are, first, that it is possible to overcome problems associated with information constraints; and, second, that decentralization does, in fact, contribute to improve educational outcomes. In Switzerland the responsibility for education has always been cantonal, with the federal government engaged in the equalization of resources. In turn, Cantons can devolve some expenditure responsibilities to their local governments, and they effectively do so. It is thus possible to observe different degrees of decentralization in education between Cantons.

Educational outcomes in the study are measured by the number of 19-year-olds that pass the final exams (*Maturité*) to enter universities.<sup>4</sup> The share of education expenditure measures the index of decentralization by the local governments in each Canton over the sum of local and cantonal expenditure for education. In other words, the index shows the degree of education expenditure within each canton:

$$D_{ct} = \frac{LE_{ct}}{LE_{ct} - CE_{ct}}$$

where  $D_{ct}$  is the index of Canton  $c$  in year  $t$ ,  $LE_{ct}$  is the sum of education expenditure in all counties of canton  $c$  in year  $t$ , and  $CE_{ct}$  is education expenditure at the cantonal level in year  $t$ .

This is a purely fiscal variable, whose use, as we mentioned, entails the risk that it does not adequately represent the degree of effective autonomy of local governments. However Barankay and Lockwood overcome the difficulty by examining cantonal regulations in four crucial areas for education: 1) appointing teachers; 2) determining pay levels for teachers; 3) granting incentives to teachers; and 4) organizing the structure of schools. It emerges that decentralization of expenditure is closely associated with higher local decision-making power, especially for teachers' incentive pay. Since local government expenditure for education is mainly for teachers' salaries, when the number of teachers or the pay levels increase, the degree of decentralization also varies within cantons. Secondly, variation in expenditures for teachers' salaries is induced by changes in the size of the student population. If it increases, local government will have to provide more teachers, because cantons impose minimum class sizes. Also, changes in student numbers induce changes in the indicator of decentralization. Variations in outcomes can thus be meaningfully associated with changes in decentralization, if the number of students does not affect outcomes.

Finally, Barankay and Lockwood regress for 20 years (1982–2002) the *Maturité* results on their chosen index of fiscal decentralization after adding, which is the most important thing for our purposes, a number of variables that control use of inputs, cantons and year-fixed effects. Results show that educational attainment is positively and significantly related to the degree of decentralization. The absolute effect of education is also

<sup>4</sup> Some problems should be noted in applying this measure of outcome. Cantons are mostly responsible for upper-secondary education, whereas local governments are fully responsible for primary education. Their expenditure and policies are thus impacting minimally on *Maturité*. To partially account for this fact, Barankay and Lockwood (2006) relate results at *Maturité* to the degree of decentralization in the years when the concerned students were enrolled in primary schools, but clearly the main effect on *Maturité* derives from years spent in secondary education. Finally, there is no federal intervention in exams that could ensure uniformity of criteria.

substantial: if the decentralization index increases by 10 percent, the share of students obtaining the *Maturité* increases by 3.5 percent. Thus, Cantons seem to play an important role in ensuring effective outcomes.

If properly structured, decentralization can contribute to improve the outcomes of education by solving a number of important challenges, such as increased effectiveness of expenditure with lesser role of central bureaucracy; reduction of the role played by teachers unions (this is meant to be instrumental to reaching the preceding goal); fostering experimentation and quality; more targeted contribution of education to local development strategies; better adaptation of education to local preferences (also with the inclusion of local languages in curricula) and local development strategies, and control of the growth of public expenditure by engaging subnational governments and families in the financing.

Many of these goals have also been assigned to decentralized arrangements and to decentralization processes observed in Latin America.

In addition, devolution of responsibilities has to rely on own sources to improve accountability; it has also to be matched by massive equalization transfers. Otherwise, local governments in the poor areas would be forced to increase taxes and contributions from families and/or reduce the level of service provision. More vulnerable groups could be disadvantaged, imperiling both growth and equity.

And a fragmented provision of education, with missing coordination and with missing standards could impact negatively on national cohesion.

Decentralization can be, and in the practice is, pursued with different strategies among which we can distinguish two main alternatives (that, in turn, are not fully mutually exclusive). The first one is to rely on subnational governments devolving them increased responsibilities and appropriate funding and, particularly, more autonomous decision-making power in relevant areas. The second alternative, labeled school-based management strategy, consists in expanding the decision-making power of schools, through higher involvement of school principals, teachers and families. Both strategies have also been pursued with varying intensity and determination in Latin American countries.

### C. Concomitant reform

A host of policies targeted to different sectors and aims can impact also on education. Their identification and appraisal is referred to in the literature as the problem of concomitant reform. Concomitant reform is a frequent occurrence in Latin America and it happens when, for example, during a decentralization process the central government, or another level of government, implements a policy that intersects with, or contradicts, the working of decentralized arrangements. For example, the allocation of conditional cash central transfers, one of the most popular programs in LA, can impact on enrollment and school attendance rates, but its merits, or demerits, cannot be assigned to local governments.

These programs lay at the intersection of central and local policies: a central government policy, or a program is implemented in combination with a decentralization process. This can impact (positively or negatively) on the action of local governments. Hence, observed outcomes at the local level cannot be ascribed directly to local officials, putting in doubt the assessment of the merits of decentralization.

The basic premise of CCTs is that properly identified poor households receive a grant, as long as they meet certain conditions. The central government pays the grant, while the conditions usually refer to activities performed by local governments. *Progresá* in Mexico, later renamed *Oportunidades* and more recently as *Prospera*, set the way for such programs.<sup>5</sup> Whether a family receives aid depends on meeting specific requirements, such as ensuring children attend school and family members receive preventive health care. These conditions are expected to exert a positive impact on the action of local governments by increasing attendance in schools and health centers and increasing the pressure from families to get better local service delivery. However, things can turn out somewhat differently.

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<sup>5</sup> See for an introduction Dávila Lárraga 2016.



The Brazilian conditional cash transfer in education, *Bolsa Escola*, provides a telling example (De Janvry, Finan, and Sadoulet, 2007). When the program was fully centralized —*i.e.* the selection of beneficiaries was also done centrally— it had a strong impact in reducing student dropout during the school year, securing a 7.8 percentage points improvement in complete year attendance. However, educational scores increased by a mere 0.8 percentage points, because the transfer helped retain students from poor families, less able or less motivated to study, who might otherwise have dropped out of school. Neither result could be ascribed to the action of Brazilian local governments.

Moreover, higher school attendance helped increase the chances of reelection of incumbent mayors, who in fact had no merits to claim. The problem is that, conscious of the fact that reelection would be facilitated, incumbents reduced their efforts in other areas of administration under their responsibility, thus reducing the overall performance. As already mentioned, this produces a perverse incentive for local officials, inducing them to lower their efforts and reducing penalization of more slack. A similar impact has been observed for the Philippines, where the allocation of the conditional grants, a central government responsibility, impacts local politics by substantially increasing the probability of incumbent mayors to be reelected (Labonne, 2012), which can be quite harmful for local competition because it jeopardizes the incentive for elected officials to ensure good governance.

In Colombia a similar program, called *Más Familias en Acción*, promotes access to schools through transfers to families. Its impact on access to labor market via more schooling is considered to be positive.<sup>6</sup>

## D. Vocational education

Countries have actually adopted very different vocational schooling structures. There are basically two models. The first one, followed among other countries by the United States, stresses the central role of general education on the argument that specific skills become too quickly obsolete and that it is necessary to give people the general ability to adapt to new technologies. General education provides students with broad knowledge and basic skills in mathematics and communication and serves as the foundation for further learning and for example.

Consequently, vocational education as a separate track in secondary schools —referred to usually as Technical Education (TE)— is absent, or has been largely eliminated. In parallel, these countries rely on vocational education activities (VE) that develop specific job-related skills and prepare students to work in specific occupations with a focus on on-the-job training. These activities are usually of much shorter duration than Technical Education and show larger flexibility in adapting curricula to the needs of the economy.

The second model is the “dual system,” led traditionally by Germany’s, but also operating in many European and developing countries. In this system, extensive vocational education and training is provided at the secondary level of general education —sometimes with direct involvement of industry through apprenticeships.

The underlying rationale is that by concentrating on specific vocational skills, it is possible to improve the entry of workers into the economy and to make them productive at an earlier point.

The two models suggest differing perspectives about a possible trade-off between short-term and long-term costs and benefits for both individuals and the entire society. Basically, the skills generated by vocational education may facilitate the transition into the labor market but may later on become obsolete at a faster rate.

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<sup>6</sup> OCDE, 2015d Reviews of Labour Market and Social Policies: Colombia 2016, OECD, Publishing, París, <http://dx.doi.org/10.1787/9789264244825-en>.

**Table 1**  
**Importance of vocational education in Latin America and the Caribbean**

Country/ Institution	People of 14-25 years of age (1)	Participants to vocational formation activities	Participants to vocational formation activities as a percent of young population
Argentina - INET - MTEySS	6 894 780	450 638	6.54
Bolivia (Plurinational State of) - INFOCAL	2 067 981	61 395	2.97
Brazil - Sistema S	34 133 651	6 482 449	18.99
Chile - SENCE	2 736 506	880 315	32.17
Colombia - SENA	8 223 253	4 069 644	49.49
Costa Rica - INA	802 358	132 85	16.56
Cuba - MTSS	1 423 274	119 486	8.40
Ecuador - SETEC-SECAP	2 940 825	85 414	2.90
El Salvador - INSAFORP	1 241 042	322 534	25.99
Guatemala - INTECAP	3 447 554	351 292	10.19
Honduras - INFOP	1 744 420	205 744	11.79
Mexico - CONALEP, DGCFT	23 276 590	758 348	3.26
Panama - INADEH	665 232	63 074	9.48
Paraguay - SNPP	1 336 661	177 173	13.25
Peru - SENATI	5 586 997	510 852	9.14
Dominican Republic - INFOTEP	1 922 713	694 388	36.12
Uruguay - UTU, INEFOP	519 628	121 76	23.43

Source: International Labour Organization, 2017.

Also the Latin American and the Caribbean countries have the two systems of technical and vocational training (Biasco, 2010; ILO, 2017; BID, 2016). On the one hand, technical secondary education has always been associated with the Ministry of Education, and is conceived as a subsystem forming part of the secondary general education program, but which also offers technical qualifications in the different sectors and branches of production. In 2000, in the majority of Latin American and the Caribbean countries, the number of students attending technical secondary schools came to approximately 30% of the students in the region (Moura Castro, Carnoy, and Wolff, 2000). Figures updated in 2006 indicate that the proportion remains the same —Argentina: 25%; Mexico: 28%,<sup>7</sup> Uruguay: 23%; except in Chile (39%) and Brazil (32%), where figures are over 30%. The same pattern prevails nowadays, with possibly a higher incidence of technical secondary schools, following reforms processes started in many countries of the continent (see, for more detail, OIT, 2017).

Vocational Education is characterized by three distinctive elements: a) independence from the general education system; b) flexibility, establishing it as a non-formal system of education that generally does not provides access to general education; and c) tripartite government (the State, business and workers), although this is the result of an initiative from the State.

Since the turn of the last century most Latin American countries have started a process of gradual reform of their system of vocational education. Different national paths characterize this process. Some countries, such as Mexico, have tried to strengthen technical education in secondary schools, shifting its weight away from VE activities. They have also tried to establish closed ties with the business sector, also in technical education. Other countries, such as Brazil, have increased the separation between technical and vocational education, aiming at establishing a closer link between businesses and schools. Reform has been prompted by growing levels of

<sup>7</sup> The figure for Mexico has fairly increased in the recent years, as we will see later.

unemployment, stagnation of growth and recognition of the need to have a workforce better equipped to face competition at the global level.

Reform has brought a reevaluation of post-secondary technological education, attempts at increasing technological input in basic and middle level education. Reform has also been concomitant with the explosion of the offer of on the job training by firms operating in the private sector. Reform has also been affected, although not always with a positive impact, by the proliferation of government programs connected to the fight against poverty.

In terms of students involved in its activities vocational education plays no minor role in Latin America, as showed by table 1. In some countries the share of young people involved in vocational education reaches 40 percent. There is, however, a huge variation and in some countries, such as Ecuador and Bolivia, its role remains marginal.

Clearly, vocational education can potentially play a crucial role in Latin America, by providing particularly a more articulate supply of skills and formations, thus contributing to reduce the education/occupation mismatch, which is at the roots of the high unemployment rate. If vocational education wants to play a more significant role, more and deeper analysis is needed, but economists and other experts tend to traditionally neglect vocational education. This is partly due to its fragmented nature that makes it difficult to reach general conclusions and policy recommendations. Happily, things are changing and more attention is showing up. Data about PISA outcomes allow comparing general education and vocational education in terms of the quality of students' human capital they contribute to build. Interesting information comes from a recent study (Atinok, 2012) that compares pupils in the two main types of the education system (vocational and general) using the international achievement test of PISA, 2009. The study shows that students from vocational schools have, in most countries, significantly lower performances in mathematics, science and reading than pupils in general education schools. However, it appears that the characteristics of pupils between the two streams are significantly different, with pupils with high socio-economic status showing a higher enrolment rate in general education than pupils coming from families with low socio-economic status. If these findings can be generalized, they point to the need of increasing the amount of resources spent on vocational education to fill the gaps deriving from personal, or better family, conditions of the students.

Vocational education in most of the Latin American region is characterized by a substantial degree of centralization. While the provision of services, meaning the management of schools is done at the subnational levels, strategies and policy orientations are elaborated at the national level, also in federal and decentralized countries. This can be a limit to the capacity of vocational education to gather to the specific needs of distinct territories. Centralization is also supported by the financing system, with payroll taxes and transfers from the national budget representing the predominant source of revenue.



## II. Education in Mexico

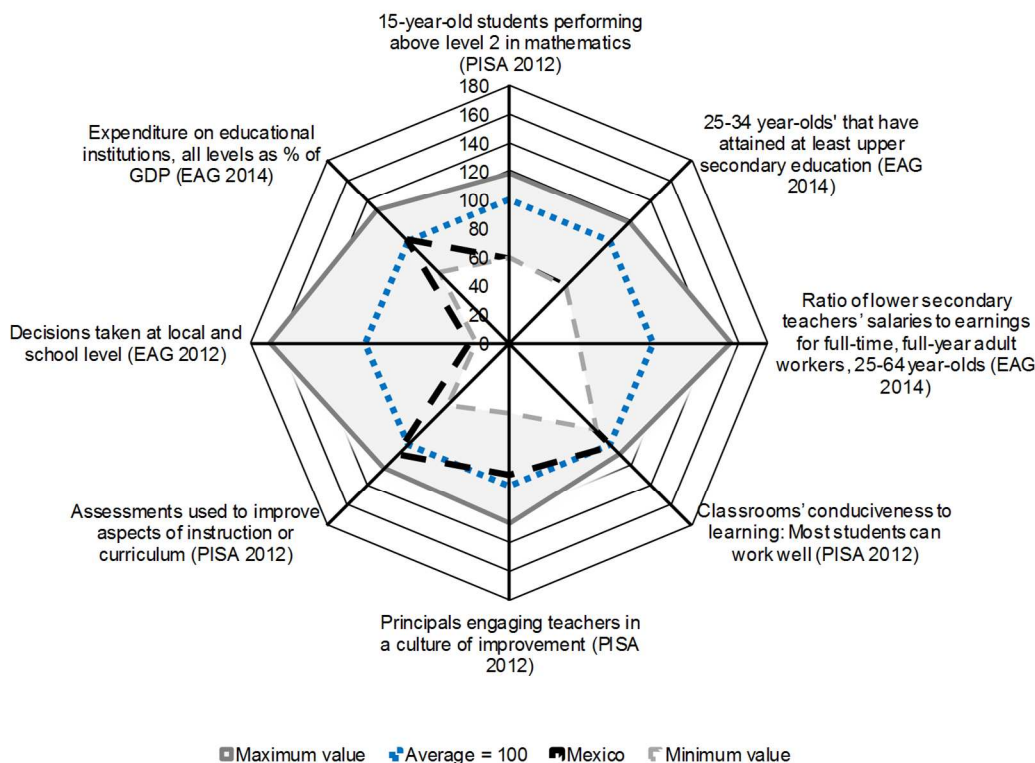
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### A. Essential features of the Mexican education system

According to Article 3 of the Constitution of Mexico, all individuals have the right to access to education. The state —Federation, States, Federal District and Municipalities— will provide pre-school, primary, secondary and tertiary education. Basic education is pre-school, primary and lower secondary, and is compulsory. The federal government is responsible for guaranteeing the quality of compulsory education ensuring that materials, curricula, organization, infrastructure, teachers and principals fit with the maximal achieving of students. Likewise, the Federal Government is responsible for the determination, in consultation with the States and other stakeholders, of curricula and programs of pre-school, primary, secondary and normal education for the whole country. All education provided by the state must to be free of charge. However, private provision of education is allowed, but the state is empowered to give accreditation to private schools. The Mexican Congress is responsible for the assignment of responsibilities in the social services area, including education, between Federation, States and Municipalities, and for the provision of economic resources.

The Mexican Education System presently attends 36,604,251 students in 257,425 schools with 2,064,775 teachers (Dirección General de Planeación, Programación y Estadística Educativa Secretaría de Educación Pública, 2018). In 2016/17 70,4 percent of students were enrolled in basic education, 13.9 per cent in secondary— and 10,3 percent in upper secondary and tertiary education. Vocational training (Capacitación para el trabajo, see later the section on vocational education) represented the remaining. 5.3 percent. In terms of teachers, 58.9% are employed in basic education implying large classes, 20.2 percent in secondary education, while the share for higher education and vocational training are 18.8 and 2.0 percent respectively. Eminently, basic education is public, while the importance of private schools increases when moving up on the educational scale. Also 83.8 percent of pre-school, 91 percent of primary and 87.3 percent of secondary establishments receive public financing, as can we see in following graph (figure 2).

**Figure 1**  
**Mexico: selected education indicators compared with the OECD average**



Source: OCDE Education Policy Outlook Snapshot: Mexico.

**Table 2**  
**Mexico: students at all levels of schools, 2016-2017**

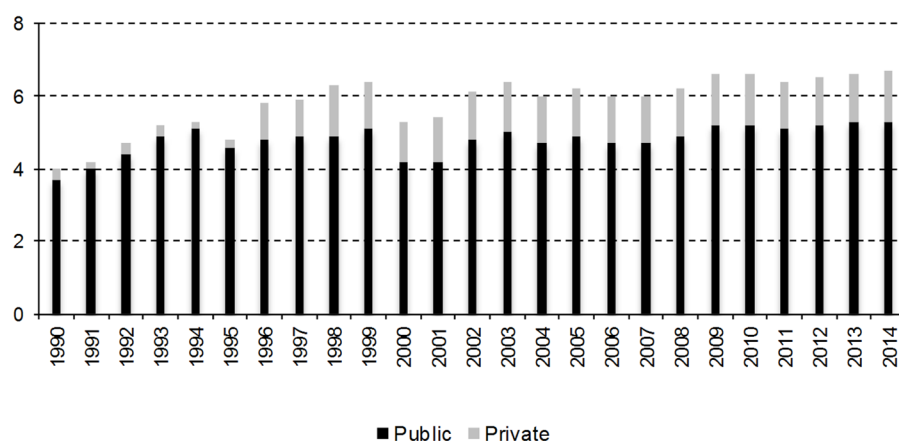
	Total	Males	Females	Teachers	Schools
Total education	36 604 251	18 315 247	18 289 004	2 064 775	257 425
Public	31 645 520	15 766 092	15 879 428	1 608 109	214 412
Private	4 958 731	2 549 155	2 409 576	456 666	43 013
Primary education	25 780 693	12 700 104	13 080 589	1 217 191	225 757
Public	23 172 402	11 413 943	11 758 459	1 049 073	196 96
Private	2 608 291	1 286 161	1 322 130	168 118	28 797
Secondary	5 128 518	2 585 376	2 543 142	417 745	20 718
Public	4 165 665	2 085 797	2 079 868	305 828	13 893
Private	962 853	499 579	463 274	111 917	6 825
Upper secondary/tertiary	3 762 679	1 864 102	1 898 577	388 31	5 311
Public	2 655 711	1 263 018	1 392 693	231 658	2 208
Private	1 106 968	601 084	505 884	156 652	3 103
Vocational training	1 932 361	1 165 665	766 696	41 529	5 639
Public	1 651 742	1 003 334	648 408	21 55	1 351
Private	280 619	162 331	118 288	19 979	4 288

Source: Dirección General de Planeación, Programación y Estadística Educativa Secretaría de Educación Pública, 2018.

In comparative terms, observable in figure 1, the education sector is not performing well with most indicators lying below, or at best aligned with, the OECD average.

A substantial education reform effort has been done by the administration of President Peña Nieto as part of an ambitious reform strategy regarding also energy, telecommunications, and taxation. Education reform seeks to increase the governability of the system through a mix of centralization and decentralization measures. The most important change refers to management of teachers, where deep problems had accumulated in the past decades leading to lower quality, high absenteeism, and clientelistic and nepotistic practices in recruitment. While individual schools will continue to be administered by the States, the federal government will take more responsibility for teacher certification, evaluation and salary decisions.

**Figure 2**  
**Mexico: national expenditure in education according origin of resources**  
(As percent of GDP)



Source: INEE, on the basis of *Anexo estadístico del Segundo Informe de Gobierno 2013-2014*, Presidencia de la República (2014); INEGI (National Accounts).

The reform introduces also school-based management. Schools will be given more autonomy managing of their own resources, definition of curriculums and utilization of teachers and staff. In other words, the federal government will use its authority to set and enforce broad standards of quality, particularly when it comes to teachers. But within that framework, the local schools will have greater latitude find creative ways to improve learning and student outcomes.

## B. Outcomes: global

Students scores in mathematics, science and reading available at the country level since 2003 to 2015 are the man variable used for comparing the country performance in education. Mexico's scores, reported in tables 3, 4, and 5 are below the OECD average. There is also some closing of the gap over the years, although gap closing appears to stall after 2012. The distance from OECD is now 15%. In Latin America Mexico scores lower than Chile and Uruguay, but better than the other countries. It is also notable that the ranking remains the same over the years.

**Table 3**  
**Student scores in mathematics: Mexico compared, 2003-2015**

	Mean score	Percent distance to OECD	Mean score	Percent distance to OECD	Mean score	Percent distance to OECD	Mean score	Percent distance to OECD
	2015		2012		2006		2003	
Singapore/Taipei/Korea	564	14.63	573	15.99	549	11.13	552	11.29
OECD average	490	-0.00	494	0.00	494	0.00	496	0.00
Chile	423	-14.02	423	-14.37	411	-16.80	n.a.	n.a.
Mexico	408	-17.07	413	-16.40	400	-19.03	382	-22.98
Costa Rica	400	-18.70	407	-17.61	n.a.	n.a.	n.a.	n.a.
Colombia	390	-20.73	376	-23.89	370	-25.10	n.a.	n.a.
Peru	387	-21.34	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Brazil	377	-23.37	391	-20.85	370	-25.10	350	-29.44
Dominican Republic	327	-33.39	n.a.	n.a.		-100.00	n.a.	n.a.
Uruguay	418	-15.04	409	-17.21	427	-13.56	412	-16.94
Argentina	n.a.	n.a.	388	-21.46	381	-22.87	n.a.	n.a.

Source: 2003 OCDE. Learning for Tomorrow's World. First Results from PISA 2003; 2006, Instituto Nacional para la Evaluación, PISA, 2006 en Mexico; 2012: OCDE, PISA 2012 Results. Vol.1; 2015: OCDE, PISA 2015 Results Excellence and Equity In Education. Volume I.

Explaining comparative performance among countries is not the aim on this study, however. Let's simply mention that Mexico spends for the schooling of its 6-15 years old pupils only 31% of OCDE average, while its GDP per capita is 44%. In other words, Mexico spends considerably less than OCDE countries, also in relative terms.

**Table 4**  
**Student scores in sciences: Mexico compared, 2003-2015**

	Mean score	Percent distance to OECD	Mean score	Percent distance to OECD	Mean score	Percent distance to OECD	Mean score	Percent distance to OECD
	2015		2012		2006		2003	
Singapore/Finland	556	12.8	551	10.0	563	13	548	9.6
OECD average	493	0.0	501	0.0	500	0	500	0
Chile	447	-9.3	445	-11.2	438	-12	-	-100
Mexico	416	-15.6	415	-17.2	410	-18	403	-19.4
Costa Rica	420	-14.8	429	-14.4	391	-22	-	-100
Colombia	416	-15.6	399	-20.4	388	-22	-	-100
Peru	397	-19.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Brazil	401	-18.7	405	-19.2	390	-22	390	-22
Dominican Republic	332	-32.7	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Uruguay	435	-11.8	416	-17.0	428	-14	438	-12.4
Argentina	n.a.	n.a.	406	-19.0	395	-21	n.a.	n.a.

Source: 2003 OCDE. Learning for Tomorrow's World. First Results from PISA 2003; 2006, Instituto Nacional para la Evaluación, PISA, 2006 en Mexico; 2012: OCDE, PISA 2012 Results. Vol.1; 2015: OCDE, PISA 2015 Results Excellence and Equity In Education. Volume I.

This does not imply, necessarily, that Mexican education is comparatively efficient. This is because, observing that gaps in student scores are less than 20 per cent, while gap in GDP is over 40 percent, does not allow saying that Mexico comparatively makes better use of its resources, since the relationship may not be strictly proportional.



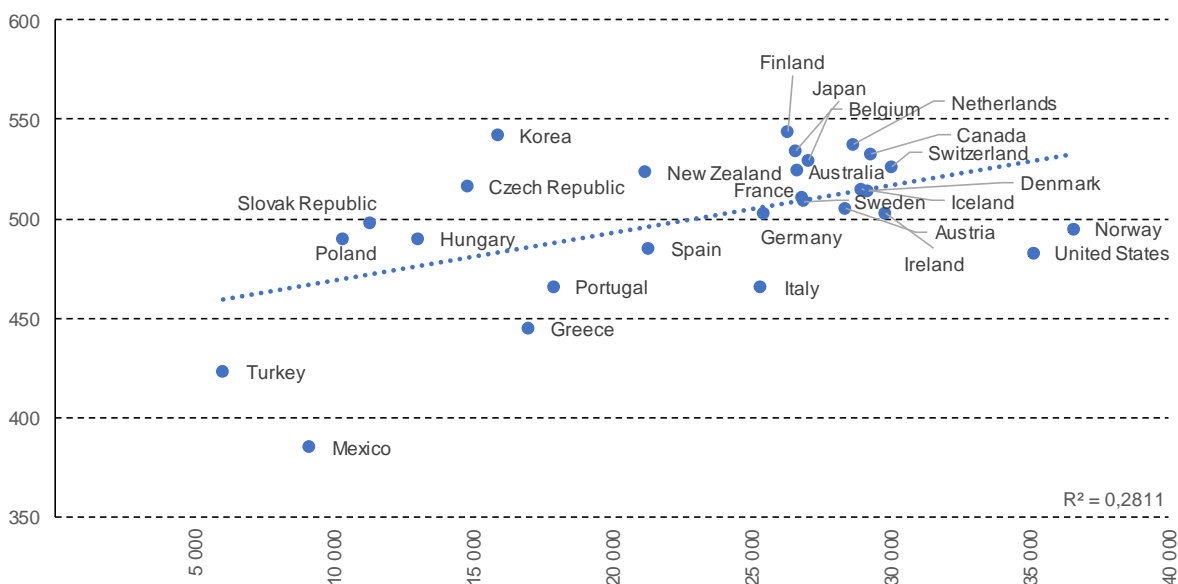
**Table 5**  
**Student scores in reading: Mexico compared, 2003-2015**

	Mean score	Percent distance to OECD	Mean score	Percent distance to OECD	Mean score	Percent distance to OECD	Mean score	Percent distance to OECD
	2015		2012		2006		2003	
Singapore/Singapore/ Korea/Finland	556	12.8	542	9.3	547	10.7	543	9.9
OECD average	493	0.0	496	0.0	494	0.0	494	0.0
Chile	459	-6.9	441	-11.1	442	-10.5	n.a.	n.a.
Mexico	423	-14.2	424	-14.5	410	-17.0	400	-19.0
Costa Rica	427	-13.4	441	-11.1	374	-24.3	n.a.	n.a.
Colombia	425	-13.8	403	-18.8	385	-22.1	n.a.	n.a.
Peru	396	-19.7	n.a.	n.a.		-100.0	n.a.	n.a.
Brazil	407	-17.4	410	-17.3	393	-20.4	403	-18.4
Dominican Republic	358	-27.4	n.a.	n.a.		-100.0	n.a.	n.a.
Uruguay	435	-11.8	411	-17.1	413	-16.4	434	-12.1
Argentina	n.a.	n.a.	396	-20.2	376	-23.9	n.a.	n.a.

Source: Dirección General de Planeación, Programación y Estadística Educativa Secretaría de Educación Pública, 2018.

Figure 3 illustrates the relationship between per capita GDP in PPPs and performance in mathematics in the OECD countries for 2003 and shows that Mexico is underperforming comparatively. Its scores are lower than that that would be allowed by its national income. Obviously, this is only a prima facie evaluation. Firmer results need more complete and accurate analysis taking into account other relevant factors.

**Figure 3**  
**Mexico: correlation between performance in mathematics and national income**  
*(GDP per capita in US dollars using PPPs)*



Source: OECD PISA, 2003, Dirección General de Planeación, Programación y Estadística Educativa Secretaría de Educación Pública, 2018.

## C. Outcome by states: the regional distribution

In general, we have to expect large disparities in the quality/quantity of private and public goods and services in countries with deep regional economic gaps. GDP is lower in the backward regions, because in general the productivity of factors is also lower. This applies to public services and, specifically, to education. This is also the case of Mexico, as shown by student scores by states in 2003 and 2012 (regional data is not available for 2015) reported in table 6 and summarized in table 7.

**Table 6**  
**Mexico: student scores by State, 2012 and 2003**

State	Mathematics	Science	Reading	Mathematics	Percentage share of 15 years old still in primary school or out of school	
	2012	2012	2003	2003	2012	2003
Aguascalientes	437	435	447	429	33.4	38.6
Baja California	415	417	428	384	33.6	34.9
Baja California Sur	414	418	423	378	19.1	26.7
Campeche	396	405	413	374	24.5	32.9
Coahuila	418	421	431	356	29.6	25.7
Colima	428	429	440	413	31.9	36.7
Chiapas	373	377	371	387	34.3	38.6
Chihuahua	429	429	444	443	20.9	31.3
Distrito Federal	428	427	448	435	17.2	30.6
Durango	424	423	436	369	30.5	30.6
Guanajuato	412	404	414	385	32.9	47.2
Guerrero	367	372	368	351	29.2	31.9
Hidalgo	406	411	414	392	18.9	30.5
Jalisco	435	436	436	420	45.1	46.4
Mexico	417	421	437	385	36.1	41
Morelos	421	425	425	390	23.4	29.6
Nayarit	414	407	418	383	17.2	29.6
Nuevo León	436	435	442	408	40.1	37.3
Puebla	415	423	423	376	26.8	35.7
Querétaro	434	432	451	409	29.3	37.9
Quintana Roo	411	416	430	390	41.3	26
San Luis Potosí	412	416	425	375	31.4	35.4
Sinaloa	411	408	417	398	17.9	32
Tabasco	378	391	395	335	17	23
Tamaulipas	411	414	421	402	35.2	32
Tlaxcala	411	412	418	355	28.2	33.1
Veracruz	402	401	410	357	24.7	29.8
Yucatán	410	415	426	387	28.7	27.8
Zacatecas	408	402	412	382	27.2	42.8
Nation	413	415	424	385	30.4	35.6

Source: For 2003, OCDE Learning for Tomorrow's World. First Results from PISA 2003; 2006, INEE, Pisa 2006 en Mexico; for 2012, INEE, PISA en Mexico, 2012.

Substantial regional disparities between scores appear. The Max/Min ratio is around 20 per cent, which is quite high. Also Range 2, i.e. the difference between the two highest scores and the two lowest ones weighed by the mean, is relatively high. A much higher variation shows up for the percentage share of 15 years old still in primary schools or out of schools, which is a more traditional, but still significant indicator of performance of the education system. Here the Max/Min ratio is 2.8 in 2012 and 2.0 in 2003.

**Table 7**  
**Mexico: summary statistics of student scores**

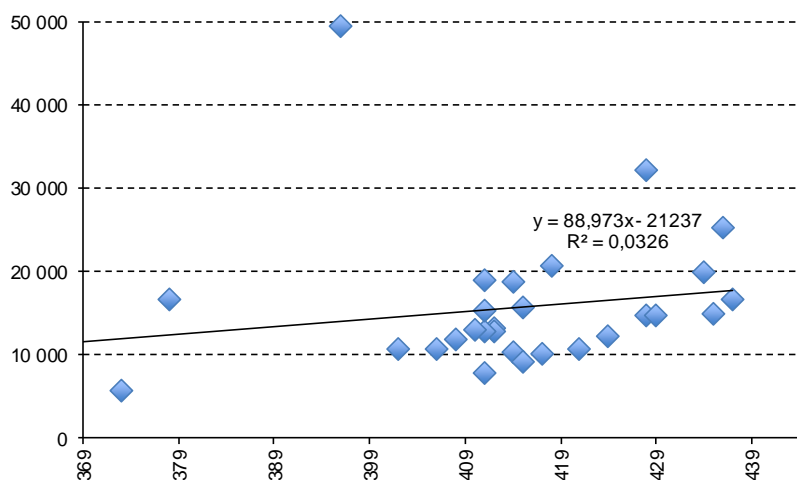
	Mathematics	Science	Reading	Mathematics
	2012		2003	
Max-Min	68	64	79	92
Max/Min	18.53	17.20	21.47	26.21
Range 2	0.42	0.52	0.63	0.89
Correlation Math with GDP	0.18	-	-	-
Correlation Science with GDP	-	0.25	-	-
Correlation Reading with GDP	-	-	0.31	19.8

Source: For education see Dirección General de Planeación, Programación y Estadística Educativa Secretaría de Educación Pública, 2018; for GDP, INEGI, PIB y Cuentas Nacionales.

There is also a net improvement over the years, meaning a narrowing of the gaps referred to student scores between the states. However, latest information by states stops in 2012 and, as observed above, there has been no further improvement of national scores from 2012 and 2015 that has likely been accompanied by a halt of the closing process of regional gaps.

As expected, and observable in figures 4 and 5. Student scores are positively correlated with per capita GDP reflecting the impact of economic conditions of families and areas.<sup>8</sup>

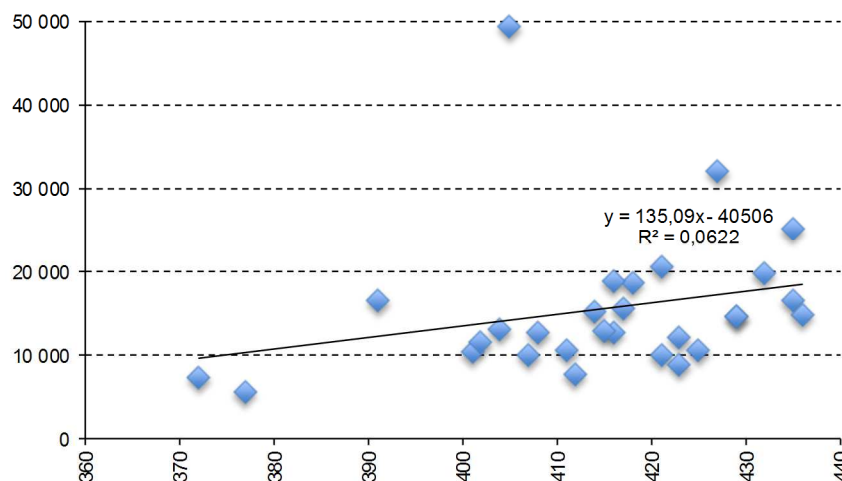
**Figure 4**  
**Mexico: relationship between maths scores and per capita GDP**



Source: For 2003, OCDE Learning for Tomorrow's World. First Results from PISA 2003; 2006, INEE, Pisa 2006 en Mexico; for 2012, INEE, PISA en Mexico, 2012.

<sup>8</sup> Correlation is higher when the main outlier, Campeche, is taken out, as observable in Figure 4b in the Annex. Campeche is an oil producing state and its very high per capita GDP does not necessarily reflect accurately the socio-economic conditions of families.

**Figure 5**  
**Mexico: relationship between science scores and percapita GDP**



Source: Author's elaboration. For 2003, OCDE Learning for Tomorrow's World. First Results from PISA 2003; 2006, INEE, Pisa 2006 en Mexico; for 2012, INEE, PISA en Mexico, 2012

Another important outcome indicator, reported in the columns at the right end of table 6 and summarized in table 8 below, also available from PISA results, is the percentage of 15 years old individuals, who are out of school or still in primary school, hence not participating to PISA program. Ideally, all 15 years old should take part to the evaluation, meaning that they schooled and did it without retardation. This is not the case in Mexico for one third, approximately, of the concerned population. At the national level the share of non-participating 15 years old is shrinking between the two years. Regional disparities remain wide with a Max/Min ratio reaching almost 2.5 times. This indicator reflects in part, represented by the number of 15 years old still in primary school, the existence of problems within schools; in part, represented by the number of 15 years old no more in schools, it reflects disparities of opportunities in regional labor markets. As it is to be expected in a country with wide regional disparities of income and employment opportunities, such as Mexico, the share of out of school or delayed students is inversely correlated to income (as shown in table 8). This means that, where employment opportunities exist, young people, especially those from poor families, leave school for the labor market. This impacts negatively on student outcomes, because of the lesser motivation of students who stay in school for lack of employment alternatives.

**Table 8**  
**Mexico: summary statistics of 15-year-old non-attending secondary schools**

	2012	2003
Max-Min	24.30	23.40
Max/Min	2.43	2.02
Range 2	3.36	2.22
Correlation 2012 with GDP	-0.07	-
Correlation 2003 with GDP	-	-0.12

Source: Author's elaborations. For 2003, OCDE Learning for Tomorrow's World. First Results from PISA 2003; 2006, INEE, Pisa 2006 en Mexico; for 2012, INEE, PISA en Mexico, 2012.

## D. Student scores, resources and regional efficiency

Lagging regions could fill their gap in education outcomes, either by being more efficient in the use of their resources, or by receiving additional support from the central government, allowing them to reach higher outcomes even with less efficiency, if the support is large enough. Lagging regions could also ask for more support from families and, in turn, provide more help to them. They could also generate more own revenues to finance education, or spend more revenue for education, after assessment of the opportunity costs.

The first two questions can be answered by observing the unit costs of student scores. If low scores are correlated with low unit costs, then it would be possible to increase scores by providing more funds to regions where low scores prevail. But if scores and unit costs are inversely correlated, funding could not help, unless a huge disbursement of funds is done.

**Table 9**  
**Mexico: unit cost of student scores by State, 2012**

State	Unit cost per mathematics score	Unit cost per science score	Unit cost per reading score
Aguascalientes	14.5	14.6	14.2
Baja California	11.8	11.7	11.4
Baja California Sur	20.9	20.7	20.5
Campeche	19.7	19.3	18.9
Coahuila	11.7	11.6	11.3
Colima	17.0	17.0	16.5
Chiapas	19.0	18.8	19.1
Chihuahua	11.9	11.9	11.5
Distrito Federal	12.6	12.6	12.0
Durango	15.9	15.9	15.4
Guanajuato	10.5	10.7	10.5
Guerrero	22.3	22.0	22.3
Hidalgo	17.3	17.0	16.9
Jalisco	8.9	8.9	8.9
Mexico	9.3	9.2	8.9
Morelos	13.0	12.8	12.8
Nayarit	16.7	17.0	16.5
Nuevo León	9.2	9.3	9.1
Puebla	11.6	11.4	11.4
Querétaro	11.5	11.5	11.1
Quintana Roo	14.3	14.1	13.6
San Luis Potosí	15.1	14.9	14.6
Sinaloa	13.1	13.2	12.9
Tabasco	14.2	13.7	13.6
Tamaulipas	13.4	13.3	13.0
Tlaxcala	16.2	16.2	15.9
Veracruz	14.0	14.0	13.7
Yucatán	12.5	12.4	12.0
Zacatecas	16.4	16.6	16.2
Nation	12.7	12.6	12.4

Source: 2012: OCDE, PISA 2012 Results. Vol.1.

We can approximate this cost by dividing student scores by the expenditure for education. More precisely, we use national specific transfers for education, now called FONE and which is part of the large category of sector specific funds called in Mexico Aportaciones. FONE represent almost 99% of total expenditure for this sector.<sup>9</sup> Unit cost figures are reported in table 9 and the information is summarized in table 10 and in figures 6 and 7.

A few observations apply. First, there is a huge variation in the size of unit costs. The highest value, 22.3 for Guerrero, is more than the double of the lowest one, 9,2 for Nuevo Leon (MAX/MIN is in fact 2.5, as in table 9), and dispersion is high, showing huge variation of efficiency in transforming financial resources in student scores.

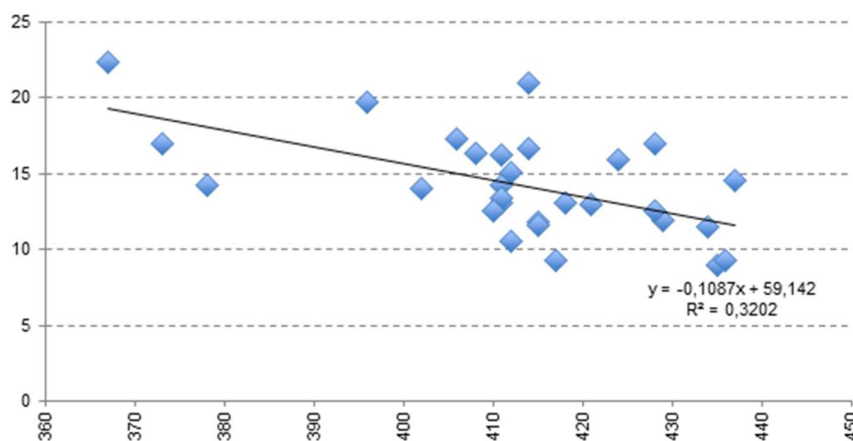
**Table 10**  
**Summary statistics of unit cost of scores**

Max-Min	13.40	13.10	13.40
Max/Min	2.50	2.47	2.50
Range 2	3.80	3.70	3.80

Source: 2012: OCDE, PISA 2012 Results. Vol.1.

Second, and more importantly, unit costs are inversely correlated with student scores, meaning that use of resources is less efficient in States with lower achievement in education. Since achievement in education is correlated with per capita GDP, this finding brings, in turn, evidence on the role of lower factor productivity of in backward regions.

**Figure 6**  
**Mexico: relationship between unit cost of student scores and scores, 2012**

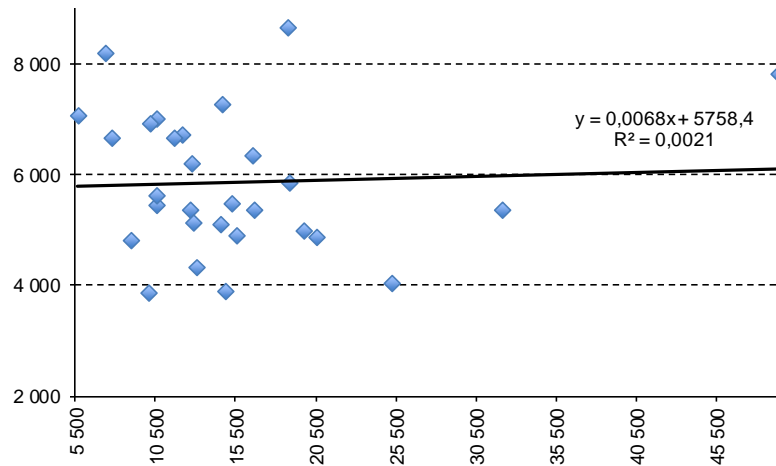


Source: Author's elaborations. For 2003, OCDE Learning for Tomorrow's World. First Results from PISA 2003; 2006, INEE, Pisa 2006 en Mexico; for 2012, INEE, PISA en Mexico, 2012

<sup>9</sup> Approximation derives from using all education expenditure and not only those corresponding to the cycle of schooling from the beginning up to 15 years.

Larger government support can contribute to fill the gaps in scores in presence of differentials of efficiency. This, however, does not seem to be the case of Mexico, where *Aportaciones* are directly, although not strongly, correlated with GDP (see figure 7).

**Figure 7**  
**Correlation between per capita GDP and aportaciones**



Source: Author's elaborations. For 2003, OCDE Learning for Tomorrow's World. First Results from PISA 2003; 2006, INEE, Pisa 2006 en Mexico; for 2012, INEE, PISA en Mexico, 2012, and on data from INEGI for *Aportaciones*.

## E. Student scores and personal equity

In addition to the average student scores per country and/or per region, Pisa results distinguish between six levels of proficiency (level 1 is the lowest one and corresponds to very basic proficiency, while level 6 is the highest one) and provide information about the percentage of students that reach these levels of proficiency.

This information, reported in table 11 and summarized in table 12, can be used to make guesses about the distribution of achievements. In particular, we focus in this paper on the percentage of students, who are not even able to reach level 1. In other words, we focus on the number of students who cannot reach even the lowest level of achievement. Focusing on them is somewhat equivalent to focus on extreme poverty in an analysis on the distribution of income, or of consumption.

As a matter of fact, the share of absolutely non-performing students is quite high, with the exception of reading, but also only in 2012, ranging between one third and one fifth of total number of students. Dispersion is also high, measured both on terms of Max/Min, and in terms of Range 1. It also to be noted that scores do not improve over the years observed in this analysis, showing the permanence of a high number of students with unsatisfactory performance that will diminish their chances to enter into the labor market.

It has to be expected that unsatisfactory performance is strongly correlated with the socio-economic conditions of regions. To check this proposition we perform two distinct correlation tests. The first one uses GDP, while the second one uses, for 2006, an indicator of marginalization, while for 2012 the analysis makes use of gross income of families estimated from the Encuesta de Hogares. Both marginalization and gross household income reflect better personal and family socio-economic conditions than GDP. For both variables and for both years the correlation is strong and negative, questioning the capacity of education policy in Mexico to overcome disparities in opportunities.

**Table 11**  
**Share of students with scores lower than level 1**

	2006			2012		
	Mathematics	Science	Reading	Mathematics	Science	Reading
Aguascalientes	16.8	8.3	11.2	13.9	8	1.5
Baja California	22.5	14.0	15.8	21.4	11.6	1.5
Baja California Sur	23.8	12.9	13.8	22.4	10.7	1.6
Campeche	35.2	19.5	22.4	29.6	15.6	2.5
Coahuila	20.9	8.6	13.6	20.6	11.5	1.1
Colima	21.2	11.5	14.8	18.1	10.5	1.5
Chiapas	47.6	35.4	39.0	42.4	28.0	9.1
Chihuahua	21.2	11.0	17.9	17.4	9.9	2.2
Distrito Federal	15.2	7.9	7.8	16.8	8.4	1.1
Durango	22.5	14.0	16.6	18.3	9.3	1.4
Guanajuato	29.1	18.4	20.1	24.2	16.5	3.6
Guerrero	43.9	25.7	30.7	46.9	27.9	9.2
Hidalgo	31.3	17.9	18.0	25.2	15.0	3.9
Jalisco	22.3	16.0	14.4	13.9	6.8	1.8
Mexico	26.3	16.1	18.8	18.1	8.2	1.0
Morelos	32.1	23.9	26.6	20.5	10.8	4.0
Nayarit	16.0	9.8	7.0	23.7	15.8	3.2
Nuevo León	33.9	20.6	24.5	14.7	6.8	1.2
Puebla	21.3	11.4	15.9	21.1	11.3	2.6
Querétaro	29.3	15.0	18.1	15.1	8.2	1.0
Quintana Roo	25.5	11.4	19.2	23.3	12.2	1.9
San Luis Potosí	31.2	22.2	29.0	25.9	12.5	2.8
Sinaloa	19.9	13.2	16.2	22.6	13.4	1.9
Tabasco	46.5	30.2	31.1	38.8	38.8	3.8
Tamaulipas	22.0	13.2	14.6	23.9	23.9	2.8
Tlaxcala	25.8	12.2	20.8	22.6	22.6	3.4
Veracruz	27.9	18.8	21.6	28.5	28.5	3.0
Yucatán	25.9	16.1	23.0	24.5	24.5	1.7
Zacatecas	22.7	16.5	19.5	23.7	23.7	3.1
National	28.4	18.1	20.3	22.8	22.8	2.6

Source: 2006, INEE, Pisa 2006 en Mexico; 2012: INEE, PISA en Mexico 2012.

**Table 12**  
**Summary statistics of scores lower than Level 1**

	2006		2012
Max/Min mathematics	3.13	Max/Min mathematics	3.05
Max/Min science	4.26	Max/Min science	4.61
Max/Min reading	5.57	Max/Min reading	8.36
Range 1 mathematics	1.11	Range 1 mathematics	1.45
Range 1 science	1.60	Range 1 science	0.95
Range 1 reading	1.67	Range 1 reading	3.12
Range 1 GDP	2.18	Range 1 GDP	3.65
Correl GDP mathematics	-0.60	Correl GDP mathematics	-0.19
Correl GDP science	-0.62	Correl GDP science	-0.27
Correl GDP reading	-0.69	Correl GDP reading	-0.40
Correl Marginalization maths	-0.86	Correl household gross income maths	-0.58
Correl Marginalization with science	-0.82	Correl household gross income science	-0.58
Correl Marginalization with reading	-0.86	Correl household gross income with reading	-0.67

Source: 2006, INEE, Pisa 2006 en Mexico; 2012: INEE, PISA en Mexico 2012.



## F. Index of decentralization: fiscal versus decision-making power

Expenditure for education was until January 2015 executed in Mexico by the states. As a matter of fact, education represents by far the largest area of expenditure for the states, distancing health and pensions. Since January 2015, payment of teachers' salaries, the main item of education expenditure, has been assigned to the federal government, although decisions about hiring and firing remain assigned (at least nominally, given the power of the purse resting with the federal government) with the states.

However, practically all education expenditure is financed by the federal government with a sector specific grant, now called FONE (Fondo de Aportaciones de Nomina Educativa y Gasto Operativo) that replaced FAEB (Fondo de Aportaciones para la Educacion Basica y Normal). FONE and also FAEB distinguish between the various sector categories of expenditure: personnel, other current, investment etc. leaving practically no autonomous decision-making power to the states, other than the possibility of adding their own resources. This is, however, taking place at a minimally appreciable level.

As a result, from a purely fiscal point of view the degree of (fiscal) decentralization in Mexico is open to debate and disagreement.

The index built by the OECD, reported for Mexico in table 12 and for a sample of Latin American countries including Mexico in table A. 2 in the Annex, allows to advance with this discussion and provides a useful starting point for understanding the allocation of tasks between levels of government and the various stakeholders. The index tries to single out the importance, calculated in percentage terms, of the decision-making power assigned to each of a set of five stakeholders with reference to four different areas of decision-making.

The five stakeholders are principals, teachers, school boards, subnational governments and the central government, while the areas of decision-making power are the following:

1. Curriculum and assessment, meaning defining curricula, choosing textbooks, determining which courses are offered and the content of those courses).
2. Resources, meaning authority to appointing and dismissing teachers, establishing teachers' starting salaries and salary raises, formulating school budgets and allocating them within the school.
3. Establishing student-assessment policies.
4. Approving students for admission to the schools. This area of decision-making impacts heavily on student choices and on incentives to stay in schools.

An interesting feature of the index is that it allows building a view on the weight that is given to the two alternative strategies for decentralization of education. To be more specific, an emphasis on the school-based management approach would emerge from high percentages of decision-making power assigned to principals, teachers and school boards. On the other hand, a traditional subnational government-based strategy of decentralization would emerge from a high percentage attributed to regional and local authorities.

The index is built by asking school principals and hence reflects closely their perceptions. Although principals are the closest and more comprehensive observers of school reality, their perceptions are strongly influenced by their role, giving the index an exploratory character. In view of the focus assigned in this paper to effective outcomes of education, the two first components are clearly the more interesting. Also, more disaggregated information about resources would be most useful and could be provided in a follow up of this report.

**Table 13**  
**Index of decentralization and autonomy in education applying to 2015**  
*(Mexico compared)*

	Principal	Teachers	School board	Local/Regional authority	National authority
Curriculum and assessment					
Mexico	3.8	18.9	10.9	24.3	42.1
Brazil	9.4	39.4	12.5	33.0	5.7
CABA (Argentina)	12.5	42.5	8.8	28.2	8.0
Chile	21.8	33.0	17.6	2.7	25.1
Colombia	21.0	40.0	27.0	5.4	6.7
Costa Rica	8.0	30.6	1.0	1.0	59.3
Dominican Republic	4.8	9.1	5.5	0.3	80.2
Peru	20.4	27.2	5.2	7.3	39.9
Uruguay	7.6	22.5	6.3	15.1	48.4
Trinidad and Tobago	24.7	35.4	4.4	1.3	34.2
OECD average	21.6	44.1	7.6	7.0	8.0
Resources					
Mexico	18.2	0.9	16.1	36.9	27.9
Brazil	14.0	0.6	12.0	65.5	7.9
CABA (Argentina)	23.3	0.2	20.9	46.4	9.2
Chile	34.3	1.4	37.2	19.0	8.2
Colombia	23.9	0.5	17.9	26.9	30.8
Costa Rica	16.7	2.3	18.8	1.8	60.4
Dominican Republic	18.0	1.2	23.1	0.0	57.7
Peru	31.9	3.4	14.9	21.8	27.9
Uruguay	10.0	1.6	12.6	3.3	72.5
Trinidad and Tobago	20.9	5.7	10.6	1.7	61.1
OECD average	39.0	2.5	12.3	23.1	23.1
Establishing student assessment policies					
Mexico	10.4	30.0	25.9	19.9	13.8
Brazil	13.0	20.4	31.3	31.6	3.7
CABA (Argentina)	20.9	46.8	18.7	11.8	1.8
Chile	-	-	-	-	-
Colombia	12.9	18.4	61.0	1.7	6.0
Costa Rica	26.8	29.0	0.8	2.3	41.1
Dominican Republic	14.1	21.1	24.9	-	39.8
Peru	32.2	37.6	8.7	7.5	14.0
Uruguay	16.7	25.6	8.0	8.1	41.5
Trinidad and Tobago	32.0	31.9	7.3	4.7	24.1
OECD average	31.5	36.3	11.0	6.7	14.5
Approving students for admission to schools					
Mexico	30.8	5.1	22.9	26.4	14.9
Brazil	36.1	11.5	27.3	19.6	5.4
CABA (Argentina)	57.9	5.1	13.0	23.5	0.5
Chile	49.4	10.4	25.1	3.7	11.5
Colombia	45.4	5.6	37.9	9.0	2.0
Costa Rica	77.1	9.5	2.9	2.4	8.1
Dominican Republic	51.8	7.0	34.7	-	6.5
Peru	60.5	15.9	16.7	3.0	3.9
Uruguay	43.6	1.8	12.6	3.9	38.0
Trinidad and Tobago	29.1	1.4	9.3	22.3	37.8
OECD average	61.4	6.1	11.2	14.3	7.0

Source: OECD, PISA 2015.

Table 13 offers two ways for understanding the degree of decentralization of education in Mexico. The first one is to compare Mexico with OECD countries; the second one is to compare Mexico with the other Latin American countries sampled. On the first account, the Mexican system is quite centralized, particularly in the areas of curriculum, assessment and of resources. More specifically, in these areas the role of central government is expanded to the expenses of that of principals, teachers and school boards. On the second account, Mexico fares not very differently, although it appears that, on account of resources, the role of its subnational government seem to be lower than that observable in Latin America federations.

## **G. Concomitant reform**

This is a crucial issue for evaluating the impact of reforms, since it focuses on the origin of the policies that are impacting on outcomes, thus avoiding attributing to a policy the merits/demerits that have in the reality their origin in another policy. However, it is difficult to assess concomitant reform, particularly in the case of decentralization. In the case of education (but not only) social policies, such as CCTs mentioned before, can impact, or even determine, the outcomes of education. As in the case of any other policy, the correct assessment of the impact of decentralizing education would require the construction of two distinct samples. The first one is made up of cases, where the social policy has been implemented together with decentralization. These cases are then compared with those of the second sample, where the social policy has not been implemented.

There are two possibilities of conducting research. The first one is to refer to a single country, and compare local government units, where social policy has been implemented, with the remaining units, where the policy has not been implemented. Individual country analysis can, however, be unable to provide convincing evidence, because of the need of having sufficiently large number of cases to analyze.

The second alternative is cross-country analysis. It allows comparisons of countries with different levels of social policies and decentralization. It is possible to solve the problems deriving from insufficient availability of comparable information for a sufficient number of countries by using information at decentralized levels of government.

Limited information on Mexico does not allow a thorough examination of concomitant reform issues, despite their relevance. Mexico has been pioneering conditional cash transfers, providing financial support to families conditional to sending their children to school. This policy is expected to impact also on student scores, as the distribution of talent is not correlated with the socio-economic conditions of families, as we noted in the introduction. Mexico has also increased support to poor students by expanding the allocation of scholarships. This cannot be strictly considered a concomitant reform, because it applies to education. It is enacted, however, by the central government. Hence, we should expect that allocations for CCTs and scholarships (reported in table 14) should be associated with improved student achievements both in terms of scores than in share of 15 years old still in schools. This does not seem to be case, at least as it emerges from simple correlation analysis (reported in table 15). CCTs and scholarships are allocated with a clear redistributive intent. They do not impact, however, decisively on student achievements.

**Table 14**  
**Personal income, revenue from CCTs and scholarships and changes in education scores**

	Per capita gross personal Income	Income from CCTs (Oportunidade) and scholarships	2012/2003 percent change Maths score	2012/2006 percent change of share of 15 years still in schools
Aguascalientes	207 576	322	1.019	0.865
Baja California	240 971	230	1.081	0.963
Baja California Sur	245 125	424	1.095	0.715
Campeche	202 403	613	1.059	0.745
Chiapas	97 155	1227	0.964	0.889
Chihuahua	200 772	146	0.968	0.668
Ciudad de México	319 625	331	0.984	0.562
Coahuila de Zaragoza	287 908	186	1.174	1.152
Colima	214 499	496	1.036	0.869
Durango	159 731	622	1.149	0.997
Guanajuato	165 509	490	1.070	0.697
Guerrero	135 720	1134	1.046	0.915
Hidalgo	141 053	664	1.036	0.620
Jalisco	227 984	213	1.036	0.972
México	189 533	262	1.083	0.880
Morelos	170 763	535	1.079	0.791
Nayarit	194 538	323	1.081	0.581
Nuevo León	279 697	169	1.069	1.075
Puebla	150 678	753	1.104	0.751
Querétaro	219 433	377	1.061	0.773
Quintana Roo	228 892	649	1.054	1.588
San Luis Potosí	161 455	827	1.099	0.887
Sinaloa	212 947	645	1.033	0.559
Tabasco	169 518	697	1.128	0.739
Tamaulipas	207 417	448	1.022	1.100
Tlaxcala	148 162	584	1.158	0.852
Veracruz de Ignacio de la Llave	131 338	890	1.126	0.829
Yucatán	184 776	735	1.059	1.032
Zacatecas	152 749	812	1.068	0.636

Source: Author's elaborations, based on INEGI 2014, on date used for table 4.

**Table 15**  
**Correlation between income, revenue from CCTs and scholarships and changes in education scores**

Correlation of scholarships and CCT with maths scores 2012	Correlation household gross income with CCT and scholarships	Correlation of scholarships and CCT with change in maths scores	Correlation scholarships with change of 15 years out of school
-0.79	-0.76	-0.02	-0.02

Source: Author's elaborations, based on INEGI 2014, on date used for table 4.

## H. Vocational education

Despite the urgent needs of an adequate supply of vocational education, the Mexican vocational education system is relatively underdeveloped in Mexico with only slightly more than 3 per cent of the young population involved in it. Technical education is provided by secondary schools (Profesional Técnico), while vocational training (Capacitación para el Trabajo) is provided mostly by centers run by the General Directorate for Education of the Ministry of Education. The two components absorb, as reported in table 16, almost equal shares of pupils. In turn, students involved in vocational education are 11.5 percent of total students at all levels. The

share of teachers is substantially lower, 8.6 percent, but we have to distinguish between the two components. More precisely, while the shares on their respective totals is the same for technical education, the share of teachers on total teachers, 2.0 percent, is much smaller than the share of students, 5.7, implying that either classes are much bigger, or, and more likely, that courses are much shorter, allowing teachers to teach to a larger number of students over the year. This is typical of vocational training, since adaptation to work requires in many cases short periods of very specialized training.

**Table 16**  
**Vocational education in Mexico, 2016-2017**

	Students	Percent on total	Teachers	Percent on total	Schools	Percent on total
Technical education	1 820 794	5.0	101 035	4.9	4 711	1.8
Upper technical education	307 883	0.8	35 412	1.7	530	0.2
Vocational training	1 932 361	5.7	41 529	2.00	5 639	2.2
Private	1 651 742		21 55		1 351	
Public	280 619		19 979		4 288	
Total	36 604 251	11.5	2 064 775	8.6	257 425	4.2

Source: Dirección General de Planeación, Programación y Estadística Educativa Secretaría de Educación Pública 2018 Principales Cifras del Sistema Educativo Nacional. Mexico.

Focus of education reform in the most recent years, particularly under President Peña Nieto administration, has been on general education with the aim of improving the quality of service provision. Reform has centralized management of teachers and has introduced a system of valuation of their performance with the aim of increasing the quality of their services. The system is pretty centralized with also most of funding provided by the federal government, as Mexican states are almost completely deprived of tax capacity.

In the most recent years, since 2008, some reform has taken place following the German model. Rather than training in a traditional vocational institution for their chosen profession, pupils learn both theoretical vocational skills and “real world,” practical skills for actual work in corporate facilities.

The typical format of this dual vocational training in Mexico consists of three years of training, 75% of which is practical training in a company environment, and 25% theoretical. Students typically study hands-on skills and techniques, either in company facilities, or at multi-company learning centers, and study theory via distance-learning software and classes.



### III. Conclusions

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The paper has singled out the main steps and issues referred to the analysis of the impact of alternative institutional arrangements on education also, and especially, on a comparative basis. A few main topics have been analyzed: the selection of proper variables representing education achievements; the factors to consider when trying their explanation; the concept and measurement of decentralization, and the issue of concomitant reform.

Data on student achievement, such as that collected by PISA (by Saber in Colombia and or by SERCE for Argentina and other Latin American countries) provides a valuable and expanding information basis for assessing the state of education sector and for evaluating the impact of alternative policies.

Single country analysis of the impact of alternative institutional arrangements is constrained by the insufficient availability of data that limits the significance of statistical analysis. Comparative analysis at the national level is still constrained by the limited number of countries with comparable information. Panel analysis of a sub group of Latin American countries with information also at the subnational level would allow performing better statistical analysis and reaching more solid, broadly-based, conclusions and looks also increasingly feasible considering the growing effort exerted in the collection of this kind of information.

For illustration sake, the paper has used information referred to Mexico. Outcomes for Mexico show some closing of the gap vis à vis OECD countries, although there is a recent stall. At the territorial level, there are still very wide disparities between the States, meaning that equality of opportunities is not achieved, although some progress towards uniformity in average outcomes appears to take place. Allocation of sector grants operates very little redistribution in favor of the poorest States. Also those same States seem to have lower levels of efficiency in spending. Although this has to be expected, it contributes to make disparities wider. In particular, the permanence of huge numbers of students with very low achievement contributes to a large personal disparity also within states.

Typical indicators of fiscal decentralization are not very illustrative for Mexico, especially before 2015. Before this date most final expenditure for education was executed at the subnational level, although without autonomy. Looking at decentralization from the assignment of decision-making power point of view, as we have done in this paper, Mexico appears to be quite centralized.

A possible explanation of slow progress in Mexico may be that uniformity of rules and of procedures deriving from centralization does not provide enough incentives to principals and teachers and does not foster sufficient involvement in the process by families.

The paper has also paid attention to technical and vocational training. This is an important component of the education that is expected to play in the immediate a much effective role in Latin America, contributing to reducing the education-occupation mismatch that is particularly ample in most countries. A number of reforms have been conducted in the recent years, whose impact and direction has still to be verified. Possibly, also, but this is a mere guess that has to be checked with deeper analysis, vocational education systems are still too centralized. This may help financially and may have a convergence impact, but at the same time, it reduces the capacity of the system to adapt to the requests and to the peculiarities of the areas and of the business activities, where technical and vocational schools and centers are operating.



## Bibliography

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- Ahmad Ehtisham, Giorgio Brosio, Vito Tanzi (2008), Local Service Provision in Selected OECD Countries. DO Decentralized Operations Work Better? IMF Working Paper WP/08/67. Available at <https://www.imf.org/external/pubs/ft/wp/2008/wp0867.pdf>.
- Altinok Nadir (2012), General versus vocational education. Some new evidence from PISA Background Paper to the Education for All Global Monitoring Report.
- Banco Interamericano de Desarrollo (BID) (2016), Empleos para crecer. Verónica Alaimo, Mariano Bosch, David Kaplan, Carmen Pagés, Laura Ripani.
- Barankay Iwan, Ben Lockwood (2007), Decentralization and the Productive Efficiency of Government: Evidence from Swiss Cantons. *Journal of Public Economics*. Vol. 91 (5–6) June, 1197–1218.
- Behrman Jere, Anil B. Deolalkar, and Lee-Ying Soon (2002), Conceptual Issues in the Role of Educational Decentralization in Promoting Effective Schooling in Asian Developing Countries. ERD Working Paper Series No. 22. Manila: Asian Development Bank.
- Biasco Irma (2010), Trends In Technical and Vocational Education and Training in Latin America. In Claudia Jacinto (ed) Recent trends in technical education in Latin America. Unesco Paris.
- Brosio Giorgio (2014), Improving Service Delivery through Decentralization: A Challenge for Asia, ADB Economics Working Paper Series.
- CEPAL La hora de la igualdad: brechas por cerrar, caminos por abrir – Cepal (2010), [repositorio.cepal.org/bitstream/handle/11362/13309/S2010986\\_es.pdf](http://repositorio.cepal.org/bitstream/handle/11362/13309/S2010986_es.pdf).
- De Janvry Alain, Frederico Finan and Elisabeth Sadoulet (2007), Local Governance and Efficiency of Conditional Cash Transfers: Bolsa Escola in Brazil.
- Dirección General de Planeación, Programación y Estadística Educativa Secretaría de Educación Pública (2018), Principales Cifras del Sistema Educativo Nacional. Mexico.
- Hanushek Eric (2008), A Education production functions. *The New Palgrave Dictionary of Economics*, Second Edition, Edited by Steven N. Durlauf and Lawrence E. Blume.
- Guerrero Jaime Ramirez (2002), The financing of vocational training in Latin America and the Caribbean <http://hdl.voced.edu.au/10707/123691>.
- International Labour Organization (ILO), Cinterfor (2017), El futuro de la formación profesional en América Latina y el Caribe. Santiago de Chile.
- Labonne Julien (2012), The Local Electoral Impacts of Conditional Cash Transfers: Evidence from a Field Experiment. CSAE Working Paper.

- Laura G Dávila Lárraga (2016), *How Does Prospera Work? Best Practices in the Implementation of Conditional Cash Transfer Programs in Latin America and the Caribbean*. IBD Technical Paper.
- Lazear E P (2003), *Teacher incentives*. *Swedish Economic Policy Review* 10(3), 179–214.
- Levy Santiago (2008), *Good Intentions, Bad Outcomes: Social Policy, Informality, and Economic Growth in Mexico*. Brookings Institution Press.
- Moura Castro C Martin Carnoy, Laurence Wolff (2000), *Secondary schools and the transition to work in Latin America and the Caribbean*. BID. Washington DC.
- Mulligan, C.B. (1999), *Galton versus the human capital approach to inheritance*. *Journal of Political Economy* 107 (pt. 2), S184–S224.
- Murnane, R.J, Willett, J.B., Duhaldeborde, Y. and Tyler, J.H. (2000), *How important are the cognitive skills of teenagers in predicting subsequent earnings?* *Journal of Policy Analysis and Management* 19, 547–68.
- Unesco, Regional Bureau for Education in Latin America Latina and the Caribbean OREALC/UNESCO (2008), *Student achievement in Latin America and the Caribbean*.
- Unesco (2017), *La Enseñanza y Formación Técnico Profesional en América Latina y el Caribe. Una perspectiva regional hacia 2030*. Unesco. Santiago de Chile.

## **Annex**

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## Statistical annex

**Table A.1**  
**Mexico. Percentage of pupils who don't reach minimum proficiency levels in Pisa tests**  
 (Percents)

	Latin American and the Caribbean countries	OCDE
Mathematics	63	23
Reading	45	18
Science	50	23

Source: International Labour 2017.

**Table A.2**  
**Mexico: percentage of 15 years old individuals, who are out of school or still in primary school**

	2012	2003
Aguascalientes	33.4	38.6
Baja California	33.6	34.9
Baja California Sur	19.1	26.7
Campeche	24.5	32.9
Chiapas	29.6	25.7
Chihuahua	31.9	36.7
Coahuila	34.3	38.6
Colima	20.9	31.3
Distrito Federal	17.2	30.6
Durango	30.5	30.6
Guanajuato	32.9	47.2
Guerrero	29.2	31.9
Hidalgo	18.9	30.5
Jalisco	45.1	46.4
México	36.1	41.0
Morelos	23.4	29.6
Nayarit	17.2	29.6
Nuevo León	40.1	37.3
Puebla	26.8	35.7
Querétaro	29.3	37.9
Quintana Roo	41.3	26.0
San Luis Potosí	31.4	35.0
Sinaloa	17.9	32.0
Tabasco	17.0	23.0
Tamaulipas	35.2	32.0
Tlaxcala	28.2	33.1
Veracruz	24.7	29.8
Yucatán	28.7	27.8
Zacatecas	27.2	42.8
Nation	30.4	35.6

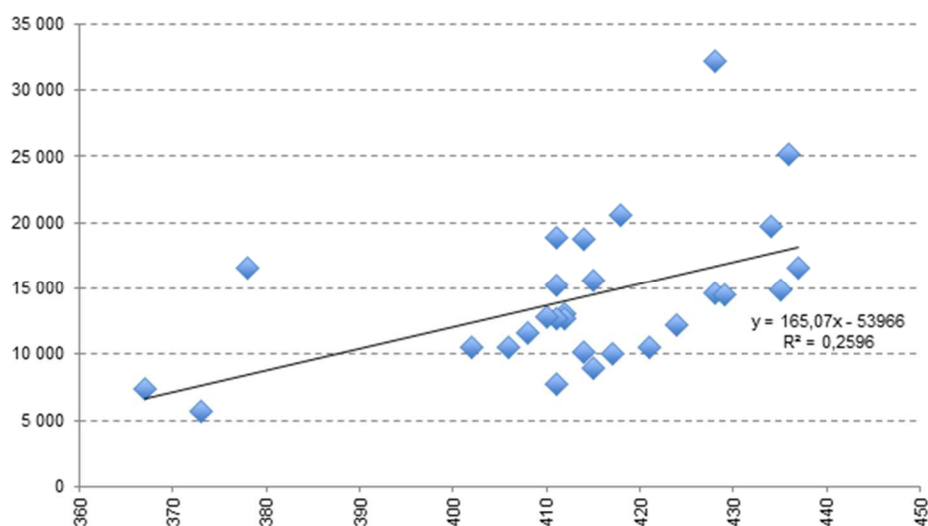
Source: INEE. Elaboración con datos del Marco de Muestreo para PISA 2012 y Proyecciones de la población de México 2005-2050, Conapo.

**Table A.3**  
**Mexico: index of school autonomy and decentralization**

	Principal	Teachers	School board	Local/regional authority	National authority	Principal + teachers	Local/regional + National
Curriculum and assessment							
Mexico	3.8	18.9	10.9	24.3	42.1	22.7	66.4
Resources							
Mexico	18.2	0.9	16.1	36.9	27.9	19.1	64.8
Establishing student assessment policies							
Mexico	10.4	30.0	25.9	19.9	13.8	40.4	54.2
Approving students for admission to the schools							
	30.8	5.1	22.9	26,4	14.9	35.9	50.8

Source: OECD, PISA 2015 Database.

**Figure A.1**  
**Relationship between maths scores and per capita GDP**  
(No outliers)



Source: Author's elaborations. For 2003, OCDE Learning for Tomorrow's World. First Results from PISA 2003; 2006, INEE, PISA 2006 en Mexico; for 2012, INEE, PISA en Mexico, 2012



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